



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 10, 2026 – 02:09 AM UTC

PDB ID : 8PYK / pdb\_00008pyk  
Title : Human IGF1R with inhibitor 47  
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Deposited on : 2023-07-25  
Resolution : 2.23 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.

The types of validation reports are described at

<http://www.wwpdb.org/validation/2017/FAQs#types>.

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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

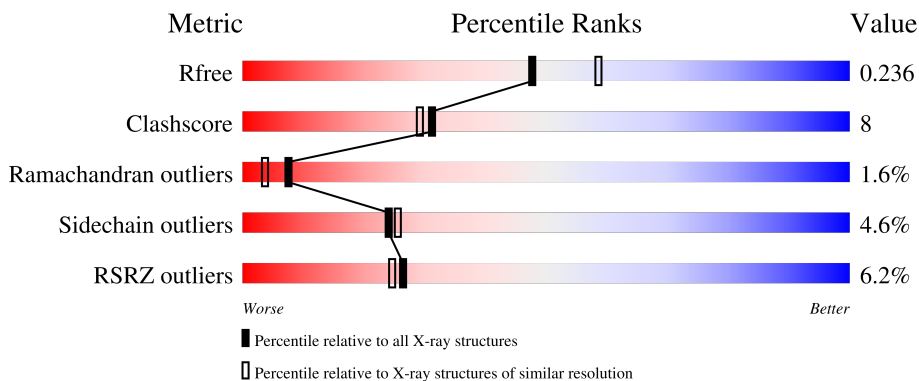
# 1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.23 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	3416 (2.26-2.22)
Clashscore	190562	3556 (2.26-2.22)
Ramachandran outliers	187476	3500 (2.26-2.22)
Sidechain outliers	187428	3501 (2.26-2.22)
RSRZ outliers	180081	3415 (2.26-2.22)

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  $\geq 3$ , 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  $\leq 5\%$ . 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	AAA	321	

The following table lists non-polymeric compounds, carbohydrate monomers and non-standard residues in protein, DNA, RNA chains that are outliers for geometric or electron-density-fit criteria:

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
3	NI	AAA	1302	-	-	X	-

## 2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 2284 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.

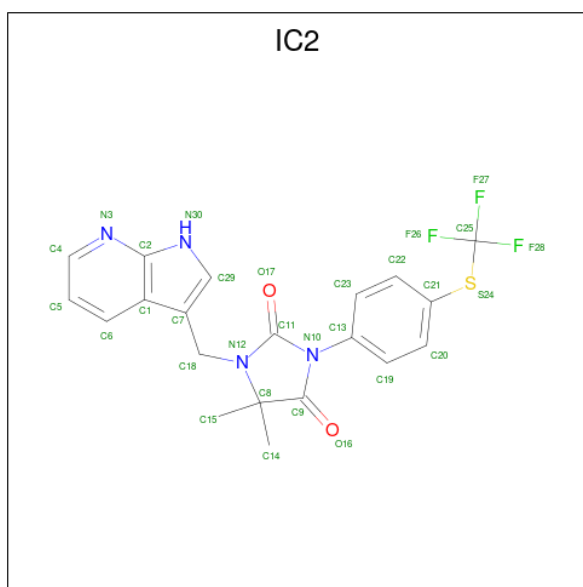
- Molecule 1 is a protein called Insulin-like growth factor 1 receptor beta chain.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
1	AAA	274	2194	1394	371	407	22	0	1	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
AAA	973	MET	-	initiating methionine	UNP P08069
AAA	1287	ALA	-	expression tag	UNP P08069
AAA	1288	GLU	-	expression tag	UNP P08069
AAA	1289	ASN	-	expression tag	UNP P08069
AAA	1290	LEU	-	expression tag	UNP P08069
AAA	1291	TYR	-	expression tag	UNP P08069
AAA	1292	PHE	-	expression tag	UNP P08069
AAA	1293	GLN	-	expression tag	UNP P08069

- Molecule 2 is 5,5-dimethyl-1-(1H-pyrrolo[2,3-b]pyridin-3-ylmethyl)-3-[4-(trifluoromethylsulfanyl)phenyl]imidazolidine-2,4-dione (CCD ID: IC2) (formula: C<sub>20</sub>H<sub>17</sub>F<sub>3</sub>N<sub>4</sub>O<sub>2</sub>S) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	
			Total	C	F	N	O			S
2	AAA	1	30	20	3	4	2	1	0	0

- Molecule 3 is NICKEL (II) ION (CCD ID: NI) (formula: Ni).

