



Full wwPDB X-ray Structure Validation Report ⓘ

Apr 25, 2026 – 07:22 PM EDT

PDB ID : 3ZCL / pdb_00003zcl
Title : X-ray Structure of c-Met kinase in complex with inhibitor (S)-3-(1-(1H-pyrrolo (2,3-b)pyridin-3-yl)ethyl)-N-isopropyl-(1,2,4)triazolo(4,3-b)pyridazin-6-amine
Authors : McTigue, M.; Grodsky, N.; Ryan, K.
Deposited on : 2012-11-20
Resolution : 1.40 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 ⓘ 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 ⓘ](#)) were used in the production of this report:

MolProbity : 4-5-2 with Phenix2.0
Mogul : 2022.3.0, CSD as543be (2022)
Xtriage (Phenix) : 2.0
EDS : 3.0
Buster-report : wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics : 20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4 : 9.0.010 (Gargrove)
Density-Fitness : 1.0.12
Ideal geometry (proteins) : Engh & Huber (2001)
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP) : 2.49

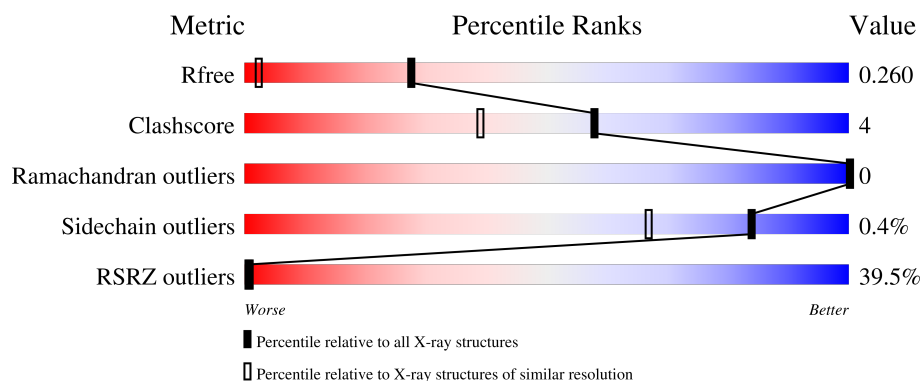
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.40 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}	180053	2563 (1.40-1.40)
Clashscore	190562	2660 (1.40-1.40)
Ramachandran outliers	187476	2611 (1.40-1.40)
Sidechain outliers	187428	2610 (1.40-1.40)
RSRZ outliers	180081	2561 (1.40-1.40)

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 $\leq 5\%$. 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	

2 Entry composition [i](#)

There are 3 unique types of molecules in this entry. The entry contains 2670 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.

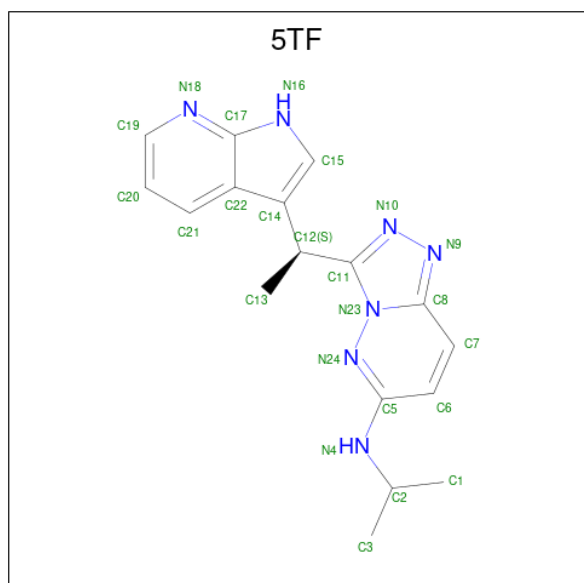
- Molecule 1 is a protein called HEPATOCYTE GROWTH FACTOR RECEPTOR.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	291	2310	1493	396	406	15	0	0	2

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 (S)-3-(1-(1H-pyrrolo(2,3-b)pyridin-3-yl)ethyl)-N-isopropyl-(1,2,4)triazolo(4,3-b)pyridazin-6-amine (CCD ID: 5TF) (formula: C₁₇H₁₉N₇).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	N	0	0
			24	17	7		

