Full wwPDB X-ray Structure Validation Report (i)

Jun 17, 2024 – 01:36 AM EDT

PDB ID	:	5K7M
Title	:	Crystal structure of the catalytic domains of Mettl3/Mettl14 complex
Authors	:	Wang, P.; Doxtader, K.A.; Nam, Y.
Deposited on	:	2016-05-26
Resolution	:	1.65 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*
A user guide is available at
https://www.wwpdb.org/validation/2017/XrayValidationReportHelp
with specific help available everywhere you see the (i) symbol.

The types of validation reports are described at
http://www.wwpdb.org/validation/2017/FAQs#types.

The following versions of software and data (see references (1)) were used in the production of this report:

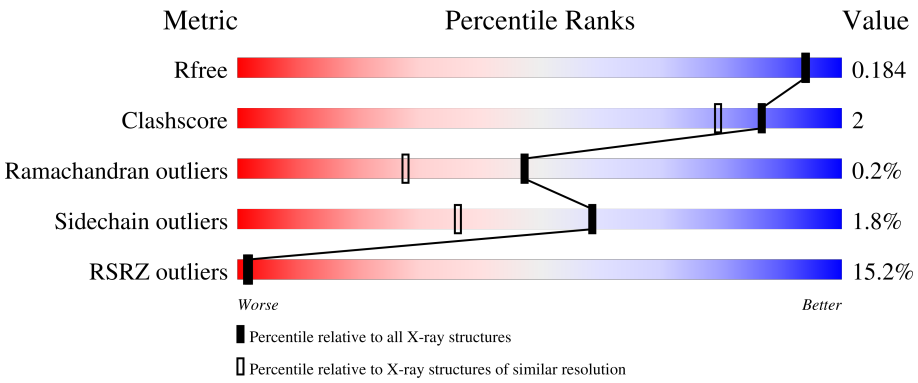
MolProbity	:	4.02b-467
Xtriage (Phenix)	:	1.13
EDS	:	2.37.1
Percentile statistics	:	20191225.v01 (using entries in the PDB archive December 25th 2019)
Refmac	:	5.8.0158
CCP4	:	7.0.044 (Gargrove)
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.37.1

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 1.65 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}	130704	1827 (1.66-1.66)
Clashscore	141614	1931 (1.66-1.66)
Ramachandran outliers	138981	1891 (1.66-1.66)
Sidechain outliers	138945	1891 (1.66-1.66)
RSRZ outliers	127900	1791 (1.66-1.66)

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 of the lower bar indicate the fraction of residues that contain outliers for >=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 <=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	225	19% 84% 6% 10%
2	B	349	9% 76% 5% • 19%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 4486 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 N6-adenosine-methyltransferase 70 kDa subunit.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	202	1666	1069	294	291	12	0	5	0

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	356	MET	-	initiating methionine	UNP Q86U44

- Molecule 2 is a protein called N6-adenosine-methyltransferase subunit METTL14.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
2	B	284	2332	1486	403	431	12	0	2	0

There are 3 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	108	GLY	-	expression tag	UNP Q9HCE5
B	109	SER	-	expression tag	UNP Q9HCE5
B	110	GLY	-	expression tag	UNP Q9HCE5

- Molecule 3 is water.

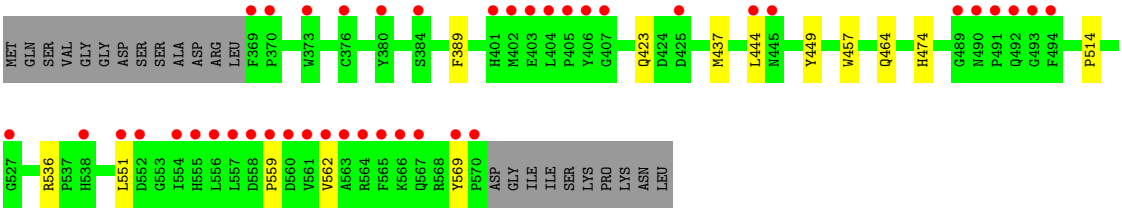
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
3	A	139	139	139	0	0
3	B	349	349	349	0	0

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.