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	Ni		
3	AAA	3	3	3	0	0

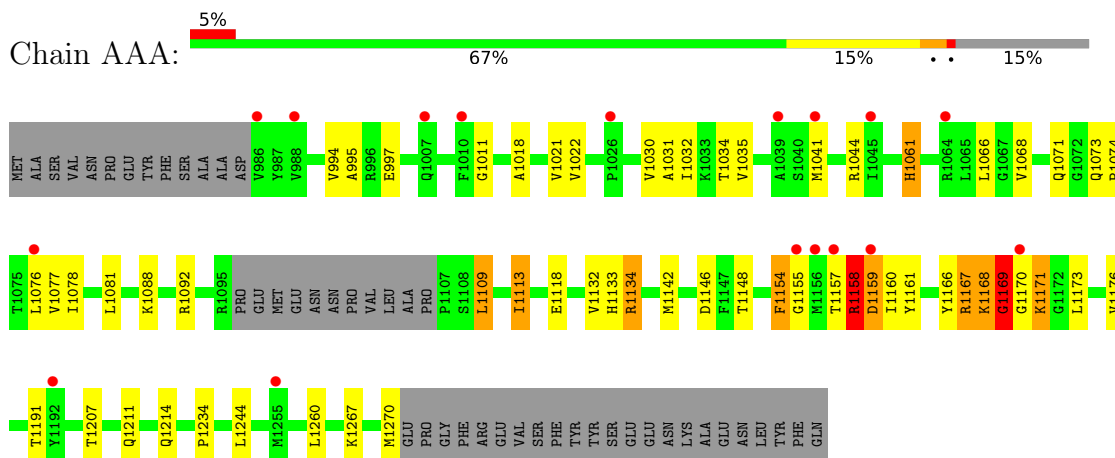
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
			Total	O		
4	AAA	57	57	57	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: Insulin-like growth factor 1 receptor beta chain



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 43 21 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	69.54Å 69.54Å 140.44Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	21.13 – 2.23 21.13 – 2.23	Depositor EDS
% Data completeness (in resolution range)	99.8 (21.13-2.23) 99.8 (21.13-2.23)	Depositor EDS
$R_{merge}$	0.07	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.15 (at 2.23Å)	Xtrriage
Refinement program	REFMAC 5.8.0267	Depositor
R, $R_{free}$	0.198 , 0.253 (Not available) , 0.236	Depositor DCC
$R_{free}$ test set	872 reflections (4.99%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	50.7	Xtrriage
Anisotropy	0.239	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.37 , 55.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.49$ , $\langle L^2 \rangle = 0.32$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	2284	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	72.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 6.50% 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: NI, IC2

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	AAA	1.19	3/2240 (0.1%)	1.53	12/3016 (0.4%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	AAA	1132	VAL	C-O	-5.79	1.17	1.24
1	AAA	1134	ARG	N-CA	5.59	1.52	1.46
1	AAA	1011	GLY	C-N	5.05	1.40	1.33

All (12) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	AAA	1169	GLY	CA-C-N	7.56	128.18	119.94
1	AAA	1169	GLY	C-N-CA	7.56	128.18	119.94
1	AAA	1267	LYS	CA-C-N	6.29	128.99	120.38
1	AAA	1267	LYS	C-N-CA	6.29	128.99	120.38
1	AAA	1154	PHE	CA-C-O	-6.24	114.15	122.51
1	AAA	1191	THR	CA-CB-OG1	-5.79	100.91	109.60
1	AAA	1134	ARG	NE-CZ-NH2	5.78	124.40	119.20
1	AAA	1158	ARG	N-CA-C	-5.71	105.62	112.59
1	AAA	1134	ARG	NE-CZ-NH1	-5.53	115.97	121.50
1	AAA	1161	TYR	CB-CA-C	5.13	120.23	111.46
1	AAA	1061	HIS	CA-CB-CG	-5.11	108.69	113.80
1	AAA	1260	LEU	CA-C-O	-5.01	115.56	120.82

