



# Full wwPDB X-ray Structure Validation Report ⓘ

Apr 10, 2014 – 08:21 AM EDT

PDB ID : 4L2W  
Title : Crystal structure of the Shroom-Binding domain of human Rock1  
Authors : Mohan, S.; VanDemark, A.P.  
Deposited on : 2013-06-04  
Resolution : 2.49 Å(reported)

This is a full wwPDB 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/ValidationPDFNotes.html>

---

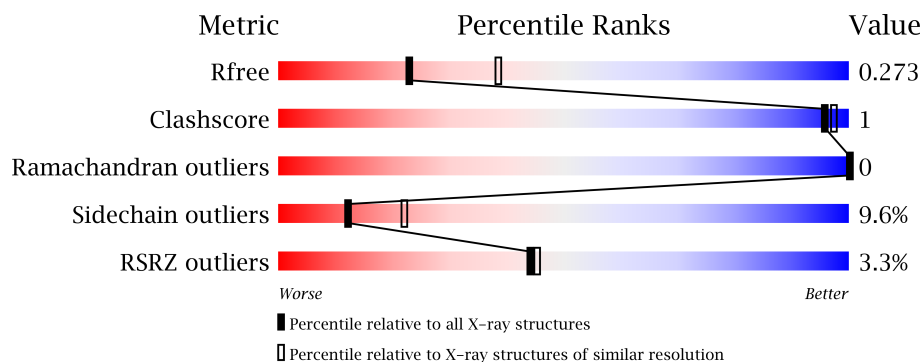
The following versions of software and data (see [references](#)) were used in the production of this report:

MolProbity : 4.02b-467  
Mogul : 1.15 2013  
Xtriage (Phenix) : dev-1439  
EDS : stable22978  
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) : stable22978

# 1 Overall quality at a glance

The reported resolution of this entry is 2.49 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	2784 (2.50-2.50)
Clashscore	79885	3562 (2.50-2.50)
Ramachandran outliers	78287	3480 (2.50-2.50)
Sidechain outliers	78261	3482 (2.50-2.50)
RSRZ outliers	66119	2785 (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. 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	87	
1	B	87	
1	C	87	
1	D	87	

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 4391 atoms, of which 2160 are hydrogens 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 Rho-associated protein kinase 1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	C	67	Total	C	H	N	O	S	0	0	0
			1100	340	549	92	118	1			
1	D	68	Total	C	H	N	O	S	0	0	0
			1093	340	538	93	121	1			
1	A	67	Total	C	H	N	O	S	0	0	0
			1082	336	535	92	118	1			
1	B	67	Total	C	H	N	O	S	0	0	0
			1089	340	538	92	118	1			

There are 36 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	828	GLY	-	EXPRESSION TAG	UNP Q13464
C	829	ILE	-	EXPRESSION TAG	UNP Q13464
C	830	ASP	-	EXPRESSION TAG	UNP Q13464
C	831	PRO	-	EXPRESSION TAG	UNP Q13464
C	832	PHE	-	EXPRESSION TAG	UNP Q13464
C	833	THR	-	EXPRESSION TAG	UNP Q13464
C	884	ALA	GLU	ENGINEERED MUTATION	UNP Q13464
C	885	ALA	LYS	ENGINEERED MUTATION	UNP Q13464
C	886	ALA	GLU	ENGINEERED MUTATION	UNP Q13464
D	828	GLY	-	EXPRESSION TAG	UNP Q13464
D	829	ILE	-	EXPRESSION TAG	UNP Q13464
D	830	ASP	-	EXPRESSION TAG	UNP Q13464
D	831	PRO	-	EXPRESSION TAG	UNP Q13464
D	832	PHE	-	EXPRESSION TAG	UNP Q13464
D	833	THR	-	EXPRESSION TAG	UNP Q13464
D	884	ALA	GLU	ENGINEERED MUTATION	UNP Q13464
D	885	ALA	LYS	ENGINEERED MUTATION	UNP Q13464
D	886	ALA	GLU	ENGINEERED MUTATION	UNP Q13464
A	828	GLY	-	EXPRESSION TAG	UNP Q13464
A	829	ILE	-	EXPRESSION TAG	UNP Q13464
A	830	ASP	-	EXPRESSION TAG	UNP Q13464

*Continued on next page...*

*Continued from previous page...*

Chain	Residue	Modelled	Actual	Comment	Reference
A	831	PRO	-	EXPRESSION TAG	UNP Q13464
A	832	PHE	-	EXPRESSION TAG	UNP Q13464
A	833	THR	-	EXPRESSION TAG	UNP Q13464
A	884	ALA	GLU	ENGINEERED MUTATION	UNP Q13464
A	885	ALA	LYS	ENGINEERED MUTATION	UNP Q13464
A	886	ALA	GLU	ENGINEERED MUTATION	UNP Q13464
B	828	GLY	-	EXPRESSION TAG	UNP Q13464
B	829	ILE	-	EXPRESSION TAG	UNP Q13464
B	830	ASP	-	EXPRESSION TAG	UNP Q13464
B	831	PRO	-	EXPRESSION TAG	UNP Q13464
B	832	PHE	-	EXPRESSION TAG	UNP Q13464
B	833	THR	-	EXPRESSION TAG	UNP Q13464
B	884	ALA	GLU	ENGINEERED MUTATION	UNP Q13464
B	885	ALA	LYS	ENGINEERED MUTATION	UNP Q13464
B	886	ALA	GLU	ENGINEERED MUTATION	UNP Q13464

- Molecule 2 is water.

Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	C	10	Total O 10 10	0	0
2	D	8	Total O 8 8	0	0
2	A	1	Total O 1 1	0	0
2	B	8	Total O 8 8	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: Rho-associated protein kinase 1

Chain C: 



- Molecule 1: Rho-associated protein kinase 1

Chain D: 



- Molecule 1: Rho-associated protein kinase 1

Chain A: 



- Molecule 1: Rho-associated protein kinase 1

Chain B: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	142.50Å 56.23Å 80.74Å 90.00° 119.14° 90.00°	Depositor
Resolution (Å)	38.31 – 2.49 38.31 – 2.49	Depositor EDS
% Data completeness (in resolution range)	80.0 (38.31-2.49) 80.0 (38.31-2.49)	Depositor EDS
$R_{merge}$	0.08	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.06 (at 2.48Å)	Xtriage
Refinement program	PHENIX (phenix.refine: 1.8.2_1309)	Depositor
R, $R_{free}$	0.236 , 0.276 0.229 , 0.273	Depositor DCC
$R_{free}$ test set	801 reflections (5.03%)	DCC
Wilson B-factor (Å <sup>2</sup> )	41.2	Xtriage
Anisotropy	0.098	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.38 , 47.2	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.35$	Xtriage
Outliers	0 of 15939 reflections	Xtriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	4391	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	66.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 9.78% of the height of the origin peak. No significant pseudotranslation is detected.*

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

## 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	0.34	0/549	0.45	0/734
1	B	0.35	0/553	0.48	0/740
1	C	0.35	0/553	0.50	0/740
1	D	0.36	0/557	0.49	0/745
All	All	0.35	0/2212	0.48	0/2959

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

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	547	535	0	2	0
1	B	551	538	0	3	0
1	C	551	549	0	2	0
1	D	555	538	0	1	0
2	A	1	0	0	0	0
2	B	8	0	0	0	0
2	C	10	0	0	0	0
2	D	8	0	0	0	0
All	All	2231	2160	0	5	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 1.

All (5) close contacts within the same asymmetric unit are listed below.

Atom-1	Atom-2	Distance(Å)	Clash(Å)
1:B:855:LEU:O	1:B:858:THR:OG1	2.32	0.46
1:A:870:LYS:NZ	1:B:871:ASN:OD1	2.50	0.45
1:A:842:LEU:HD11	1:B:842:LEU:HB3	2.00	0.44
1:C:887:THR:HG1	1:C:888:LEU:N	2.18	0.41
1:C:839:MET:HB3	1:D:839:MET:SD	2.60	0.41

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	65/87 (75%)	65 (100%)	0	0	100	100
1	B	65/87 (75%)	64 (98%)	1 (2%)	0	100	100
1	C	65/87 (75%)	63 (97%)	2 (3%)	0	100	100
1	D	66/87 (76%)	65 (98%)	1 (2%)	0	100	100
All	All	261/348 (75%)	257 (98%)	4 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 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	59/75 (79%)	51 (86%)	8 (14%)	5	10

*Continued on next page...*



*Continued from previous page...*

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	B	60/75 (80%)	56 (93%)	4 (7%)	23	40
1	C	60/75 (80%)	56 (93%)	4 (7%)	23	40
1	D	60/75 (80%)	53 (88%)	7 (12%)	8	14
All	All	239/300 (80%)	216 (90%)	23 (10%)	12	22

All (23) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	C	855	LEU
1	C	861	LYS
1	C	865	GLU
1	C	873	GLU
1	D	835	ASN
1	D	836	GLU
1	D	846	LEU
1	D	855	LEU
1	D	875	LEU
1	D	877	LYS
1	D	888	LEU
1	A	842	LEU
1	A	853	SER
1	A	855	LEU
1	A	870	LYS
1	A	875	LEU
1	A	881	LEU
1	A	888	LEU
1	A	890	THR
1	B	840	ARG
1	B	847	GLU
1	B	853	SER
1	B	870	LYS

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	D	845	GLN
1	D	850	GLN
1	D	882	GLN
1	A	879	GLN

### 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 ⓘ

There are no ligands in this entry.

### 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, 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	67/87 (77%)	0.45	3 (4%) 32 33	39, 62, 110, 130	0
1	B	67/87 (77%)	0.49	4 (5%) 21 21	44, 66, 92, 136	0
1	C	67/87 (77%)	0.27	1 (1%) 70 72	30, 48, 72, 87	0
1	D	68/87 (78%)	0.30	1 (1%) 70 72	34, 52, 89, 120	0
All	All	269/348 (77%)	0.37	9 (3%) 44 45	30, 58, 92, 136	0

All (9) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	837	GLY	3.2
1	B	875	LEU	2.7
1	A	902	GLU	2.4
1	B	842	LEU	2.4
1	B	867	ILE	2.1
1	C	878	ILE	2.1
1	A	838	GLN	2.1
1	D	836	GLU	2.0
1	B	860	VAL	2.0

### 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

There are no ligands in this entry.

## 6.5 Other polymers

There are no such residues in this entry.