



# Full wwPDB X-ray Structure Validation Report ⓘ

Nov 20, 2017 – 10:53 PM EST

PDB ID : 1IMF  
Title : STRUCTURAL STUDIES OF METAL BINDING BY INOSITOL MONOPHOSPHATASE: EVIDENCE FOR TWO-METAL ION CATALYSIS  
Authors : Bone, R.  
Deposited on : unknown  
Resolution : 2.50 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

<http://wwpdb.org/validation/2016/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)	:	NOT EXECUTED
EDS	:	NOT EXECUTED
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	rb-20030345

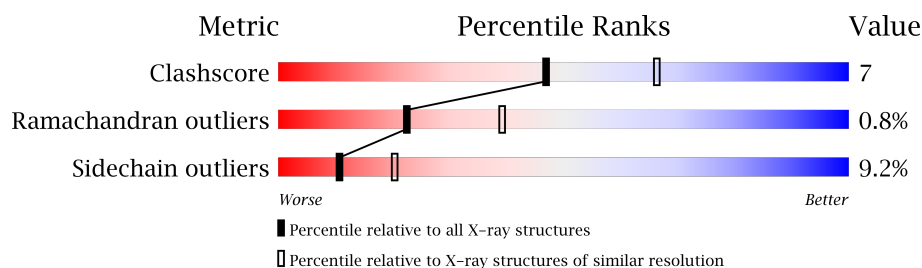
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.50 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	112137	4554 (2.50-2.50)
Ramachandran outliers	110173	4463 (2.50-2.50)
Sidechain outliers	110143	4465 (2.50-2.50)

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. 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.

Note EDS was not executed.

Mol	Chain	Length	Quality of chain
1	A	277	 <div style="display: flex; justify-content: space-around; width: 100%;"> <span>68%</span> <span>23%</span> <span>• • 5%</span> </div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 2043 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 INOSITOL MONOPHOSPHATASE.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	264	Total	C	N	O	S	36	0	2
			1998	1260	341	381	16			

- Molecule 2 is water.

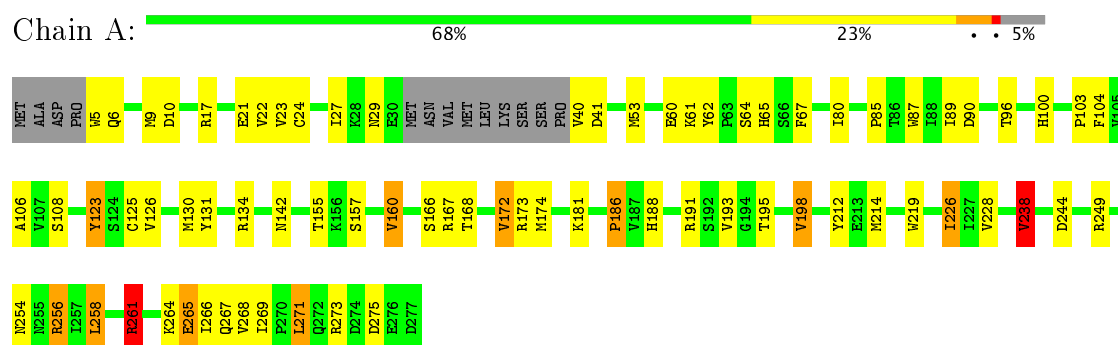
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
2	A	45	Total	O	0	0
			45	45		

### 3 Residue-property plots [i](#)

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 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.

Note EDS was not executed.

#### • Molecule 1: INOSITOL MONOPHOSPHATASE



## 4 Data and refinement statistics

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

Property	Value	Source
Space group	P 31 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	100.83Å 100.83Å 62.51Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	8.00 – 2.50	Depositor
% Data completeness (in resolution range)	(Not available) (8.00-2.50)	Depositor
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	(Not available)	Depositor
Refinement program	PROLSQ, X-PLOR	Depositor
R, $R_{free}$	0.177 , (Not available)	Depositor
Estimated twinning fraction	No twinning to report.	Xtriage
Total number of atoms	2043	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	36.0	wwPDB-VP

## 5 Model quality

### 5.1 Standard geometry

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	0.92	0/2029	1.62	28/2745 (1.0%)

There are no bond length outliers.