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	AAA	2194	0	2189	35	0
2	AAA	30	0	0	1	0
3	AAA	3	0	0	1	1
4	AAA	57	0	0	1	2
All	All	2284	0	2189	36	2

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 8.

All (36) 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:AAA:995:ALA:HB1	1:AAA:997:GLU:OE1	1.86	0.75
3:AAA:1302:NI:NI	4:AAA:1401:HOH:O	1.35	0.71
1:AAA:1030:VAL:HG23	1:AAA:1032:ILE:HD11	1.76	0.67
1:AAA:1032:ILE:HD12	1:AAA:1078:ILE:HG13	1.82	0.62
1:AAA:1074:PRO:HG2	1:AAA:1076:LEU:HD21	1.83	0.60
1:AAA:1133:HIS:O	1:AAA:1134:ARG:HB2	2.04	0.58
1:AAA:1018:ALA:HB1	1:AAA:1021:VAL:HG11	1.86	0.56
1:AAA:1109:LEU:HD22	1:AAA:1113:ILE:HG12	1.88	0.55
1:AAA:1168:LYS:O	1:AAA:1169:GLY:C	2.48	0.55
1:AAA:1066:LEU:HB2	1:AAA:1078:ILE:HG22	1.89	0.54
1:AAA:1031:ALA:C	1:AAA:1032:ILE:HD13	2.33	0.54
1:AAA:1211:GLN:HB2	1:AAA:1214:GLN:HG3	1.90	0.52
1:AAA:1159:ASP:N	1:AAA:1159:ASP:OD1	2.44	0.50
1:AAA:1021:VAL:HG23	1:AAA:1022:VAL:HG23	1.94	0.49
1:AAA:1034:THR:HG22	1:AAA:1076:LEU:HD22	1.95	0.48
1:AAA:1030:VAL:CG2	1:AAA:1032:ILE:HD11	2.43	0.48
1:AAA:1061:HIS:CE1	1:AAA:1118:GLU:HG2	2.48	0.48
1:AAA:1270:MET:O	1:AAA:1270:MET:CG	2.63	0.47
1:AAA:1032:ILE:HD13	1:AAA:1032:ILE:N	2.29	0.46
1:AAA:1158:ARG:NE	1:AAA:1158:ARG:HA	2.31	0.46
1:AAA:1166:TYR:HD2	1:AAA:1176:VAL:HG11	1.81	0.46
1:AAA:1113:ILE:HA	1:AAA:1113:ILE:HD13	1.72	0.46
1:AAA:1170:GLY:O	1:AAA:1171:LYS:C	2.59	0.45

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:AAA:1034:THR:HG22	1:AAA:1076:LEU:CD2	2.47	0.45
1:AAA:1146:ASP:OD1	1:AAA:1148:THR:OG1	2.35	0.44
1:AAA:1167:ARG:HG2	1:AAA:1173:LEU:HD23	1.97	0.44
1:AAA:1244:LEU:HD12	1:AAA:1244:LEU:HA	1.88	0.43
1:AAA:1071:GLN:HE21	1:AAA:1071:GLN:N	2.16	0.43
1:AAA:1207:THR:HG22	1:AAA:1234:PRO:HB3	2.00	0.43
1:AAA:1158:ARG:HA	1:AAA:1158:ARG:CZ	2.49	0.43
1:AAA:1092:ARG:HH22	1:AAA:1211:GLN:HE21	1.66	0.42
1:AAA:1035:VAL:HG11	1:AAA:1044:ARG:HG2	2.01	0.42
1:AAA:1068:VAL:HG12	1:AAA:1077:VAL:HG22	2.01	0.42
1:AAA:1158:ARG:HB3	1:AAA:1160:ILE:HG22	2.01	0.42
1:AAA:1142:MET:HE2	2:AAA:1301:IC2:C1	2.50	0.41
1:AAA:1088:LYS:NZ	1:AAA:1211:GLN:HE22	2.20	0.40