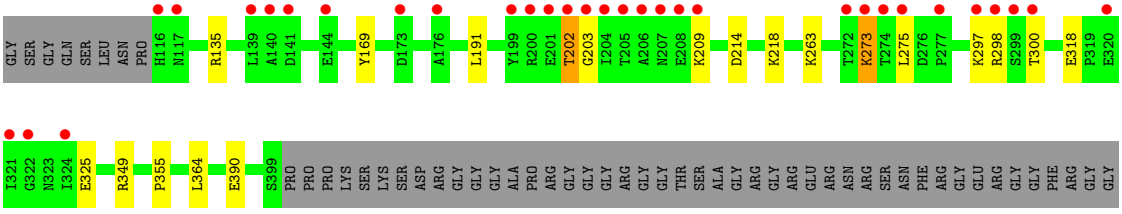
- Molecule 1: N6-adenosine-methyltransferase 70 kDa subunit

Chain A:



- Molecule 2: N6-adenosine-methyltransferase subunit METTL14

Chain B:



4 Data and refinement statistics (i)

Property	Value	Source
Space group	P 41 21 2	Depositor
Cell constants a, b, c, α, β, γ	101.86Å 101.86Å 117.66Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	38.51 – 1.65 38.51 – 1.65	Depositor EDS
% Data completeness (in resolution range)	99.7 (38.51-1.65) 99.7 (38.51-1.65)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	3.61 (at 1.65Å)	Xtriage
Refinement program	PHENIX (1.10_2155)	Depositor
R, R_{free}	0.160 , 0.184 0.160 , 0.184	Depositor DCC
R_{free} test set	3758 reflections (5.04%)	wwPDB-VP
Wilson B-factor (Å^2)	12.8	Xtriage
Anisotropy	0.020	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.36 , 52.2	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.96	EDS
Total number of atoms	4486	wwPDB-VP
Average B, all atoms (Å^2)	25.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.43% of the height of the origin peak. No significant pseudotranslation is detected.*

[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)

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	0.32	0/1726	0.56	0/2346
2	B	0.38	0/2396	0.60	0/3246
All	All	0.36	0/4122	0.58	0/5592

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

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	1666	0	1660	8	0
2	B	2332	0	2299	11	0
3	A	139	0	0	0	0
3	B	349	0	0	4	0
All	All	4486	0	3959	17	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 2.

All (17) 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)
2:B:214:ASP:OD1	3:B:501:HOH:O	2.07	0.73

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:437[B]:MET:SD	3:B:702:HOH:O	2.48	0.71
2:B:297:LYS:HB2	2:B:300:THR:HG22	1.89	0.54
1:A:444[A]:LEU:HG	1:A:449:TYR:HB2	1.90	0.53
1:A:437[B]:MET:SD	3:B:576:HOH:O	2.60	0.51
1:A:464:GLN:OE1	2:B:135:ARG:NH2	2.46	0.48
1:A:457:TRP:CE3	1:A:514:PRO:HD3	2.48	0.48
2:B:325:GLU:CD	2:B:349:ARG:HH21	2.17	0.48
1:A:474:HIS:O	2:B:298:ARG:HD3	2.16	0.46
2:B:218:LYS:NZ	3:B:511:HOH:O	2.49	0.45
2:B:263:LYS:HB3	2:B:318:GLU:HG2	2.01	0.43
2:B:297:LYS:HB3	2:B:297:LYS:HE2	1.72	0.43
2:B:202:THR:N	2:B:203:GLY:HA2	2.34	0.42
2:B:273:LYS:NZ	2:B:275:LEU:HD22	2.33	0.42
1:A:559:PRO:HA	1:A:562:VAL:HG12	2.02	0.42
1:A:389:PHE:O	1:A:423:GLN:HG2	2.20	0.42
2:B:169:TYR:HB2	2:B:364[B]:LEU:HD23	2.03	0.41