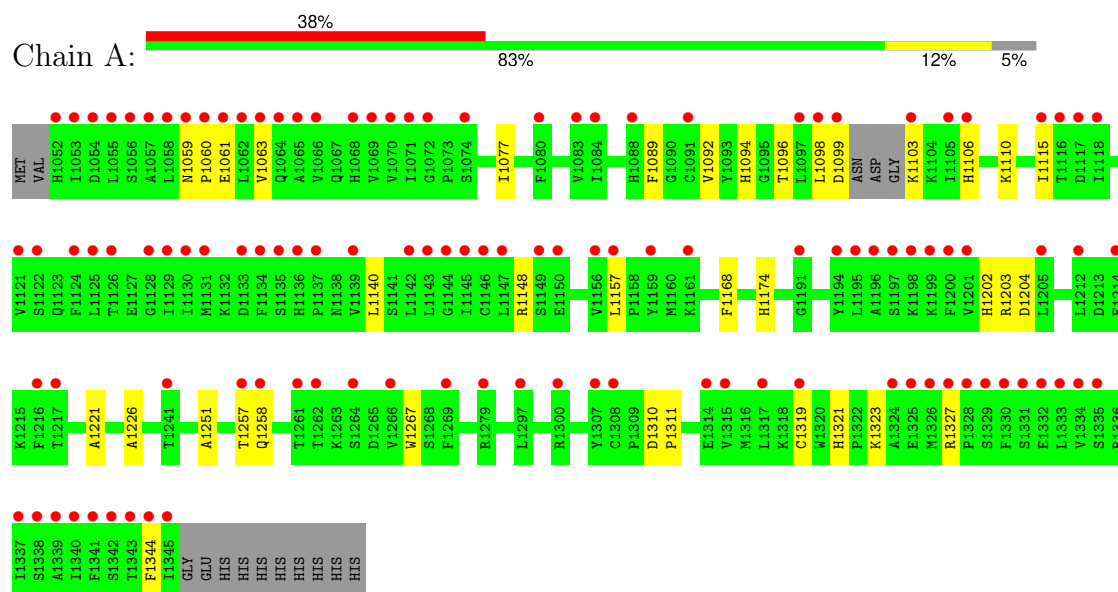
- Molecule 3 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	336	Total	O	0	0
			336	336		

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: 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)	41.46 – 1.40 41.46 – 1.40	Depositor EDS
% Data completeness (in resolution range)	82.4 (41.46-1.40) 81.1 (41.46-1.40)	Depositor EDS
R_{merge}	0.07	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	2.26 (at 1.40Å)	Xtriage
Refinement program	CNX 2005	Depositor
R, R_{free}	0.193 , 0.211 0.253 , 0.260	Depositor DCC
R_{free} test set	2974 reflections (5.06%)	wwPDB-VP
Wilson B-factor (Å ²)	14.3	Xtriage
Anisotropy	0.975	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 57.3	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.94	EDS
Total number of atoms	2670	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 5.86% 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 [i](#)

5.1 Standard geometry [i](#)

Bond lengths and bond angles in the following residue types are not validated in this section: 5TF

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	0.36	2/2368 (0.1%)	0.61	0/3207

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	A	1344	PHE	C-N	-5.82	1.25	1.33
1	A	1098	LEU	C-N	-5.65	1.25	1.33

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	2310	0	2337	21	0
2	A	24	0	19	1	0
3	A	336	0	0	0	0
All	All	2670	0	2356	21	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 (21) 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:1140:LEU:HD21	1:A:1157:LEU:HD13	1.52	0.89
1:A:1321:HIS:HD2	1:A:1323:LYS:H	1.23	0.85
1:A:1202:HIS:HD2	1:A:1204:ASP:H	1.25	0.82
1:A:1157:LEU:HD12	2:A:1:5TF:H132	1.66	0.77
1:A:1157:LEU:HD11	1:A:1226:ALA:HB2	1.76	0.66
1:A:1092:VAL:HG22	1:A:1110:LYS:HD3	1.82	0.59
1:A:1202:HIS:HE1	1:A:1221:ALA:O	1.88	0.57
1:A:1099:ASP:N	1:A:1103:LYS:HG3	2.21	0.56
1:A:1077:ILE:HB	1:A:1096:THR:OG1	2.05	0.55
1:A:1059:ASN:ND2	1:A:1060:PRO:HD2	2.23	0.53
1:A:1319:CYS:O	1:A:1327:ARG:HD2	2.10	0.51
1:A:1310:ASP:N	1:A:1311:PRO:HD2	2.28	0.49
1:A:1168:PHE:O	1:A:1174:HIS:HD2	1.96	0.48
1:A:1202:HIS:O	1:A:1203:ARG:HB2	2.14	0.47
1:A:1251:ALA:HA	1:A:1267:TRP:CD2	2.53	0.44
1:A:1257:THR:O	1:A:1258:GLN:HB2	2.19	0.43
1:A:1059:ASN:O	1:A:1063:VAL:HG23	2.18	0.43
1:A:1140:LEU:CD2	1:A:1157:LEU:HD13	2.35	0.43
1:A:1059:ASN:OD1	1:A:1061:GLU:HB2	2.20	0.41
1:A:1094:HIS:HD2	1:A:1106:HIS:NE2	2.19	0.40
1:A:1089:PHE:CD1	1:A:1115:ILE:HD11	2.57	0.40

