



wwPDB X-ray Structure Validation Summary Report ⓘ

Aug 29, 2016 – 04:13 PM EDT

PDB ID : 5K4L
Title : Crystal structure of KDM5A in complex with a naphthyridone inhibitor
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Deposited on : 2016-05-20
Resolution : 3.18 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 ⓘ symbol.

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

MolProbity : 4.02b-467
Mogul : 1.7.1 (RC1), CSD as537be (2016)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20027939
Percentile statistics : 20151230.v01 (using entries in the PDB archive December 30th 2015)
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-20027939

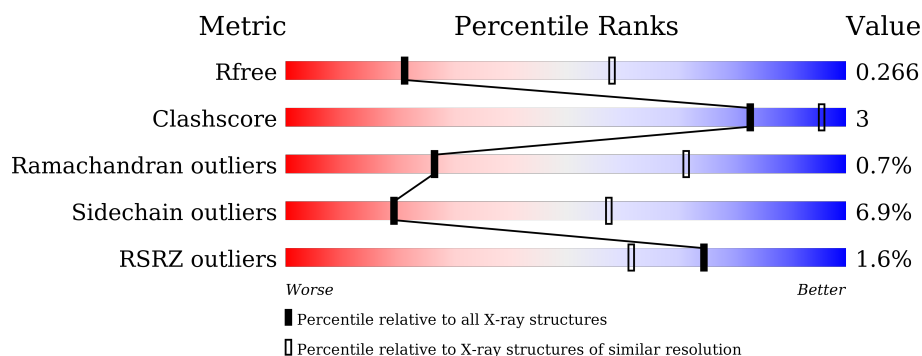
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.18 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}	91344	1115 (3.22-3.14)
Clashscore	102246	1125 (3.20-3.16)
Ramachandran outliers	100387	1105 (3.20-3.16)
Sidechain outliers	100360	1104 (3.20-3.16)
RSRZ outliers	91569	1120 (3.22-3.14)

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 $\leq 5\%$. 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	790	
1	B	790	
2	F	10	
2	G	10	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit crite-

ria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
4	ZN	B	902	-	-	-	X

2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 18192 atoms, of which 8844 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 Lysine-specific demethylase 5A.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
1	A	577	Total	C	H	N	O	S	0	0	0
			8998	2952	4407	755	846	38			
1	B	577	Total	C	H	N	O	S	0	0	0
			9012	2955	4415	758	846	38			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	11	SER	-	expression tag	UNP P29375
A	798	GLY	-	expression tag	UNP P29375
A	799	ASN	-	expression tag	UNP P29375
A	800	SER	-	expression tag	UNP P29375
B	11	SER	-	expression tag	UNP P29375
B	798	GLY	-	expression tag	UNP P29375
B	799	ASN	-	expression tag	UNP P29375
B	800	SER	-	expression tag	UNP P29375

- Molecule 2 is a protein called Unknown Peptide.

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf	Trace
2	F	10	Total	C	N	O	0	0	0
			50	30	10	10			
2	G	10	Total	C	N	O	0	0	0
			50	30	10	10			

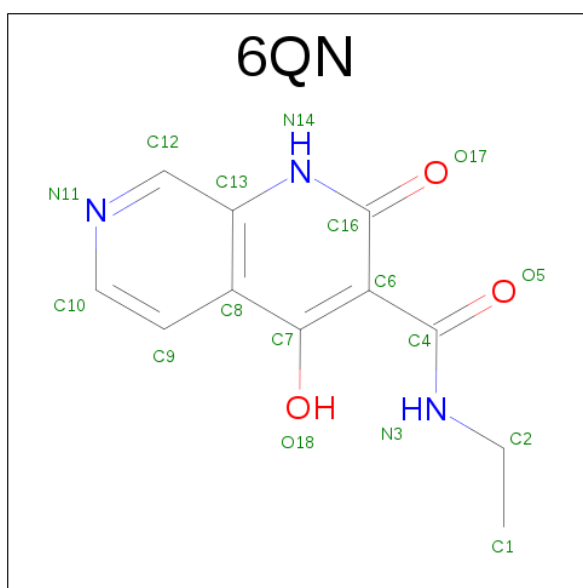
- Molecule 3 is NICKEL (II) ION (three-letter code: NI) (formula: Ni).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	B	1	Total	Ni	0	0
			1	1		
3	A	1	Total	Ni	0	0
			1	1		

- Molecule 4 is ZINC ION (three-letter code: ZN) (formula: Zn).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	B	2	Total	Zn	0	0
			2	2		
4	A	2	Total	Zn	0	0
			2	2		

- Molecule 5 is {N}-ethyl-4-oxidanyl-2-oxidanylidene-1 {H}-1,7-naphthyridine-3-carboxamid e (three-letter code: 6QN) (formula: C₁₁H₁₁N₃O₃).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
5	A	1	Total	C	H	N	O	0	0
			28	11	11	3	3		
5	B	1	Total	C	H	N	O	0	0
			28	11	11	3	3		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	7	Total	O	0	0
			7	7		
6	B	13	Total	O	0	0
			13	13		



