



# Full wwPDB X-ray Structure Validation Report

May 16, 2020 – 08:08 am BST

PDB ID : 5HOA  
Title : Crystal structure of c-Met L1195V in complex with SAR125844  
Authors : Vallee, F.; Marquette, J.-P.  
Deposited on : 2016-01-19  
Resolution : 2.14 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](mailto: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.

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

MolProbity : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.13  
EDS : 2.11  
buster-report : 1.1.7 (2018)  
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) : 2.11

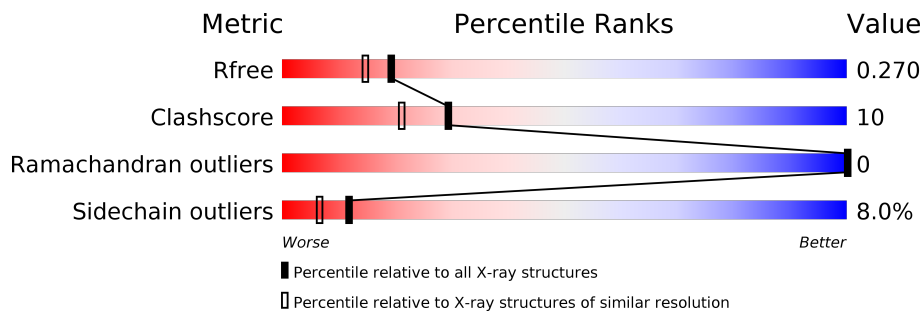
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.14 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	2523 (2.16-2.12)
Clashscore	141614	2653 (2.16-2.12)
Ramachandran outliers	138981	2618 (2.16-2.12)
Sidechain outliers	138945	2617 (2.16-2.12)

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  $\geq 3$ , 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  $\leq 5\%$ .

Mol	Chain	Length	Quality of chain
1	A	312	

## 2 Entry composition i

There are 3 unique types of molecules in this entry. The entry contains 1907 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.

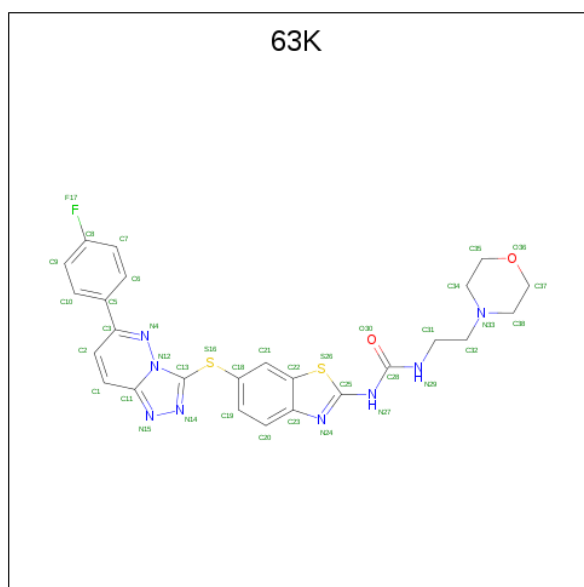
- Molecule 1 is a protein called Hepatocyte growth factor receptor.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	A	225	1810	1179	309	310	12	0	0	0

There are 4 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	1194	PHE	TYR	conflict	UNP P08581
A	1195	VAL	LEU	conflict	UNP P08581
A	1234	PHE	TYR	conflict	UNP P08581
A	1235	ASP	TYR	conflict	UNP P08581

- Molecule 2 is 1-(6-{[6-(4-fluorophenyl)[1,2,4]triazolo[4,3-b]pyridazin-3-yl]sulfanyl}-1,3-benzothiazol-2-yl)-3-[2-(morpholin-4-yl)ethyl]urea (three-letter code: 63K) (formula: C<sub>25</sub>H<sub>23</sub>FN<sub>8</sub>O<sub>2</sub>S<sub>2</sub>).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	F	N	O			S
2	A	1	38	25	1	8	2	2	0	0

- Molecule 3 is water.