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	205/225 (91%)	201 (98%)	3 (2%)	1 (0%)	29 11
2	B	284/349 (81%)	277 (98%)	7 (2%)	0	100 100
All	All	489/574 (85%)	478 (98%)	10 (2%)	1 (0%)	47 28

All (1) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	A	569	TYR

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	184/198 (93%)	182 (99%)	2 (1%)	73	57
2	B	256/295 (87%)	250 (98%)	6 (2%)	50	25
All	All	440/493 (89%)	432 (98%)	8 (2%)	59	36

All (8) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	536	ARG
1	A	551	LEU
2	B	191	LEU
2	B	202	THR
2	B	209	LYS
2	B	273	LYS
2	B	355	PRO
2	B	390	GLU

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. There are no such sidechains identified.

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)

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 (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	202/225 (89%)	1.07	42 (20%)	1	1	7, 30, 59, 91	0
2	B	284/349 (81%)	0.51	32 (11%)	5	4	6, 16, 48, 83	0
All	All	486/574 (84%)	0.74	74 (15%)	2	1	6, 21, 54, 91	0

All (74) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	207	ASN	7.9
2	B	116	HIS	7.8
1	A	569	TYR	7.5
1	A	369	PHE	7.3
2	B	202	THR	7.0
1	A	403	GLU	6.4
2	B	275	LEU	6.2
1	A	570	PRO	6.0
2	B	321	ILE	5.9
1	A	557	LEU	5.6
1	A	565	PHE	5.6
1	A	490	ASN	5.1
1	A	405	PRO	5.0
1	A	492	GLN	4.9
2	B	204	ILE	4.4
1	A	559	PRO	4.4
1	A	560	ASP	4.3
1	A	494	PHE	4.1
1	A	567	GLN	4.1
2	B	299	SER	4.1
2	B	322	GLY	4.0
1	A	404	LEU	4.0
2	B	297	LYS	3.9
1	A	373	TRP	3.9

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Mol	Chain	Res	Type	RSRZ
2	B	117	ASN	3.8
1	A	370	PRO	3.8
1	A	406	TYR	3.7
2	B	205	THR	3.7
1	A	402	MET	3.6
1	A	554	ILE	3.6
1	A	562	VAL	3.6
1	A	527	GLY	3.5
1	A	407	GLY	3.4
1	A	401	HIS	3.4
2	B	141	ASP	3.3
1	A	561	VAL	3.2
1	A	564	ARG	3.1
2	B	200	ARG	3.1
2	B	206	ALA	3.1
1	A	425	ASP	2.9
1	A	558	ASP	2.9
2	B	176	ALA	2.9
2	B	272	THR	2.9
1	A	563	ALA	2.8
2	B	203	GLY	2.8
1	A	552	ASP	2.7
1	A	556	LEU	2.7
2	B	300	THR	2.7
2	B	273	LYS	2.7
1	A	444[A]	LEU	2.6
1	A	491	PRO	2.6
1	A	566	LYS	2.6
1	A	489	GLY	2.6
2	B	320	GLU	2.6
1	A	538	HIS	2.5
2	B	324	ILE	2.5
2	B	139[A]	LEU	2.5
2	B	277	PRO	2.5
2	B	208	GLU	2.4
2	B	140	ALA	2.4
2	B	274	THR	2.4
1	A	555	HIS	2.4
2	B	298	ARG	2.4
1	A	376	CYS	2.3
2	B	199	TYR	2.3
1	A	493	GLY	2.3

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Mol	Chain	Res	Type	RSRZ
2	B	209	LYS	2.2
1	A	551	LEU	2.2
1	A	445[A]	ASN	2.2
2	B	201	GLU	2.2
2	B	144	GLU	2.2
1	A	384	SER	2.1
1	A	380	TYR	2.1
2	B	173	ASP	2.1

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)

There are no ligands in this entry.

6.5 Other polymers (i)

There are no such residues in this entry.