



# Full wwPDB X-ray Structure Validation Report ⓘ

Aug 31, 2020 – 09:20 AM BST

PDB ID : 1CVL  
Title : CRYSTAL STRUCTURE OF BACTERIAL LIPASE FROM CHROMOBACTERIUM VISCOSUM ATCC 6918  
Authors : Lang, D.A.; Hofmann, B.; Haalck, L.; Hecht, H.-J.; Spener, F.; Schmid, R.D.; Schomburg, D.  
Deposited on : 1997-01-09  
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](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  
Xtriage (Phenix) : 1.13  
EDS : 2.13  
Percentile statistics : 20191225.v01 (using entries in the PDB archive December 25th 2019)  
Refmac : 5.8.0158  
CCP4 : 7.0.044 (Gargrove)  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.13

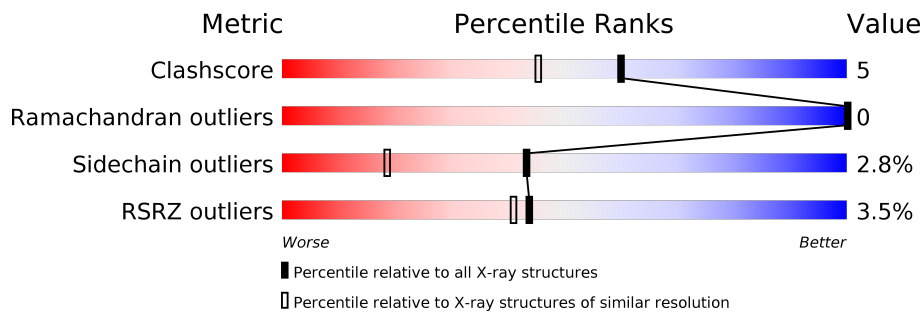
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

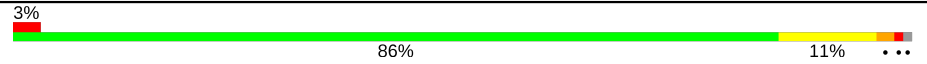
The reported resolution of this entry is 1.60 Å.

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))
Clashscore	141614	3665 (1.60-1.60)
Ramachandran outliers	138981	3564 (1.60-1.60)
Sidechain outliers	138945	3563 (1.60-1.60)
RSRZ outliers	127900	3321 (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  $\geq 3$ , 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  $\leq 5\%$ . 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	319	

## 2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 2546 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 TRIACYLGLYCEROL HYDROLASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	316	2315	1440	408	464	3	0	0	0

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

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	1	Total	Ca	0	0
			1	1		

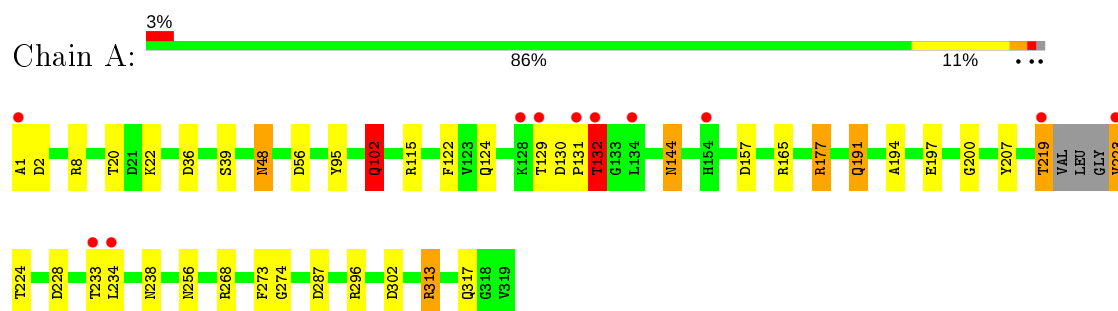
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	230	Total	O	0	0
			230	230		