4 Data and refinement statistics

Property	Value	Source
Space group	P 31	Depositor
Cell constants a, b, c, α , β , γ	159.14Å 159.14Å 92.11Å 90.00° 90.00° 120.00°	Depositor
Resolution (Å)	34.50 – 3.18 34.50 – 3.18	Depositor EDS
% Data completeness (in resolution range)	92.9 (34.50-3.18) 88.9 (34.50-3.18)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.82 (at 3.18Å)	Xtriage
Refinement program	PHENIX	Depositor
R, R_{free}	0.222 , 0.257 0.233 , 0.266	Depositor DCC
R_{free} test set	1968 reflections (5.05%)	DCC
Wilson B-factor (Å ²)	61.7	Xtriage
Anisotropy	0.360	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	(Not available) , (Not available)	EDS
L-test for twinning ²	$\langle L \rangle = 0.44$, $\langle L^2 \rangle = 0.26$	Xtriage
Estimated twinning fraction	0.079 for -h,-k,l 0.428 for h,-h-k,-l 0.085 for -k,-h,-l	Xtriage
Reported twinning fraction	0.500 for k,h,-l	Depositor
Outliers	0 of 40747 reflections	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	18192	wwPDB-VP
Average B, all atoms (Å ²)	114.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.03% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical 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

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: NI, ZN, 6QN

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	0.25	0/4719	0.47	0/6415
1	B	0.25	0/4725	0.47	0/6422
All	All	0.25	0/9444	0.47	0/12837

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	A	0	4
1	B	0	3
All	All	0	7

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

5 of 7 planarity outliers are listed below:

Mol	Chain	Res	Type	Group
1	A	425	LYS	Peptide
1	A	457	ALA	Peptide
1	A	466	MET	Peptide
1	A	778	ASN	Peptide
1	B	457	ALA	Peptide

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	4591	4407	4391	30	0
1	B	4597	4415	4401	26	0
2	F	50	0	13	1	0
2	G	50	0	12	2	0
3	A	1	0	0	0	0
3	B	1	0	0	0	0
4	A	2	0	0	0	0
4	B	2	0	0	0	0
5	A	17	11	0	2	0
5	B	17	11	0	0	0
6	A	7	0	0	0	0
6	B	13	0	0	0	0
All	All	9348	8844	8817	57	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 3.

The worst 5 of 57 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:457:ALA:O	1:B:459:ILE:N	2.16	0.78
1:A:457:ALA:O	1:A:459:ILE:N	2.23	0.70
1:A:426:ASP:O	1:A:428:ARG:N	2.29	0.66
1:B:170:GLU:O	1:B:174:SER:N	2.28	0.64
1:B:426:ASP:O	1:B:428:ARG:N	2.30	0.64

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	571/790 (72%)	527 (92%)	40 (7%)	4 (1%)	26	71
1	B	571/790 (72%)	523 (92%)	44 (8%)	4 (1%)	26	71
All	All	1142/1580 (72%)	1050 (92%)	84 (7%)	8 (1%)	26	71

5 of 8 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	458	HIS
1	B	458	HIS
1	A	427	GLY
1	B	427	GLY
1	A	457	ALA

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	498/710 (70%)	466 (94%)	32 (6%)	22	61
1	B	499/710 (70%)	462 (93%)	37 (7%)	17	55
All	All	997/1420 (70%)	928 (93%)	69 (7%)	19	58

5 of 69 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	780	LEU
1	B	113	LYS
1	B	679	CYS
1	B	18	GLU
1	B	65	VAL

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	493	ASN
1	B	556	ASN
1	B	613	HIS

5.3.3 RNA ⓘ

There are no RNA molecules 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 ⓘ

Of 8 ligands modelled in this entry, 6 are monoatomic - leaving 2 for Mogul analysis.

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	$\# Z > 2$
5	6QN	A	904	3	17,18,18	0.94	0	19,25,25	1.11	1 (5%)
5	6QN	B	904	3	17,18,18	0.93	0	19,25,25	1.16	2 (10%)

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
5	6QN	A	904	3	-	0/7/7/7	0/2/2/2
5	6QN	B	904	3	-	0/7/7/7	0/2/2/2

There are no bond length outliers.

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
5	A	904	6QN	C12-C13-C8	-3.01	116.56	121.64
5	B	904	6QN	C12-C13-C8	-2.92	116.71	121.64
5	B	904	6QN	C10-C9-C8	-2.16	117.79	119.82

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 2 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
5	A	904	6QN	2	0

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(Å ²)	Q<0.9
1	A	577/790 (73%)	0.16	11 (1%) 70 55	43, 113, 164, 202	0
1	B	577/790 (73%)	0.13	8 (1%) 78 65	38, 94, 159, 199	0
2	F	0/10	-	-	-	-
2	G	0/10	-	-	-	-
All	All	1154/1600 (72%)	0.14	19 (1%) 74 62	38, 104, 163, 202	0

The worst 5 of 19 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	765	VAL	5.6
1	A	464	SER	4.2
1	B	688	LEU	3.7
1	A	453	GLN	3.3
1	A	656	MET	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(\AA^2)	Q<0.9
4	ZN	B	902	1/1	1.00	0.29	2.24	24,24,24,24	0
5	6QN	B	904	17/17	0.97	0.30	0.93	48,87,107,108	0
4	ZN	A	903	1/1	1.00	0.23	0.76	64,64,64,64	0
3	NI	A	901	1/1	0.92	0.27	0.31	66,66,66,66	0
3	NI	B	901	1/1	0.88	0.25	-0.13	78,78,78,78	0
5	6QN	A	904	17/17	0.97	0.26	-0.13	53,108,132,143	0
4	ZN	A	902	1/1	0.99	0.16	-0.97	192,192,192,192	0
4	ZN	B	903	1/1	0.89	0.13	-1.19	202,202,202,202	0

6.5 Other polymers [i](#)

There are no such residues in this entry.