



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 10:20 AM GMT

PDB ID : 3LQH
Title : Crystal structure of MLL1 PHD3-Bromo in the free form
Authors : Wang, Z.; Patel, D.J.
Deposited on : 2010-02-09
Resolution : 1.72 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
<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 (RC4), CSD as536be (2015)
Xtriage (Phenix) : 1.9-1692
EDS : rb-20026688
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) : trunk26865

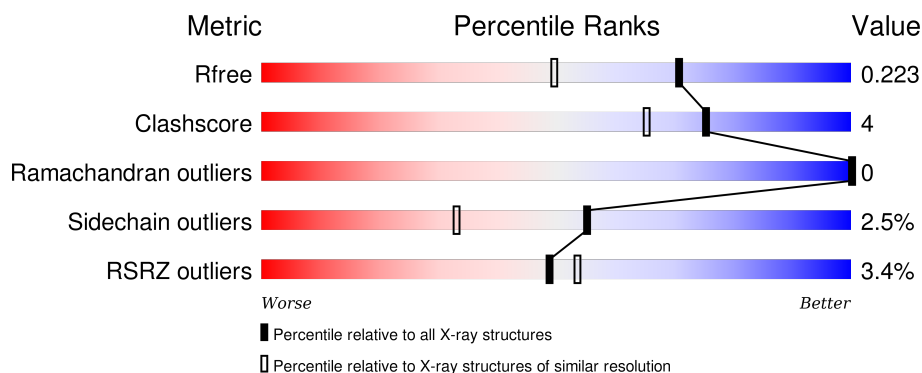
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

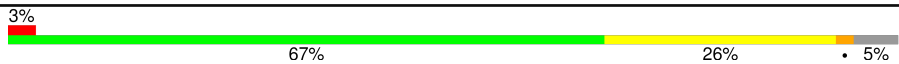
The reported resolution of this entry is 1.72 Å.

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	3998 (1.74-1.70)
Clashscore	102246	4425 (1.74-1.70)
Ramachandran outliers	100387	4360 (1.74-1.70)
Sidechain outliers	100360	4360 (1.74-1.70)
RSRZ outliers	91569	4010 (1.74-1.70)

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	183	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 1571 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 Histone-lysine N-methyltransferase MLL.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	174	Total	C	N	O	S	0	0	0
			1420	893	244	269	14			

There is a discrepancy between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1565	SER	-	EXPRESSION TAG	UNP Q03164

- Molecule 2 is ZINC ION (three-letter code: ZN) (formula: Zn).

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

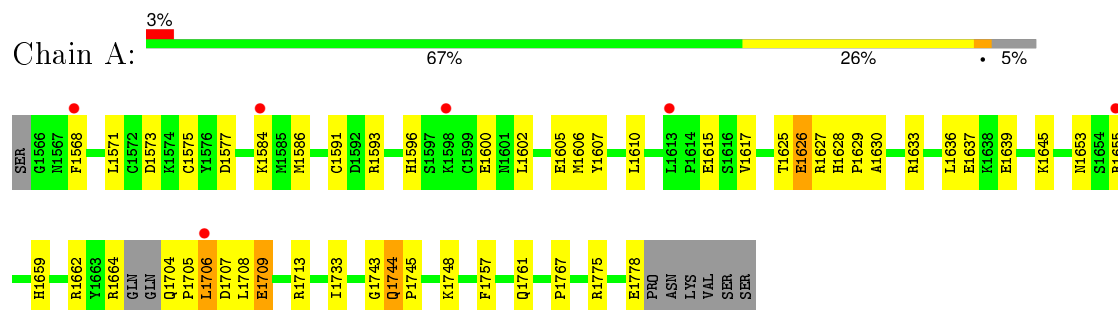
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	149	Total	O	0	0
			149	149		

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 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: Histone-lysine N-methyltransferase MLL