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	287/306 (94%)	281 (98%)	6 (2%)	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%)	256 (100%)	1 (0%)	84	67

All (1) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1148	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (5) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1094	HIS
1	A	1113	ASN
1	A	1174	HIS
1	A	1202	HIS
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 oligosaccharides 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	5TF	A	1	-	25,27,27	1.52	4 (16%)	33,39,39	0.88	1 (3%)

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	5TF	A	1	-	-	3/12/12/12	0/4/4/4

All (4) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1	5TF	C6-C5	5.12	1.52	1.41
2	A	1	5TF	C15-C14	2.92	1.40	1.36
2	A	1	5TF	C21-C22	2.38	1.43	1.39
2	A	1	5TF	C20-C21	2.10	1.42	1.38

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1	5TF	C6-C5-N4	-2.33	117.27	122.40

There are no chirality outliers.

All (3) torsion outliers are listed below:

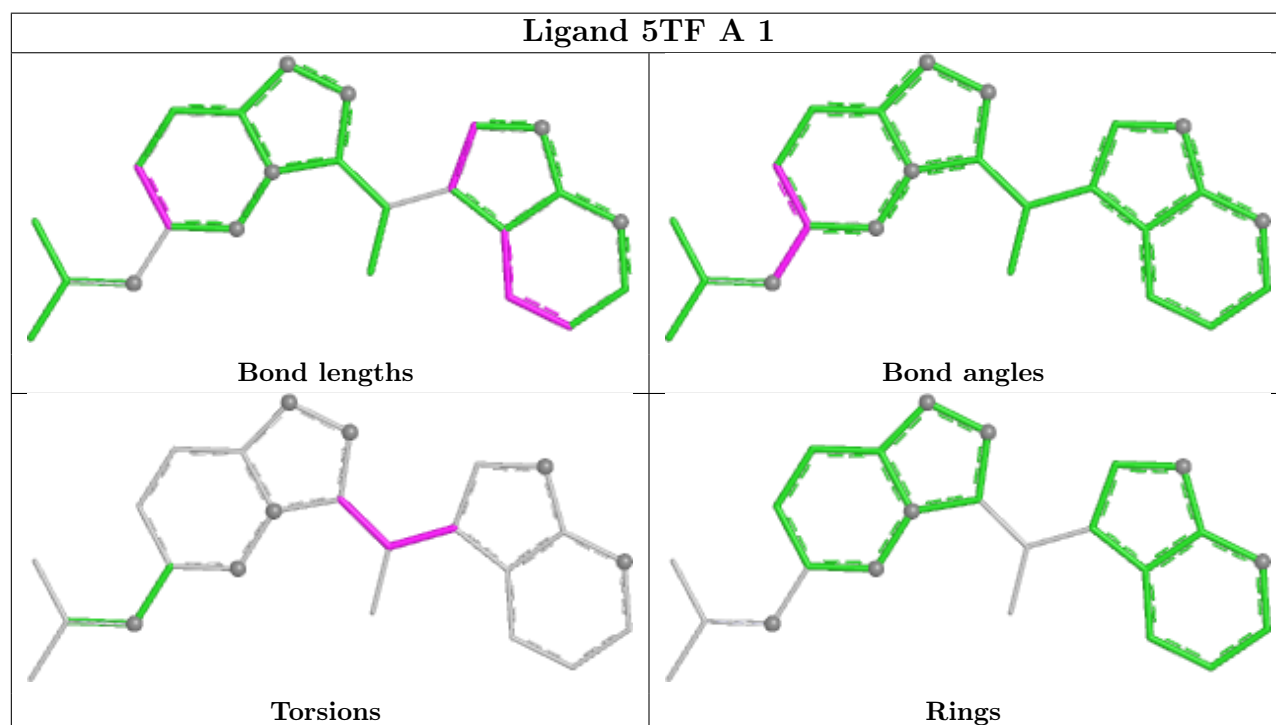
Mol	Chain	Res	Type	Atoms
2	A	1	5TF	C11-C12-C14-C15
2	A	1	5TF	C11-C12-C14-C22
2	A	1	5TF	N10-C11-C12-C14

