wwPDB X-ray Structure Validation Summary Report (i)

Jan 25, 2018 – 11:14 AM EST

PDB ID	:	6EWX
Title	:	Structure of Pragmin pseudo-kinase reveals a dimerization mechanism to regulate protein tyrosine phosphorylation and nuclear transcription
Authors	:	Gelin, M.; Allemand, F.; Fournet, A.; Labesse, G.
Deposited on	:	2017-11-06
Resolution	:	2.77 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
A user guide is available at
http://wwpdb.org/validation/2016/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

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

|		
MolProbity	:	4.02b-467
Mogul	:	1.7.2 (RC1), CSD as538be (2017)
Xtriage (Phenix)	:	1.9-1692
EDS	:	rb-20030736
Percentile statistics	:	20161228.v01 (using entries in the PDB archive December 28th 2016)
Refmac	:	5.8.0135
CCP4	:	6.5.0
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	rb-20030736

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.77 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.
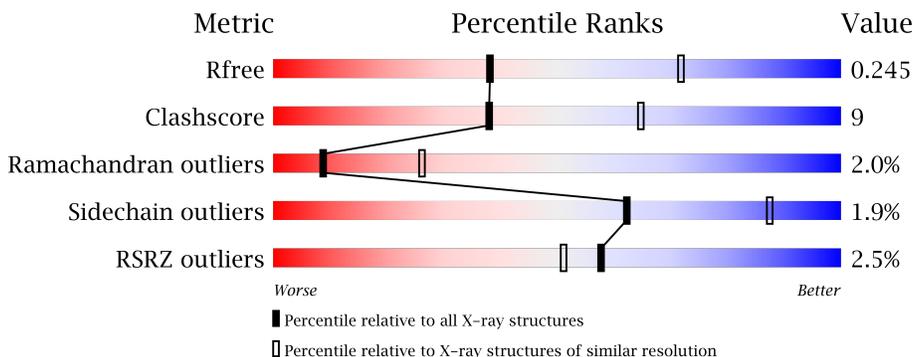
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	100719	3276 (2.80-2.76)
Clashscore	112137	3771 (2.80-2.76)
Ramachandran outliers	110173	3707 (2.80-2.76)
Sidechain outliers	110143	3709 (2.80-2.76)
RSRZ outliers	101464	3307 (2.80-2.76)

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. 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 <=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	484	2% 56% 17% • 26%
1	B	484	.% 59% 14% • 26%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 5705 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 PEAK1-related kinase-activating pseudokinase 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	359	Total 2853	C 1818	N 498	O 514	S 23	0	1	0
1	B	358	Total 2793	C 1780	N 475	O 513	S 25	0	5	0

There are 42 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	885	MET	-	initiating methionine	UNP D3ZMK9
A	886	GLY	-	expression tag	UNP D3ZMK9
A	887	SER	-	expression tag	UNP D3ZMK9
A	888	SER	-	expression tag	UNP D3ZMK9
A	889	HIS	-	expression tag	UNP D3ZMK9
A	890	HIS	-	expression tag	UNP D3ZMK9
A	891	HIS	-	expression tag	UNP D3ZMK9
A	892	HIS	-	expression tag	UNP D3ZMK9
A	893	HIS	-	expression tag	UNP D3ZMK9
A	894	HIS	-	expression tag	UNP D3ZMK9
A	895	SER	-	expression tag	UNP D3ZMK9
A	896	SER	-	expression tag	UNP D3ZMK9
A	897	GLY	-	expression tag	UNP D3ZMK9
A	898	LEU	-	expression tag	UNP D3ZMK9
A	899	VAL	-	expression tag	UNP D3ZMK9
A	900	PRO	-	expression tag	UNP D3ZMK9
A	901	ARG	-	expression tag	UNP D3ZMK9
A	902	GLY	-	expression tag	UNP D3ZMK9
A	903	SER	-	expression tag	UNP D3ZMK9
A	904	HIS	-	expression tag	UNP D3ZMK9
A	905	MET	-	expression tag	UNP D3ZMK9
B	885	MET	-	initiating methionine	UNP D3ZMK9
B	886	GLY	-	expression tag	UNP D3ZMK9
B	887	SER	-	expression tag	UNP D3ZMK9
B	888	SER	-	expression tag	UNP D3ZMK9