### 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: TRIACYLGLYCEROL HYDROLASE



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	41.08Å 156.82Å 43.61Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	8.00 – 1.60 19.68 – 1.59	Depositor EDS
% Data completeness (in resolution range)	88.0 (8.00-1.60) 85.1 (19.68-1.59)	Depositor EDS
$R_{merge}$	0.05	Depositor
$R_{sym}$	0.05	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.84 (at 1.59Å)	Xtrriage
Refinement program	PROLSQ	Depositor
R, $R_{free}$	0.178 , (Not available) 0.162 , (Not available)	Depositor DCC
$R_{free}$ test set	No test flags present.	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	13.2	Xtrriage
Anisotropy	0.350	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.34 , 81.1	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.97	EDS
Total number of atoms	2546	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	17.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 8.43% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>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:  
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	1.19	3/2356 (0.1%)	1.82	45/3220 (1.4%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	223	VAL	N-CA	13.10	1.72	1.46
1	A	223	VAL	CA-C	5.92	1.68	1.52
1	A	273	PHE	CG-CD1	5.09	1.46	1.38

All (45) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	177	ARG	NE-CZ-NH1	27.49	134.04	120.30
1	A	115	ARG	NE-CZ-NH2	-24.64	107.98	120.30
1	A	115	ARG	NE-CZ-NH1	16.76	128.68	120.30
1	A	268	ARG	NE-CZ-NH2	-16.54	112.03	120.30
1	A	177	ARG	NE-CZ-NH2	-16.01	112.30	120.30
1	A	165	ARG	NE-CZ-NH2	-11.77	114.42	120.30
1	A	8	ARG	NE-CZ-NH2	-11.06	114.77	120.30
1	A	223	VAL	C-N-CA	-10.49	95.47	121.70
1	A	313	ARG	NE-CZ-NH1	10.45	125.53	120.30
1	A	268	ARG	NE-CZ-NH1	9.90	125.25	120.30
1	A	122	PHE	CB-CG-CD1	-8.60	114.78	120.80
1	A	223	VAL	CA-C-N	-8.59	98.30	117.20
1	A	177	ARG	CD-NE-CZ	8.30	135.22	123.60
1	A	56	ASP	CB-CG-OD1	8.14	125.63	118.30
1	A	313	ARG	NE-CZ-NH2	-8.13	116.24	120.30
1	A	287	ASP	CB-CG-OD1	-8.06	111.05	118.30
1	A	223	VAL	CB-CA-C	7.68	126.00	111.40
1	A	234	LEU	CA-CB-CG	7.66	132.91	115.30

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	8	ARG	CD-NE-CZ	-7.52	113.08	123.60
1	A	36	ASP	CB-CG-OD1	7.49	125.04	118.30
1	A	165	ARG	NE-CZ-NH1	7.40	124.00	120.30
1	A	302	ASP	CB-CG-OD1	7.11	124.70	118.30
1	A	2	ASP	CB-CG-OD1	7.04	124.64	118.30
1	A	207	TYR	CB-CG-CD1	-6.76	116.94	121.00
1	A	131	PRO	O-C-N	6.34	132.85	122.70
1	A	268	ARG	CG-CD-NE	-6.33	98.51	111.80
1	A	228	ASP	CB-CG-OD1	6.31	123.98	118.30
1	A	200	GLY	O-C-N	6.30	133.90	123.20
1	A	132	THR	CA-CB-CG2	6.27	121.18	112.40
1	A	144	ASN	CB-CG-OD1	-5.99	109.62	121.60
1	A	233	THR	O-C-N	5.72	131.86	122.70
1	A	22	LYS	CB-CA-C	-5.72	98.96	110.40
1	A	197	GLU	OE1-CD-OE2	5.69	130.13	123.30
1	A	234	LEU	CB-CA-C	5.66	120.95	110.20
1	A	296	ARG	NE-CZ-NH1	-5.60	117.50	120.30
1	A	224	THR	N-CA-CB	-5.55	99.76	110.30
1	A	223	VAL	O-C-N	5.53	131.55	122.70
1	A	115	ARG	CA-CB-CG	-5.25	101.85	113.40
1	A	177	ARG	NH1-CZ-NH2	-5.25	113.63	119.40
1	A	268	ARG	CD-NE-CZ	-5.23	116.28	123.60
1	A	191	GLN	CG-CD-OE1	5.14	131.89	121.60
1	A	22	LYS	N-CA-CB	5.07	119.73	110.60
1	A	95	TYR	CZ-CE2-CD2	-5.07	115.23	119.80
1	A	102	GLN	CG-CD-OE1	-5.03	111.53	121.60
1	A	157	ASP	CB-CG-OD1	5.03	122.83	118.30

There are no chirality outliers.

