



Full wwPDB X-ray Structure Validation Report ⓘ

Feb 1, 2016 – 02:23 PM GMT

PDB ID : 3ZC5
Title : X-ray Structure of c-Met kinase in complex with inhibitor (S)-6-(1-(6-(1-methyl-1H-pyrazol-4-yl)-(1,2,4)triazolo(4,3-b)pyridazin-3-yl)ethyl) quinoline.
Authors : McTigue, M.; Grodsky, N.; Ryan, K.
Deposited on : 2012-11-15
Resolution : 2.20 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

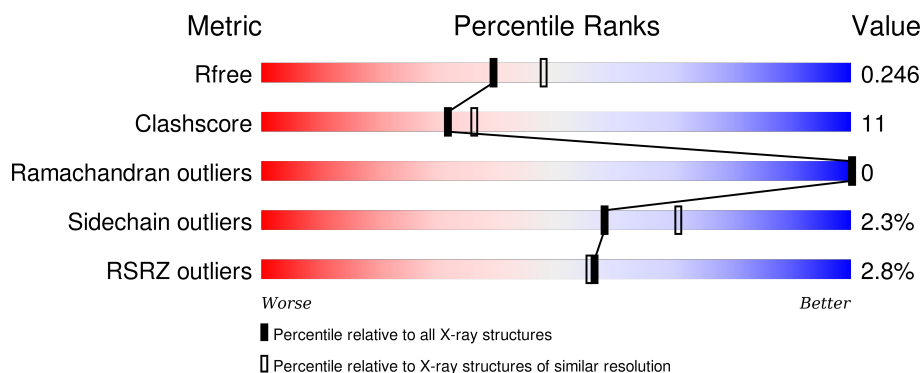
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION


The reported resolution of this entry is 2.20 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	3774 (2.20-2.20)
Clashscore	102246	4477 (2.20-2.20)
Ramachandran outliers	100387	4404 (2.20-2.20)
Sidechain outliers	100360	4405 (2.20-2.20)
RSRZ outliers	91569	3781 (2.20-2.20)

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	306	

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.

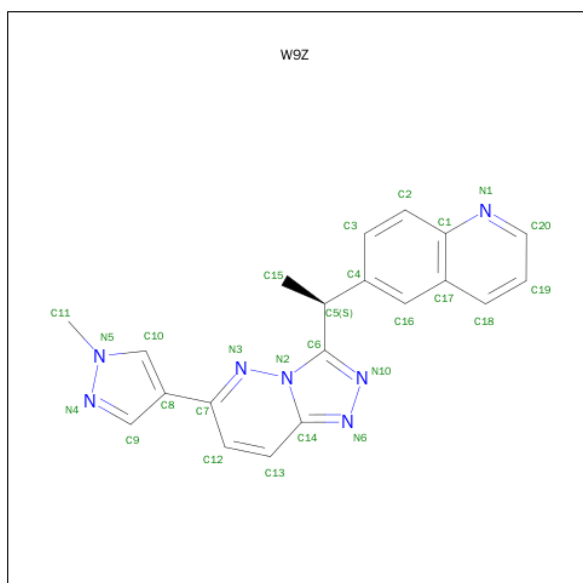
- Molecule 1 is a protein called HEPATOCYTE GROWTH FACTOR RECEPTOR.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	290	Total	C	N	O	S	0	0	1
			2309	1493	395	406	15			

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1050	MET	-	EXPRESSION TAG	UNP P08581
A	1349	HIS	-	EXPRESSION TAG	UNP P08581
A	1350	HIS	-	EXPRESSION TAG	UNP P08581
A	1351	HIS	-	EXPRESSION TAG	UNP P08581
A	1352	HIS	-	EXPRESSION TAG	UNP P08581
A	1353	HIS	-	EXPRESSION TAG	UNP P08581
A	1354	HIS	-	EXPRESSION TAG	UNP P08581
A	1355	HIS	-	EXPRESSION TAG	UNP P08581

- Molecule 2 is 6-{(1S)-1-[6-(1-METHYL-1H-PYRAZOL-4-YL)[1,2,4]TRIAZOLO[4,3-B]PYRIDAZIN-3-YL]ETHYL}QUINOLINE (three-letter code: W9Z) (formula: C₂₀H₁₇N₇).