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Chain	Residue	Modelled	Actual	Comment	Reference
B	889	HIS	-	expression tag	UNP D3ZMK9
B	890	HIS	-	expression tag	UNP D3ZMK9
B	891	HIS	-	expression tag	UNP D3ZMK9
B	892	HIS	-	expression tag	UNP D3ZMK9
B	893	HIS	-	expression tag	UNP D3ZMK9
B	894	HIS	-	expression tag	UNP D3ZMK9
B	895	SER	-	expression tag	UNP D3ZMK9
B	896	SER	-	expression tag	UNP D3ZMK9
B	897	GLY	-	expression tag	UNP D3ZMK9
B	898	LEU	-	expression tag	UNP D3ZMK9
B	899	VAL	-	expression tag	UNP D3ZMK9
B	900	PRO	-	expression tag	UNP D3ZMK9
B	901	ARG	-	expression tag	UNP D3ZMK9
B	902	GLY	-	expression tag	UNP D3ZMK9
B	903	SER	-	expression tag	UNP D3ZMK9
B	904	HIS	-	expression tag	UNP D3ZMK9
B	905	MET	-	expression tag	UNP D3ZMK9

- Molecule 2 is SULFATE ION (three-letter code: SO4) (formula: O_4S).
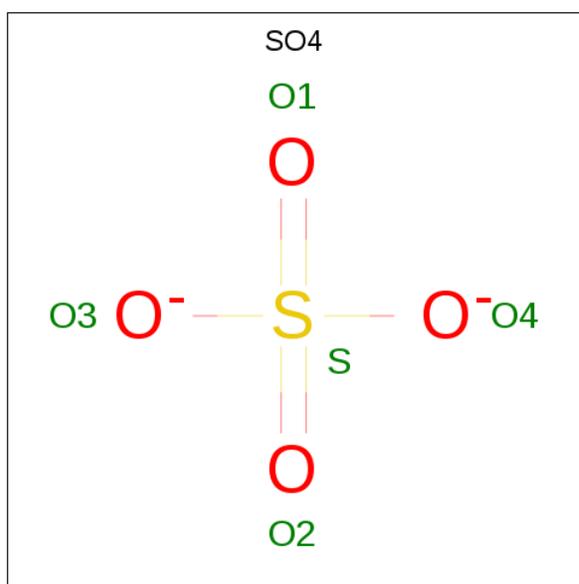
Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total 5	O 4	S 1	0	0
2	B	1	Total 5	O 4	S 1	0	0

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	19	Total 19	O 19	0	0
3	B	30	Total 30	O 30	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 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: PEAK1-related kinase-activating pseudokinase 1

- Molecule 1: PEAK1-related kinase-activating pseudokinase 1

L1257 Y1258 H1267 R1296 E1300 T1312 L1313 I1317 D1318 M1319 K1320 R1321 E1334 R1335 E1342 D1343 W1344 Q1348 E1354 P1355 L1362 L1368

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	193.43Å 58.92Å 110.64Å 90.00° 118.48° 90.00°	Depositor
Resolution (Å)	55.00 – 2.77	Depositor
	55.00 – 2.77	EDS
% Data completeness	88.7 (55.00-2.77)	Depositor
(in resolution range)	88.7 (55.00-2.77)	EDS
R_{merge}	0.05	Depositor
R_{sym}	(Not available)	Depositor
$<I/\sigma(I)>$ [1]	2.69 (at 2.77Å)	Xtriage
Refinement program	PHENIX (1.13_2998: ???)	Depositor
R, R_{free}	0.188 , 0.246	Depositor
	0.186 , 0.245	DCC
R_{free} test set	1236 reflections (4.94%)	DCC
Wilson B-factor (Å^2)	56.8	Xtriage
Anisotropy	0.068	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.30 , 59.3	EDS
L-test for twinning[2]	$<|L|> = 0.49$, $<L^2> = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.93	EDS
Total number of atoms	5705	wwPDB-VP
Average B, all atoms (Å^2)	60.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.29% of the height of the origin peak. No significant pseudotranslation is detected.*

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[1] Intensities estimated from amplitudes.
[2] Theoretical values of $<|L|>$, $<L^2>$ 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: SO4

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	0.47	0/2915	0.63	1/3938 (0.0%)
1	B	0.45	0/2874	0.64	2/3892 (0.1%)
All	All	0.46	0/5789	0.64	3/7830 (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	B	0	1

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	B	1362	LEU	CB-CG-CD2	-5.63	101.42	111.00
1	B	1257	LEU	CA-CB-CG	5.59	128.15	115.30
1	A	1273	ASP	CB-CG-OD1	5.35	123.12	118.30

There are no chirality outliers.