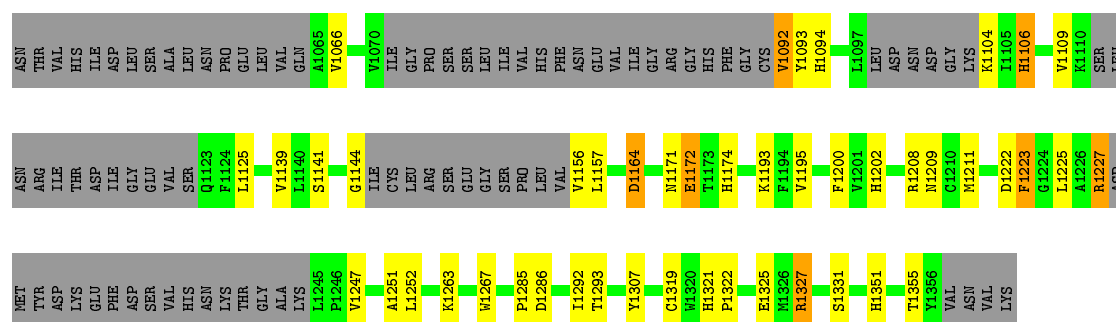
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	59	Total	O	0	0
			59	59		

### 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 the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry. 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. 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

Chain A: 



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 21 21 21	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	42.88Å 47.55Å 153.65Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	31.85 – 2.14 31.84 – 2.14	Depositor EDS
% Data completeness (in resolution range)	100.0 (31.85-2.14) 97.6 (31.84-2.14)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.10	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.37 (at 2.14Å)	Xtriage
Refinement program	REFMAC	Depositor
R, $R_{free}$	(Not available) , (Not available) 0.238 , 0.270	Depositor DCC
$R_{free}$ test set	898 reflections (5.08%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	31.3	Xtriage
Anisotropy	0.174	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.40 , 65.3	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.53$ , $\langle L^2 \rangle = 0.38$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	1907	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	34.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 10.13% of the height of the origin peak. No significant pseudotranslation is detected.*

<sup>1</sup>Intensities estimated from amplitudes.

<sup>2</sup>Theoretical 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: 63K

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	0.74	0/1855	0.75	1/2507 (0.0%)

There are no bond length outliers.

All (1) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	A	1327	ARG	NE-CZ-NH2	-6.07	117.27	120.30

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	1810	0	1826	34	0
2	A	38	0	0	1	0
3	A	59	0	0	3	0
All	All	1907	0	1826	35	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 10.

All (35) 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:1092:VAL:HA	1:A:1109:VAL:O	1.80	0.82
1:A:1144:GLY:O	1:A:1156:VAL:CG2	2.32	0.78
1:A:1351:HIS:ND1	3:A:1501:HOH:O	2.18	0.76
1:A:1172:GLU:CD	1:A:1172:GLU:H	1.94	0.69
1:A:1139:VAL:HG13	1:A:1223:PHE:HZ	1.58	0.69
1:A:1247:VAL:HG13	1:A:1292:ILE:HG21	1.73	0.69
1:A:1195:VAL:HG13	1:A:1200:PHE:HD2	1.58	0.68
1:A:1109:VAL:HG22	1:A:1156:VAL:HG12	1.75	0.68
1:A:1139:VAL:HG13	1:A:1223:PHE:CZ	2.34	0.63
1:A:1144:GLY:O	1:A:1156:VAL:HG23	2.00	0.59
1:A:1171:ASN:HB3	1:A:1174:HIS:ND1	2.18	0.57
2:A:1401:63K:O30	2:A:1401:63K:S26	2.63	0.57
1:A:1094:HIS:ND1	1:A:1106:HIS:CE1	2.74	0.56
1:A:1195:VAL:CG1	1:A:1200:PHE:HD2	2.20	0.55
1:A:1094:HIS:ND1	1:A:1106:HIS:HE1	2.04	0.54
1:A:1285:PRO:HD3	3:A:1523:HOH:O	2.09	0.53
1:A:1164:ASP:HA	1:A:1211:MET:HE2	1.89	0.53
1:A:1202:HIS:O	1:A:1227:ARG:NH2	2.42	0.53
1:A:1307:TYR:OH	1:A:1351:HIS:HD2	1.91	0.52
1:A:1251:ALA:HA	1:A:1267:TRP:CD2	2.44	0.52
1:A:1321:HIS:ND1	1:A:1322:PRO:HD2	2.25	0.52
1:A:1193:LYS:HE3	1:A:1331:SER:HB2	1.94	0.51
1:A:1263:LYS:NZ	1:A:1327:ARG:O	2.45	0.48
1:A:1223:PHE:HD2	1:A:1223:PHE:H	1.62	0.47
1:A:1319:CYS:O	1:A:1327:ARG:HD3	2.15	0.47
1:A:1139:VAL:CG1	1:A:1223:PHE:HZ	2.27	0.45
1:A:1093:TYR:N	1:A:1109:VAL:O	2.49	0.45
1:A:1092:VAL:N	3:A:1506:HOH:O	2.49	0.44
1:A:1223:PHE:HD2	1:A:1223:PHE:N	2.16	0.44
1:A:1247:VAL:HG13	1:A:1292:ILE:CG2	2.45	0.43
1:A:1144:GLY:O	1:A:1156:VAL:HG22	2.16	0.43
1:A:1223:PHE:CD2	1:A:1223:PHE:N	2.87	0.42
1:A:1193:LYS:HD2	1:A:1331:SER:HA	2.01	0.42
1:A:1209:ASN:HB3	1:A:1222:ASP:HB3	2.02	0.41
1:A:1066:VAL:HG11	1:A:1125:LEU:HD22	2.02	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	213/312 (68%)	207 (97%)	6 (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	199/277 (72%)	183 (92%)	16 (8%)	12 6