All (28) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	167	ARG	NE-CZ-NH2	-8.00	116.30	120.30
1	A	219	TRP	CD1-CG-CD2	7.67	112.43	106.30
1	A	268	VAL	CG1-CB-CG2	-7.60	98.74	110.90
1	A	167	ARG	NE-CZ-NH1	7.07	123.83	120.30
1	A	271	LEU	CA-CB-CG	7.06	131.53	115.30
1	A	172	VAL	CG1-CB-CG2	-6.75	100.11	110.90
1	A	5	TRP	CE2-CD2-CG	-6.61	102.01	107.30
1	A	5	TRP	CD1-CG-CD2	6.58	111.56	106.30
1	A	87	TRP	CD1-CG-CD2	6.56	111.55	106.30
1	A	87	TRP	CE2-CD2-CG	-6.53	102.08	107.30
1	A	219	TRP	CE2-CD2-CG	-6.47	102.12	107.30
1	A	244	ASP	CB-CG-OD1	6.40	124.06	118.30
1	A	160	VAL	CG1-CB-CG2	-6.35	100.75	110.90
1	A	212	TYR	CB-CG-CD1	-6.27	117.24	121.00
1	A	9	MET	CA-CB-CG	-6.05	103.01	113.30
1	A	64	SER	N-CA-CB	-6.04	101.44	110.50
1	A	125	CYS	CA-CB-SG	-5.86	103.45	114.00
1	A	198	VAL	CG1-CB-CG2	-5.80	101.61	110.90
1	A	5	TRP	CB-CG-CD1	-5.71	119.57	127.00
1	A	123	TYR	CB-CG-CD2	-5.56	117.66	121.00
1	A	131	TYR	CB-CG-CD1	-5.49	117.71	121.00
1	A	238	VAL	CA-CB-CG2	-5.24	103.04	110.90
1	A	228	VAL	CG1-CB-CG2	-5.21	102.57	110.90
1	A	126	VAL	CA-CB-CG1	-5.17	103.14	110.90
1	A	267	GLN	CA-CB-CG	-5.17	102.02	113.40
1	A	193	VAL	CA-CB-CG2	-5.10	103.25	110.90
1	A	261	ARG	CD-NE-CZ	-5.08	116.49	123.60

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	256	ARG	NE-CZ-NH1	5.05	122.83	120.30

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	1998	0	2009	28	0
2	A	45	0	0	2	0
All	All	2043	0	2009	28	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 7.

All (28) 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:226:ILE:O	1:A:226:ILE:HG13	2.04	0.57
1:A:254:ASN:OD1	1:A:258:LEU:HD22	2.05	0.56
1:A:23:VAL:O	1:A:27:ILE:HG13	2.06	0.55
1:A:22:VAL:HG21	1:A:53:MET:HE1	1.87	0.55
1:A:61:LYS:HE3	1:A:62:TYR:CZ	2.42	0.54
1:A:155:THR:HA	1:A:186:PRO:O	2.08	0.53
1:A:106:ALA:HA	1:A:123:TYR:O	2.10	0.51
1:A:214:MET:HG2	1:A:249:ARG:HB3	1.94	0.49
1:A:261:ARG:NH1	1:A:265:GLU:OE1	2.46	0.49
1:A:61:LYS:HE3	1:A:62:TYR:CE2	2.48	0.48
1:A:6:GLN:HG3	1:A:10:ASP:OD1	2.13	0.48
1:A:214:MET:HE3	1:A:269:ILE:HD12	1.96	0.48
1:A:17:ARG:O	1:A:21:GLU:HG3	2.14	0.47
1:A:96:THR:O	1:A:100:HIS:HD2	1.97	0.47
1:A:104:PHE:CD2	1:A:198:VAL:HG11	2.48	0.47
1:A:130:MET:H	1:A:142:ASN:ND2	2.13	0.47
1:A:65:HIS:CG	1:A:85:PRO:HB2	2.52	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:90:ASP:HB3	1:A:108:SER:HB3	2.00	0.44
1:A:238:VAL:HG22	1:A:266:ILE:HD11	2.01	0.43
1:A:181:LYS:HD2	2:A:294:HOH:O	2.19	0.43
1:A:168:THR:O	1:A:172:VAL:HG23	2.20	0.41
1:A:273:ARG:HE	1:A:275:ASP:HB2	1.86	0.41
1:A:22:VAL:HG21	1:A:53:MET:CE	2.50	0.41
1:A:174:MET:HE1	2:A:308:HOH:O	2.20	0.41
1:A:160:VAL:HG12	1:A:191:ARG:HB2	2.03	0.41
1:A:130:MET:HB3	1:A:142:ASN:ND2	2.36	0.40
1:A:61:LYS:HE3	1:A:62:TYR:OH	2.22	0.40
1:A:157:SER:O	1:A:188:HIS:HB2	2.22	0.40

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	260 / 277 (94%)	248 (95%)	10 (4%)	2 (1%)	22	39

All (2) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	29	ASN
1	A	103	PRO

### 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	217/231 (94%)	197 (91%)	20 (9%)	11	20

All (20) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	24	CYS
1	A	40	VAL
1	A	41	ASP
1	A	60	GLU
1	A	67	PHE
1	A	80	ILE
1	A	89	ILE
1	A	134	ARG
1	A	166	SER
1	A	173	ARG
1	A	186	PRO
1	A	195	THR
1	A	226	ILE
1	A	238	VAL
1	A	256	ARG
1	A	258	LEU
1	A	261	ARG
1	A	264	LYS
1	A	265	GLU
1	A	271	LEU

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (3) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	100	HIS
1	A	142	ASN
1	A	267	GLN

### 5.3.3 RNA ⓘ

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.