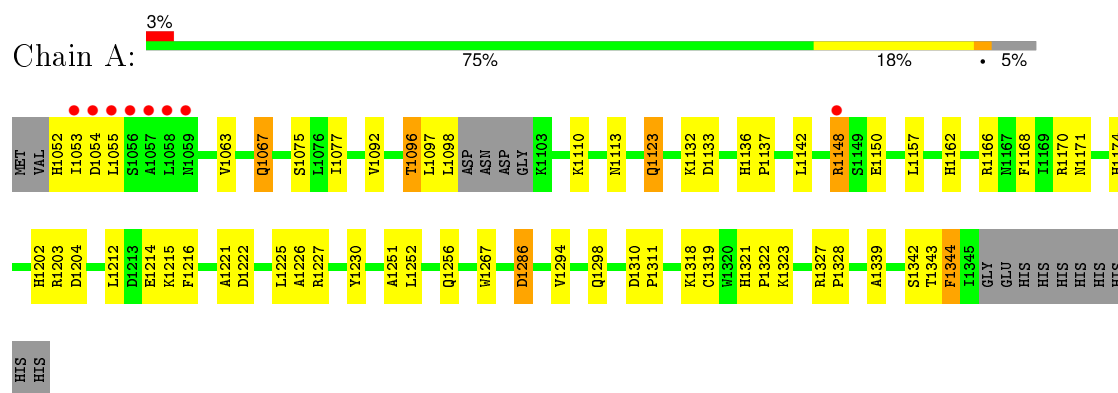


Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	N	0	0
			27	20	7		

- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	289	Total	O	0	0
			289	289		

- Molecule 1: HEPATOCYTE GROWTH FACTOR RECEPTOR



4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 2	Depositor
Cell constants a, b, c, α , β , γ	77.00Å 94.51Å 46.83Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	47.26 – 2.20 47.25 – 2.19	Depositor EDS
% Data completeness (in resolution range)	93.7 (47.26-2.20) 92.9 (47.25-2.19)	Depositor EDS
R_{merge}	0.10	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	18.71 (at 2.18Å)	Xtriage
Refinement program	CNX 2005	Depositor
R, R_{free}	0.204 , 0.256 0.199 , 0.246	Depositor DCC
R_{free} test set	505 reflections (3.09%)	DCC
Wilson B-factor (Å ²)	27.5	Xtriage
Anisotropy	0.835	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.32 , 52.8	EDS
Estimated twinning fraction	No twinning to report.	Xtriage
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.32$	Xtriage
Outliers	0 of 16937 reflections	Xtriage
F_o, F_c correlation	0.95	EDS
Total number of atoms	2625	wwPDB-VP
Average B, all atoms (Å ²)	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.84% 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: W9Z

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	0.29	0/2367	0.46	0/3205

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

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	2309	0	2337	50	0
2	A	27	0	17	1	0
3	A	289	0	0	6	0
All	All	2625	0	2354	50	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 11.

All (50) 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:1123:GLN:HA	1:A:1123:GLN:HE21	1.43	0.83

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1212:LEU:HD22	1:A:1216:PHE:HA	1.68	0.75
1:A:1202:HIS:HD2	1:A:1204:ASP:H	1.36	0.72
1:A:1321:HIS:HD2	1:A:1323:LYS:H	1.38	0.72
1:A:1166:ARG:O	1:A:1170:ARG:HG3	1.96	0.66
1:A:1077:ILE:HB	1:A:1096:THR:HG23	1.82	0.62
1:A:1286:ASP:HB3	3:A:2244:HOH:O	1.99	0.61
1:A:1202:HIS:HE1	1:A:1221:ALA:O	1.84	0.61
1:A:1148:ARG:HD3	1:A:1148:ARG:N	2.16	0.60
1:A:1318:LYS:HG2	1:A:1328:PRO:HD3	1.84	0.60
1:A:1214:GLU:OE2	1:A:1215:LYS:HE3	2.03	0.58
1:A:1202:HIS:O	1:A:1203:ARG:HB2	2.02	0.57
1:A:1157:LEU:HD21	1:A:1226:ALA:HB2	1.86	0.57
1:A:1075:SER:HA	1:A:1098:LEU:HD12	1.87	0.57
1:A:1123:GLN:CA	1:A:1123:GLN:HE21	2.16	0.56
1:A:1142:LEU:HD22	1:A:1225:LEU:HD12	1.90	0.53
1:A:1148:ARG:HG3	1:A:1148:ARG:HH11	1.74	0.52
1:A:1321:HIS:CD2	1:A:1322:PRO:HD2	2.45	0.51
1:A:1319:CYS:O	1:A:1327:ARG:HD2	2.10	0.51
1:A:1092:VAL:HG22	1:A:1110:LYS:HD3	1.94	0.50
1:A:1294:VAL:O	1:A:1298:GLN:HG3	2.12	0.49
1:A:1053:ILE:HG22	1:A:1053:ILE:O	2.11	0.49
1:A:1251:ALA:HA	1:A:1267:TRP:CD2	2.48	0.48
1:A:1202:HIS:HD2	1:A:1204:ASP:N	2.09	0.48
1:A:1202:HIS:CD2	1:A:1204:ASP:H	2.26	0.47
1:A:1132:LYS:HG3	1:A:1133:ASP:OD1	2.15	0.47
1:A:1174:HIS:HE1	3:A:2156:HOH:O	1.98	0.46
1:A:1322:PRO:HG2	1:A:1323:LYS:HE2	1.97	0.46
1:A:1063:VAL:HG12	1:A:1067:GLN:OE1	2.15	0.46
1:A:1339:ALA:O	1:A:1343:THR:HG23	2.16	0.45
1:A:1168:PHE:O	1:A:1174:HIS:HD2	1.99	0.45
1:A:1075:SER:O	1:A:1097:LEU:HD12	2.16	0.45
1:A:1055:LEU:N	1:A:1055:LEU:HD23	2.31	0.44
1:A:1310:ASP:HB2	1:A:1311:PRO:HD3	1.99	0.44
1:A:1203:ARG:HD2	3:A:2181:HOH:O	2.18	0.44
1:A:1318:LYS:HE3	1:A:1318:LYS:HB2	1.75	0.43
1:A:1052:HIS:HB2	1:A:1150:GLU:OE2	2.18	0.43
1:A:1132:LYS:HD2	3:A:2058:HOH:O	2.19	0.42
1:A:1113:ASN:ND2	3:A:2097:HOH:O	2.51	0.42
1:A:1157:LEU:HD13	2:A:2345:W9Z:C15	2.50	0.42
1:A:1252:LEU:O	1:A:1256:GLN:HG3	2.19	0.42
1:A:1054:ASP:HA	3:A:2052:HOH:O	2.18	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:1148:ARG:HG3	1:A:1148:ARG:NH1	2.33	0.42
1:A:1136:HIS:CG	1:A:1137:PRO:HD2	2.54	0.42
1:A:1171:ASN:HB3	1:A:1174:HIS:CD2	2.55	0.41
1:A:1310:ASP:N	1:A:1311:PRO:CD	2.84	0.41
1:A:1342:SER:C	1:A:1344:PHE:H	2.24	0.41
1:A:1162:HIS:HB2	1:A:1212:LEU:HB3	2.02	0.41
1:A:1110:LYS:HE3	1:A:1230:TYR:OH	2.21	0.41
1:A:1222:ASP:OD1	1:A:1227:ARG:HA	2.21	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	286/306 (94%)	278 (97%)	8 (3%)	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	257/272 (94%)	251 (98%)	6 (2%)	58	71