All (16) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	A	1092	VAL
1	A	1104	LYS
1	A	1106	HIS
1	A	1141	SER
1	A	1157	LEU
1	A	1164	ASP
1	A	1172	GLU
1	A	1208	ARG
1	A	1223	PHE
1	A	1225	LEU
1	A	1227	ARG
1	A	1252	LEU
1	A	1286	ASP

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Mol	Chain	Res	Type
1	A	1293	THR
1	A	1325	GLU
1	A	1355	THR

Some sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (4) such sidechains are listed below:

Mol	Chain	Res	Type
1	A	1106	HIS
1	A	1167	ASN
1	A	1304	GLN
1	A	1351	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	63K	A	1401	-	36,43,43	0.93	2 (5%)	43,60,60	1.55	8 (18%)

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	63K	A	1401	-	-	1/14/26/26	0/6/6/6

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	1401	63K	C11-N15	2.87	1.37	1.33
2	A	1401	63K	C5-C3	-2.19	1.45	1.48

All (8) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	A	1401	63K	C2-C1-C11	-5.07	113.62	119.76
2	A	1401	63K	C19-C20-C23	-3.09	116.95	120.84
2	A	1401	63K	C22-C23-N24	2.91	114.81	108.04
2	A	1401	63K	C37-C38-N33	-2.72	105.98	110.10
2	A	1401	63K	C38-N33-C34	2.68	114.86	108.83
2	A	1401	63K	C18-C21-C22	-2.59	116.07	120.17
2	A	1401	63K	O36-C37-C38	-2.57	106.14	111.80
2	A	1401	63K	C31-C32-N33	-2.31	107.14	112.88

There are no chirality outliers.

All (1) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	1401	63K	N29-C31-C32-N33

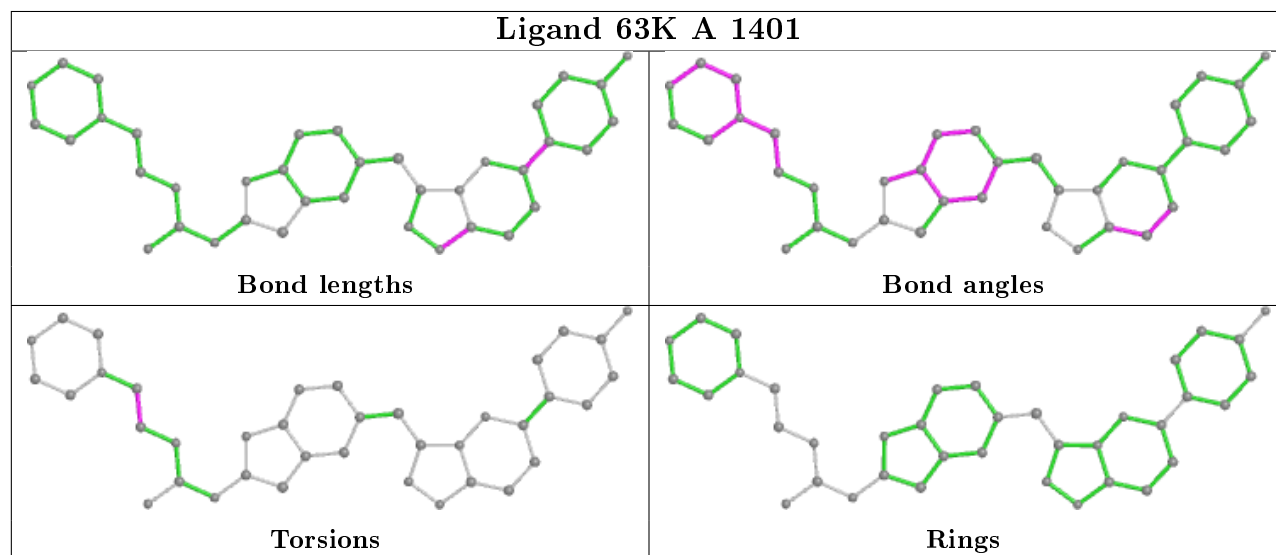
There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	A	1401	63K	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 [\(i\)](#)