All (1) planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	B	967	LEU	Peptide

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	2853	0	2872	50	0
1	B	2793	0	2777	52	0
2	A	5	0	0	0	0
2	B	5	0	0	0	0
3	A	19	0	0	1	0
3	B	30	0	0	4	0
All	All	5705	0	5649	99	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 9.

The worst 5 of 99 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:B:1246:ARG:HA	1:B:1267:HIS:HB3	1.53	0.90
1:A:957:PHE:HB2	1:A:1065:ILE:HD11	1.52	0.90
1:A:1345:LEU:HD23	1:A:1348:GLN:HE21	1.36	0.88
1:B:918:ILE:HA	1:B:924:THR:HG21	1.65	0.78
1:B:1181:LYS:NZ	3:B:1502:HOH:O	2.16	0.78

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	344/484 (71%)	312 (91%)	25 (7%)	7 (2%)	9	26

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	B	349/484 (72%)	324 (93%)	18 (5%)	7 (2%)	9	26
All	All	693/968 (72%)	636 (92%)	43 (6%)	14 (2%)	9	26

5 of 14 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	B	970	ASN
1	B	993	ILE
1	B	1335	ARG
1	B	1013	SER
1	B	1210	GLN

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	319/424 (75%)	310 (97%)	9 (3%)	49	80
1	B	312/424 (74%)	309 (99%)	3 (1%)	80	94
All	All	631/848 (74%)	619 (98%)	12 (2%)	62	87

5 of 12 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1130	CYS
1	A	1247	GLU
1	B	1198	GLN
1	A	1090	GLU
1	A	1337	ARG

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (2) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1059	GLN
1	A	1348	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)

2 ligands are modelled in this entry.

In the following table, the Counts columns list the number of bonds (or angles) for which Mogul statistics could be retrieved, the number of bonds (or angles) that are observed in the model and the number of bonds (or angles) that are defined in the Chemical Component Dictionary. The Link column lists molecule types, if any, to which the group is linked. 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 $|Z| > 2$ is considered an outlier worth inspection. RMSZ is the root-mean-square of all Z scores of the bond lengths (or angles).

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	$\#|Z| > 2$	Counts	RMSZ	$\#|Z| > 2$
2	SO4	A	1401	-	4,4,4	0.19	0	6,6,6	0.33	0
2	SO4	B	1401	-	4,4,4	0.26	0	6,6,6	0.37	0

In the following table, the Chirals column lists the number of chiral outliers, the number of chiral centers analysed, the number of these observed in the model and the number defined in the Chemical Component Dictionary. Similar counts are reported in the Torsion and Rings columns. '-' means no outliers of that kind were identified.

Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	SO4	A	1401	-	-	0/0/0/0	0/0/0/0
2	SO4	B	1401	-	-	0/0/0/0	0/0/0/0

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, 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(Å²)	Q<0.9
1	A	359/484 (74%)	0.06	11 (3%)	49 42	23, 59, 95, 137	26 (7%)
1	B	358/484 (73%)	-0.01	7 (1%)	65 60	23, 56, 106, 133	27 (7%)
All	All	717/968 (74%)	0.03	18 (2%)	58 51	23, 58, 103, 137	53 (7%)

The worst 5 of 18 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	B	1013	SER	3.8
1	A	915	LEU	3.7
1	A	969	CYS	3.4
1	A	1028	VAL	3.3
1	A	964	LEU	3.2

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 carbohydrates 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. 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	RSCC	RSR	LLDF	B-factors(Å²)	Q<0.9
2	SO4	B	1401	5/5	0.98	0.11	-	45,53,59,71	0
2	SO4	A	1401	5/5	0.98	0.12	-	65,65,71,71	0

6.5 Other polymers (i)

There are no such residues in this entry.