There are no planarity outliers.

## 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	2315	0	2266	21	0
2	A	1	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	A	230	0	0	4	2
All	All	2546	0	2266	21	2

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 5.

All (21) 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:223:VAL:CA	1:A:223:VAL:N	1.72	1.50
1:A:130:ASP:OD1	1:A:132:THR:HG23	1.38	1.21
1:A:130:ASP:OD1	1:A:132:THR:CG2	2.25	0.84
1:A:20:THR:HA	1:A:48:ASN:ND2	1.96	0.81
1:A:124:GLN:HB2	3:A:500:HOH:O	1.81	0.80
1:A:102:GLN:NE2	1:A:102:GLN:H	1.96	0.64
1:A:20:THR:HA	1:A:48:ASN:HD22	1.64	0.61
1:A:102:GLN:HE21	1:A:102:GLN:H	1.47	0.61
1:A:223:VAL:N	1:A:223:VAL:CB	2.59	0.60
1:A:130:ASP:C	1:A:132:THR:H	2.06	0.58
1:A:256:ASN:HB2	3:A:536:HOH:O	2.06	0.55
1:A:313:ARG:O	1:A:317:GLN:HG2	2.10	0.50
1:A:219:THR:HG23	1:A:219:THR:O	2.12	0.49
1:A:191:GLN:NE2	3:A:552:HOH:O	2.47	0.48
1:A:130:ASP:C	1:A:132:THR:N	2.68	0.47
1:A:194:ALA:O	1:A:274:GLY:HA2	2.14	0.47
1:A:223:VAL:N	1:A:223:VAL:C	2.64	0.45
1:A:191:GLN:CD	3:A:552:HOH:O	2.55	0.44
1:A:219:THR:CG2	1:A:219:THR:O	2.66	0.42
1:A:1:ALA:HA	1:A:39:SER:O	2.21	0.40
1:A:238:ASN:HA	1:A:238:ASN:HD22	1.70	0.40

All (2) 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)
3:A:542:HOH:O	3:A:618:HOH:O[1_556]	0.73	1.47
3:A:540:HOH:O	3:A:600:HOH:O[4_456]	1.98	0.22



## 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	312/319 (98%)	304 (97%)	8 (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	246/248 (99%)	239 (97%)	7 (3%)	43 18

All (7) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	48	ASN
1	A	102	GLN
1	A	129	THR
1	A	132	THR
1	A	144	ASN
1	A	177	ARG
1	A	219	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	48	ASN

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Mol	Chain	Res	Type
1	A	102	GLN
1	A	124	GLN
1	A	144	ASN
1	A	238	ASN

### 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 monosaccharides in this entry.

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

Of 1 ligands modelled in this entry, 1 is 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.

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 [i](#)

### 6.1 Protein, DNA and RNA chains [i](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	A	316/319 (99%)	-0.29	11 (3%) 44 41	6, 14, 31, 44	0

All (11) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	223	VAL	5.5
1	A	132	THR	5.2
1	A	134	LEU	4.0
1	A	233	THR	4.0
1	A	131	PRO	3.5
1	A	219	THR	3.5
1	A	154	HIS	3.1
1	A	129	THR	3.0
1	A	1	ALA	2.5
1	A	128	LYS	2.4
1	A	234	LEU	2.2

### 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 monosaccharides in this entry.

### 6.4 Ligands [i](#)

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. The B-factors column lists the minimum,

median, 95<sup>th</sup> 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	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
2	CA	A	320	1/1	0.93	0.15	2,2,2,2	0

## 6.5 Other polymers [i](#)

There are no such residues in this entry.