All (2) symmetry-related close contacts are listed below. The label for Atom-2 includes the symmetry operator and encoded unit-cell translations to be applied.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
3:AAA:1302:NI:NI	4:AAA:1402:HOH:O[3_454]	1.21	0.99
4:AAA:1403:HOH:O	4:AAA:1416:HOH:O[4_445]	2.05	0.15

## 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	AAA	250/321 (78%)	233 (93%)	13 (5%)	4 (2%)	<b>7</b> <b>4</b>

All (4) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	AAA	1157	THR
1	AAA	1155	GLY

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Mol	Chain	Res	Type
1	AAA	1169	GLY
1	AAA	1171	LYS

### 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	AAA	240/280 (86%)	229 (95%)	11 (5%)	24 25

All (11) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	AAA	994	VAL
1	AAA	1041	MET
1	AAA	1073	GLN
1	AAA	1081	LEU
1	AAA	1109	LEU
1	AAA	1113	ILE
1	AAA	1154	PHE
1	AAA	1158	ARG
1	AAA	1159	ASP
1	AAA	1167	ARG
1	AAA	1168	LYS

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 oligosaccharides in this entry.

## 5.6 Ligand geometry [i](#)

Of 4 ligands modelled in this entry, 3 are monoatomic - leaving 1 for Mogul analysis.

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	IC2	AAA	1301	-	32,33,33	1.94	7 (21%)	44,51,51	1.93	7 (15%)

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	IC2	AAA	1301	-	-	0/13/37/37	0/4/4/4

All (7) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	AAA	1301	IC2	C13-N10	-6.93	1.33	1.44
2	AAA	1301	IC2	C1-C7	-3.62	1.38	1.44
2	AAA	1301	IC2	C11-N10	-3.39	1.33	1.40
2	AAA	1301	IC2	C9-N10	-2.72	1.35	1.40
2	AAA	1301	IC2	C25-S24	2.66	1.87	1.77
2	AAA	1301	IC2	C11-N12	-2.47	1.33	1.37
2	AAA	1301	IC2	C2-N30	-2.45	1.32	1.36

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	AAA	1301	IC2	C15-C8-N12	-7.13	102.91	111.48
2	AAA	1301	IC2	C1-C2-N3	-5.43	119.73	126.31

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	AAA	1301	IC2	C6-C1-C2	4.13	121.28	117.16
2	AAA	1301	IC2	N30-C2-N3	3.40	132.19	126.69
2	AAA	1301	IC2	C15-C8-C9	2.75	113.11	107.89
2	AAA	1301	IC2	C14-C8-C9	2.24	112.16	107.89
2	AAA	1301	IC2	C18-N12-C11	2.17	125.37	121.84

There are no chirality outliers.