4 Data and refinement statistics

Property	Value	Source
Space group	I 2 2 2	Depositor
Cell constants a, b, c, α , β , γ	63.22Å 71.88Å 93.87Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	50.00 – 1.72 17.48 – 1.60	Depositor EDS
% Data completeness (in resolution range)	93.6 (50.00-1.72) 85.8 (17.48-1.60)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	0.11	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.61 (at 1.60Å)	Xtriage
Refinement program	CNS	Depositor
R, R_{free}	0.206 , 0.234 0.202 , 0.223	Depositor DCC
R_{free} test set	2139 reflections (9.90%)	DCC
Wilson B-factor (Å ²)	11.7	Xtriage
Anisotropy	0.627	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.39 , 50.7	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 25940 reflections	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	1571	wwPDB-VP
Average B, all atoms (Å ²)	19.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.79% 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, 0.375 respectively for untwinned datasets, and 0.333, 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: ZN

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	1.64	53/1448 (3.7%)	0.97	14/1948 (0.7%)

All (53) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1709	GLU	CD-OE1	-10.38	1.14	1.25
1	A	1639	GLU	CD-OE2	-9.45	1.15	1.25
1	A	1655	ARG	C-O	-9.21	1.05	1.23
1	A	1733	ILE	C-O	-8.87	1.06	1.23
1	A	1637	GLU	CD-OE2	-8.55	1.16	1.25
1	A	1607	TYR	CE1-CZ	-8.53	1.27	1.38
1	A	1600	GLU	CD-OE1	-8.28	1.16	1.25
1	A	1639	GLU	CG-CD	-8.15	1.39	1.51
1	A	1605	GLU	CB-CG	-8.15	1.36	1.52
1	A	1607	TYR	C-O	-7.95	1.08	1.23
1	A	1605	GLU	CD-OE2	-7.89	1.17	1.25
1	A	1630	ALA	CA-CB	-7.82	1.36	1.52
1	A	1625	THR	C-O	-7.61	1.08	1.23
1	A	1745	PRO	C-O	-7.48	1.08	1.23
1	A	1626	GLU	CG-CD	-7.47	1.40	1.51
1	A	1605	GLU	C-O	-7.47	1.09	1.23
1	A	1600	GLU	C-O	-7.24	1.09	1.23
1	A	1775	ARG	CD-NE	-7.18	1.34	1.46
1	A	1707	ASP	C-O	-7.18	1.09	1.23
1	A	1615	GLU	CB-CG	-7.12	1.38	1.52
1	A	1778	GLU	CD-OE1	-7.11	1.17	1.25
1	A	1596	HIS	C-O	-7.08	1.09	1.23
1	A	1637	GLU	CD-OE1	-6.79	1.18	1.25
1	A	1627	ARG	C-O	-6.76	1.10	1.23
1	A	1705	PRO	CG-CD	-6.67	1.28	1.50
1	A	1573	ASP	CG-OD1	-6.58	1.10	1.25

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1744	GLN	C-O	-6.48	1.11	1.23
1	A	1605	GLU	CG-CD	6.14	1.61	1.51
1	A	1602	LEU	CG-CD2	-6.11	1.29	1.51
1	A	1627	ARG	CZ-NH1	-6.00	1.25	1.33
1	A	1607	TYR	CG-CD2	-5.92	1.31	1.39
1	A	1626	GLU	CB-CG	5.92	1.63	1.52
1	A	1645	LYS	C-O	-5.92	1.12	1.23
1	A	1745	PRO	CB-CG	-5.87	1.20	1.50
1	A	1626	GLU	C-O	-5.86	1.12	1.23
1	A	1707	ASP	N-CA	-5.80	1.34	1.46
1	A	1706	LEU	C-O	-5.79	1.12	1.23
1	A	1744	GLN	CG-CD	-5.75	1.37	1.51
1	A	1571	LEU	CG-CD2	-5.62	1.31	1.51
1	A	1705	PRO	C-O	-5.60	1.12	1.23
1	A	1704	GLN	CG-CD	-5.57	1.38	1.51
1	A	1653	ASN	CG-OD1	-5.52	1.11	1.24
1	A	1606	MET	C-O	-5.50	1.12	1.23
1	A	1767	PRO	C-O	-5.50	1.12	1.23
1	A	1664	ARG	CZ-NH1	-5.49	1.25	1.33
1	A	1706	LEU	CG-CD1	-5.40	1.31	1.51
1	A	1659	HIS	C-O	-5.39	1.13	1.23
1	A	1607	TYR	CG-CD1	-5.39	1.32	1.39
1	A	1704	GLN	C-O	-5.37	1.13	1.23
1	A	1602	LEU	C-O	-5.37	1.13	1.23
1	A	1744	GLN	CB-CG	-5.26	1.38	1.52
1	A	1653	ASN	C-O	-5.22	1.13	1.23
1	A	1633	ARG	C-O	-5.00	1.13	1.23