### 6.1 Protein, DNA and RNA chains [\(i\)](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.2 Non-standard residues in protein, DNA, RNA chains [\(i\)](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

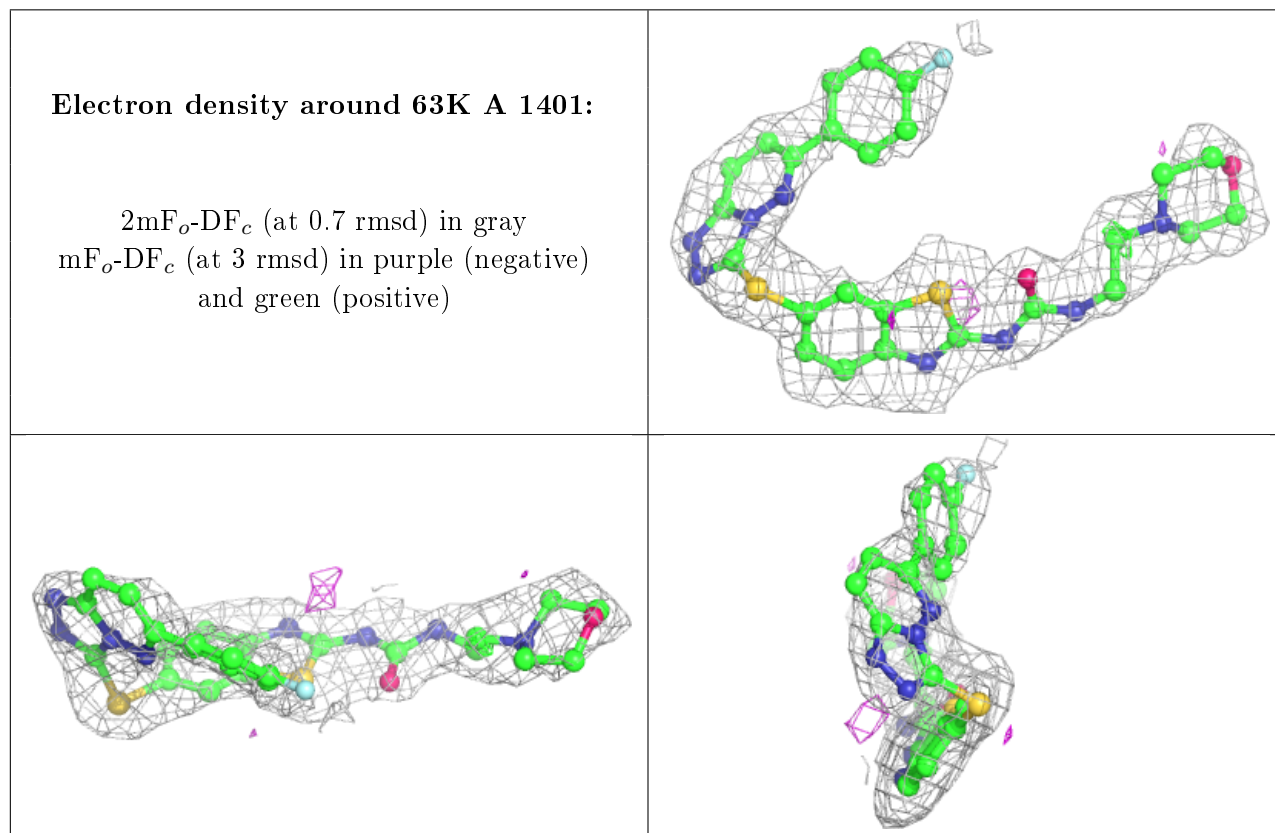
### 6.3 Carbohydrates [\(i\)](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

### 6.4 Ligands [\(i\)](#)

Unable to reproduce the depositors R factor - this section is therefore empty.

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.



## 6.5 Other polymers

Unable to reproduce the depositors R factor - this section is therefore empty.