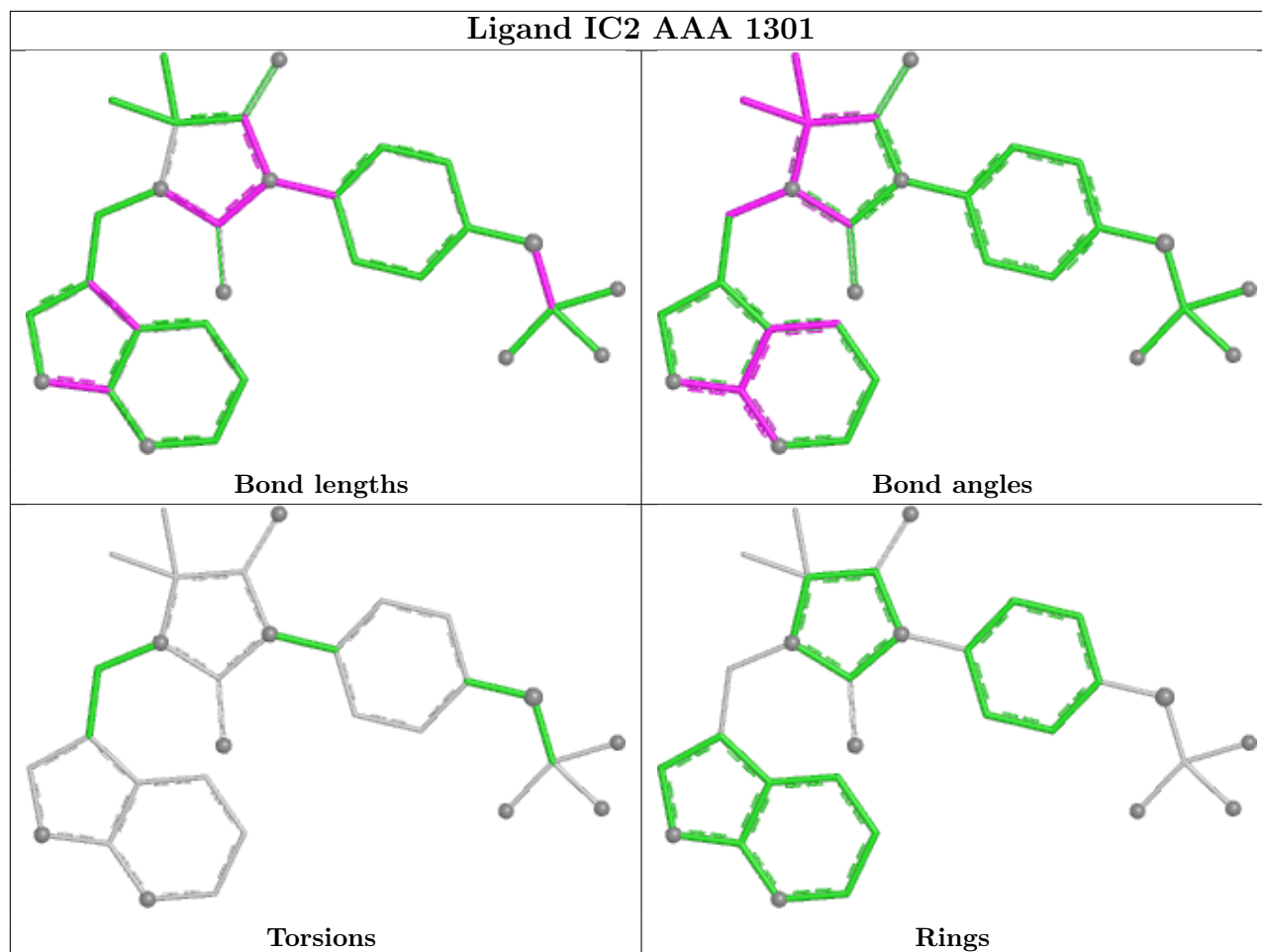
There are no torsion outliers.

There are no ring outliers.

1 monomer is involved in 1 short contact:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	AAA	1301	IC2	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](#)

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, 95<sup>th</sup> 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 <sup>2</sup> )	Q<0.9
1	AAA	274/321 (85%)	0.26	17 (6%) 26 24	33, 66, 127, 150	1 (0%)

All (17) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	AAA	986	VAL	4.7
1	AAA	1157	THR	3.8
1	AAA	1155	GLY	2.5
1	AAA	1159	ASP	2.4
1	AAA	1064[A]	ARG	2.4
1	AAA	1026	PRO	2.3
1	AAA	1170	GLY	2.2
1	AAA	1076	LEU	2.2
1	AAA	988	VAL	2.2
1	AAA	1010	PHE	2.2
1	AAA	1045	ILE	2.1
1	AAA	1156	MET	2.1
1	AAA	1039	ALA	2.1
1	AAA	1192	TYR	2.1
1	AAA	1255	MET	2.1
1	AAA	1041	MET	2.0
1	AAA	1007	GLN	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](#)