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1	5TF	1	0

The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. Any bond that is central to one or more torsion angles identified as an outlier by Mogul will be highlighted in the graph. For rings, the root-mean-square deviation (RMSD) between the ring in question and similar rings identified by Mogul is calculated over all ring torsion angles. If the average RMSD is greater than 60 degrees and the minimal RMSD between the ring in question and any Mogul-identified rings is also greater than 60 degrees, then that ring is considered an outlier. The outliers are highlighted in purple. The color gray indicates Mogul did not find sufficient equivalents in the CSD to analyse the geometry.



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	291/306 (95%)	1.96	115 (39%) 1 1	13, 21, 40, 84	0

All (115) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	A	1057	ALA	8.2
1	A	1099	ASP	7.6
1	A	1053	ILE	7.5
1	A	1055	LEU	7.2
1	A	1052	HIS	7.1
1	A	1058	LEU	6.9
1	A	1066	VAL	5.6
1	A	1060	PRO	5.0
1	A	1130	ILE	5.0
1	A	1059	ASN	5.0
1	A	1054	ASP	4.9
1	A	1069	VAL	4.6
1	A	1345	ILE	4.5
1	A	1103	LYS	4.3
1	A	1339	ALA	4.3
1	A	1070	VAL	4.2
1	A	1098	LEU	4.1
1	A	1061	GLU	4.0
1	A	1062	LEU	3.9
1	A	1056	SER	3.8
1	A	1128	GLY	3.8
1	A	1330	PHE	3.7
1	A	1117	ASP	3.6
1	A	1324	ALA	3.6
1	A	1129	ILE	3.6
1	A	1196	ALA	3.6
1	A	1063	VAL	3.5

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Mol	Chain	Res	Type	RSRZ
1	A	1065	ALA	3.5
1	A	1064	GLN	3.4
1	A	1071	ILE	3.4
1	A	1159	TYR	3.4
1	A	1327	ARG	3.4
1	A	1334	VAL	3.3
1	A	1133	ASP	3.3
1	A	1124	PHE	3.3
1	A	1134	PHE	3.3
1	A	1194	TYR	3.3
1	A	1072	GLY	3.1
1	A	1325	GLU	3.1
1	A	1147	LEU	3.0
1	A	1198	LYS	3.0
1	A	1157	LEU	3.0
1	A	1197	SER	3.0
1	A	1335	SER	3.0
1	A	1328	PRO	2.9
1	A	1146	CYS	2.9
1	A	1319	CYS	2.9
1	A	1068	HIS	2.9
1	A	1139	VAL	2.8
1	A	1143	LEU	2.8
1	A	1333	LEU	2.8
1	A	1344	PHE	2.8
1	A	1331	SER	2.8
1	A	1343	THR	2.8
1	A	1307	TYR	2.8
1	A	1241	THR	2.8
1	A	1105	ILE	2.8
1	A	1266	VAL	2.7
1	A	1149	SER	2.7
1	A	1338	SER	2.7
1	A	1258	GLN	2.7
1	A	1083	VAL	2.7
1	A	1131	MET	2.7
1	A	1199	LYS	2.7
1	A	1200	PHE	2.7
1	A	1091	CYS	2.7
1	A	1195	LEU	2.7
1	A	1262	THR	2.7
1	A	1340	ILE	2.7