All (6) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1067	GLN
1	A	1096	THR
1	A	1123	GLN
1	A	1148	ARG
1	A	1286	ASP
1	A	1344	PHE

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (8) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1052	HIS
1	A	1068	HIS
1	A	1113	ASN
1	A	1123	GLN
1	A	1174	HIS
1	A	1202	HIS
1	A	1256	GLN
1	A	1321	HIS

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](#)

1 ligand is 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	W9Z	A	2345	-	25,31,31	2.60	15 (60%)	29,45,45	1.38	3 (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
2	W9Z	A	2345	-	-	0/6/12/12	0/5/5/5

All (15) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	2345	W9Z	C14-N6	-4.07	1.28	1.33
2	A	2345	W9Z	N6-N10	-3.87	1.30	1.37
2	A	2345	W9Z	C9-N4	-2.27	1.29	1.33
2	A	2345	W9Z	C12-C7	2.33	1.44	1.38
2	A	2345	W9Z	C6-C5	2.35	1.53	1.50
2	A	2345	W9Z	C20-N1	2.41	1.37	1.32
2	A	2345	W9Z	C17-C1	2.86	1.46	1.42
2	A	2345	W9Z	C4-C5	2.90	1.58	1.52
2	A	2345	W9Z	C2-C3	2.93	1.42	1.36
2	A	2345	W9Z	C19-C18	3.09	1.43	1.36
2	A	2345	W9Z	C13-C12	3.10	1.43	1.36
2	A	2345	W9Z	C7-N3	3.60	1.37	1.33
2	A	2345	W9Z	C10-N5	3.63	1.39	1.35
2	A	2345	W9Z	C3-C4	3.85	1.45	1.39
2	A	2345	W9Z	C16-C4	4.70	1.44	1.37

All (3) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	2345	W9Z	C12-C13-C14	-3.73	115.20	119.72
2	A	2345	W9Z	C15-C5-C4	-2.19	104.83	111.62
2	A	2345	W9Z	C9-N4-N5	4.63	109.03	104.24

There are no chirality outliers.

There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	2345	W9Z	1	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	290/306 (94%)	-0.34	8 (2%) 56 55	17, 31, 53, 88	0

All (8) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1057	ALA	14.5
1	A	1054	ASP	5.4
1	A	1056	SER	4.3
1	A	1053	ILE	3.1
1	A	1055	LEU	2.8
1	A	1148	ARG	2.2
1	A	1059	ASN	2.2
1	A	1058	LEU	2.2

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
2	W9Z	A	2345	27/27	0.94	0.11	1.03	15,22,25,25	0

6.5 Other polymers [i](#)

There are no such residues in this entry.