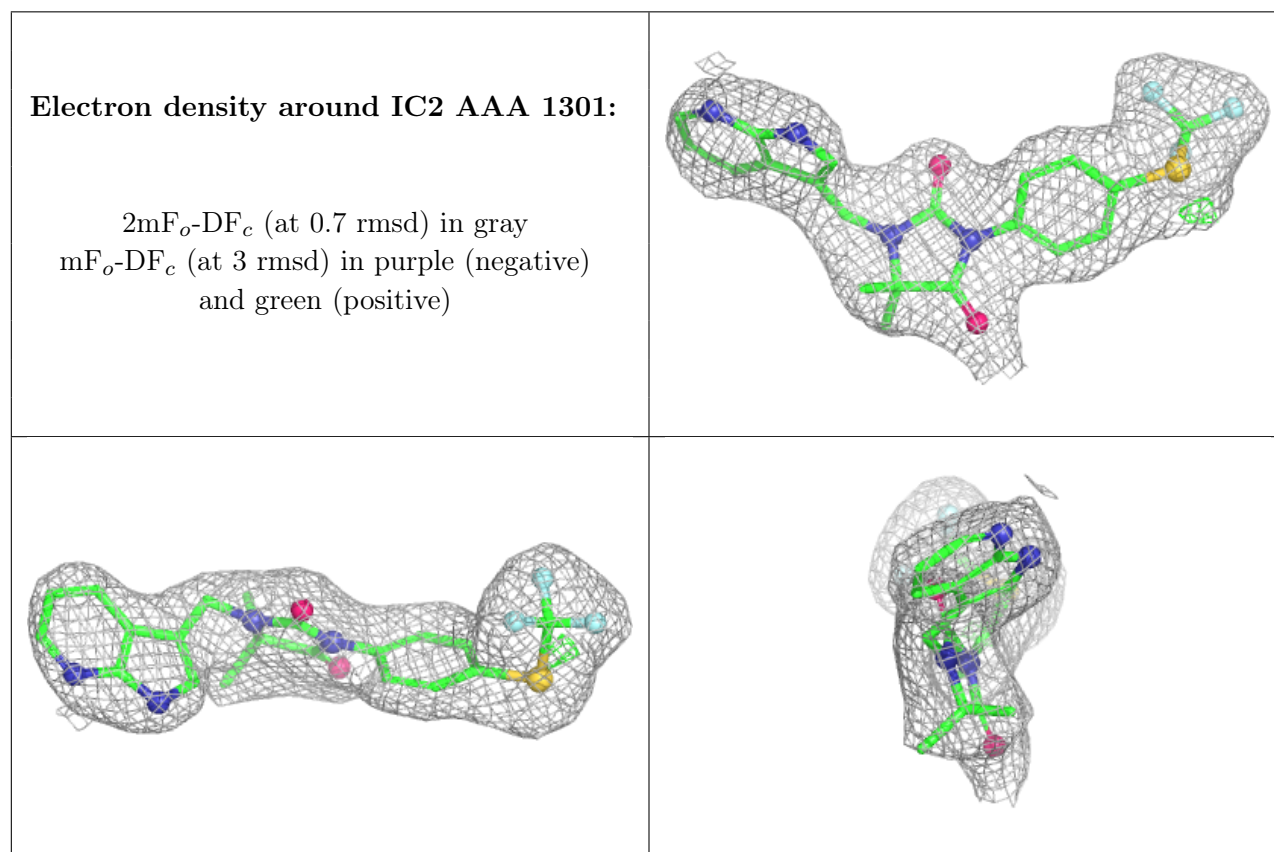
There are no oligosaccharides in this entry.

## 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, 95<sup>th</sup> 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(Å <sup>2</sup> )	Q<0.9
3	NI	AAA	1304	1/1	0.78	0.17	130,130,130,130	0
3	NI	AAA	1303	1/1	0.96	0.04	53,53,53,53	0
2	IC2	AAA	1301	30/30	0.97	0.07	39,50,70,74	0
3	NI	AAA	1302	1/1	0.99	0.02	35,35,35,35	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.



## 6.5 Other polymers [i](#)

There are no such residues in this entry.