All (14) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1775	ARG	NE-CZ-NH2	-8.56	116.02	120.30
1	A	1627	ARG	NE-CZ-NH2	8.45	124.52	120.30
1	A	1626	GLU	CG-CD-OE2	-6.85	104.61	118.30
1	A	1633	ARG	NE-CZ-NH1	-6.60	117.00	120.30
1	A	1626	GLU	OE1-CD-OE2	5.97	130.47	123.30
1	A	1645	LYS	CD-CE-NZ	-5.92	98.07	111.70
1	A	1706	LEU	CB-CG-CD1	5.85	120.94	111.00
1	A	1775	ARG	NE-CZ-NH1	5.63	123.12	120.30
1	A	1655	ARG	CG-CD-NE	5.59	123.54	111.80
1	A	1626	GLU	N-CA-CB	-5.52	100.67	110.60
1	A	1637	GLU	OE1-CD-OE2	-5.41	116.81	123.30

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Mol	Chain	Res	Type	Atoms	Z	Observed($^{\circ}$)	Ideal($^{\circ}$)
1	A	1664	ARG	NE-CZ-NH2	5.26	122.93	120.30
1	A	1602	LEU	CA-CB-CG	5.11	127.04	115.30
1	A	1605	GLU	OE1-CD-OE2	5.08	129.40	123.30

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	1420	0	1385	11	0
2	A	2	0	0	0	0
3	A	149	0	0	2	0
All	All	1571	0	1385	11	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 4.

All (11) 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:1584:LYS:HG2	3:A:80:HOH:O	1.93	0.66
1:A:1743:GLY:HA2	1:A:1748:LYS:HE2	1.81	0.62
1:A:1709:GLU:HG3	1:A:1713:ARG:NH1	2.18	0.57
1:A:1577:ASP:HA	3:A:91:HOH:O	2.08	0.52
1:A:1617:VAL:HG21	1:A:1636:LEU:HD13	1.92	0.51
1:A:1628:HIS:HA	1:A:1629:PRO:C	2.29	0.50
1:A:1662:ARG:HA	1:A:1708:LEU:HB2	1.95	0.48
1:A:1610:LEU:HD23	1:A:1610:LEU:C	2.35	0.46
1:A:1568:PHE:CE1	1:A:1575:CYS:HB2	2.50	0.46
1:A:1591:CYS:SG	1:A:1593:ARG:HG2	2.56	0.46
1:A:1757:PHE:O	1:A:1761:GLN:HG2	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	170/183 (93%)	169 (99%)	1 (1%)	0	100	100

There are no Ramachandran outliers to report.

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	161/170 (95%)	157 (98%)	4 (2%)	55	33

All (4) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1586	MET
1	A	1626	GLU
1	A	1706	LEU
1	A	1744	GLN

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	1719	ASN
1	A	1751	ASN

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](#)

Of 2 ligands modelled in this entry, 2 are monoatomic - leaving 0 for Mogul analysis.

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 ⓘ

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, 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	174/183 (95%)	0.15	6 (3%) 49 53	7, 18, 32, 37	0

All (6) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1655	ARG	3.2
1	A	1568	PHE	3.1
1	A	1706	LEU	2.7
1	A	1598	LYS	2.5
1	A	1584	LYS	2.2
1	A	1613	LEU	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 ⓘ

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
2	ZN	A	1002	1/1	0.99	0.03	-1.43	13,13,13,13	0
2	ZN	A	1001	1/1	0.98	0.03	-	18,18,18,18	0

6.5 Other polymers [i](#)

There are no such residues in this entry.