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Mol	Chain	Res	Type	RSRZ
1	A	1144	GLY	2.6
1	A	1201	VAL	2.6
1	A	1214	GLU	2.6
1	A	1212	LEU	2.6
1	A	1279	ARG	2.6
1	A	1121	VAL	2.6
1	A	1118	ILE	2.6
1	A	1342	SER	2.6
1	A	1126	THR	2.5
1	A	1337	ILE	2.5
1	A	1084	ILE	2.5
1	A	1329	SER	2.5
1	A	1269	PHE	2.5
1	A	1257	THR	2.5
1	A	1088	HIS	2.5
1	A	1308	CYS	2.4
1	A	1332	GLU	2.4
1	A	1106	HIS	2.4
1	A	1125	LEU	2.4
1	A	1136	HIS	2.4
1	A	1115	ILE	2.4
1	A	1261	THR	2.4
1	A	1137	PRO	2.3
1	A	1297	LEU	2.3
1	A	1142	LEU	2.3
1	A	1135	SER	2.3
1	A	1145	ILE	2.3
1	A	1317	LEU	2.3
1	A	1074	SER	2.3
1	A	1326	MET	2.2
1	A	1191	GLY	2.2
1	A	1080	PHE	2.2
1	A	1341	PHE	2.2
1	A	1116	THR	2.1
1	A	1300	ARG	2.1
1	A	1314	GLU	2.1
1	A	1217	THR	2.1
1	A	1216	PHE	2.1
1	A	1315	VAL	2.1
1	A	1161	LYS	2.1
1	A	1150	GLU	2.1
1	A	1122	SER	2.1

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Mol	Chain	Res	Type	RSRZ
1	A	1205	LEU	2.0
1	A	1264	SER	2.0
1	A	1156	VAL	2.0
1	A	1097	LEU	2.0

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 oligosaccharides in this entry.

6.4 Ligands [i](#)

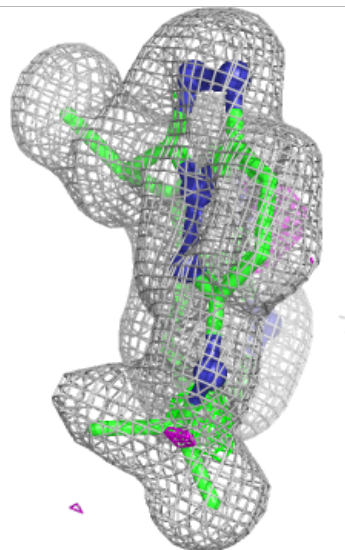
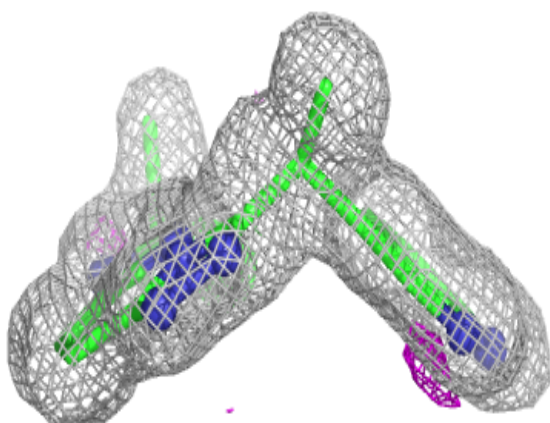
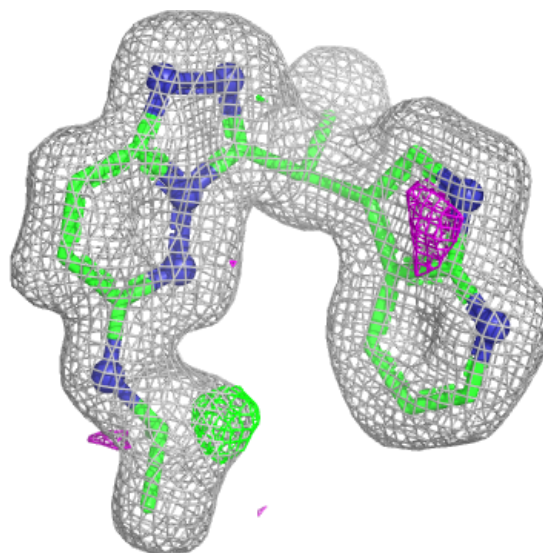
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists the number of atoms with occupancy less than 0.9.

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	5TF	A	1	24/24	0.91	0.10	13,15,22,25	0

The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation to approximate a three-dimensional view.

Electron density around 5TF A 1:

$2mF_o-DF_c$ (at 0.7 rmsd) in gray
 mF_o-DF_c (at 3 rmsd) in purple (negative)
and green (positive)



6.5 Other polymers [i](#)

There are no such residues in this entry.