



# Full wwPDB X-ray Structure Validation Report ⓘ

May 25, 2020 – 12:36 pm BST

PDB ID : 4W9H  
Title : pVHL:EloB:EloC in complex with (2S,4R)-1-((S)-2-acetamido-3,3-dimethylbutanoyl)-4-hydroxy-N-(4-(4-methylthiazol-5-yl)benzyl)pyrrolidine-2-carboxamide (ligand 7)  
Authors : Gadd, M.S.; Soares, P.; Galdeano, C.; van Molle, I.; Ciulli, A.  
Deposited on : 2014-08-27  
Resolution : 2.10 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 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

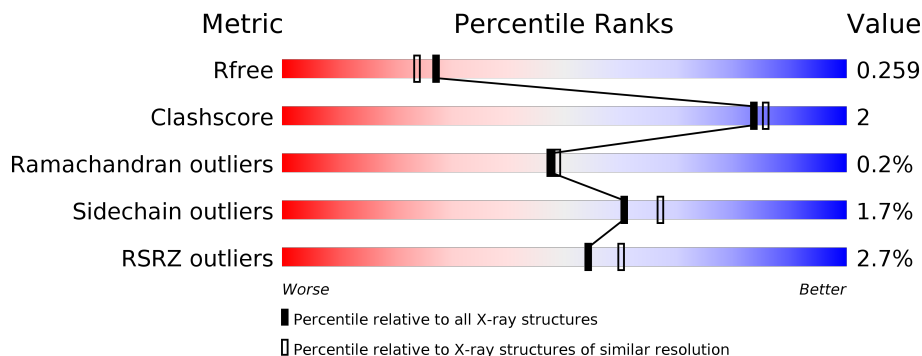
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.10 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	5197 (2.10-2.10)
Clashscore	141614	5710 (2.10-2.10)
Ramachandran outliers	138981	5647 (2.10-2.10)
Sidechain outliers	138945	5648 (2.10-2.10)
RSRZ outliers	127900	5083 (2.10-2.10)

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  $\leq 5\%$ . 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	104	97% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%)
1	D	104	2% (Poor fit: 2%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%), 98% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%)
1	G	104	2% (Poor fit: 2%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%), 91% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%), 8% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%)
1	J	104	3% (Poor fit: 3%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%), 91% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%), 7% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%)
2	B	97	3% (Poor fit: 3%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%), 84% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%), 5% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%), 11% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%)
2	E	97	0% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%), 85% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%), 6% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%), 9% (Poor fit: 0%, 0-3 outliers: 0%, 1 outlier: 0%, 2 outliers: 0%, 3+ outliers: 0%, Not modelled: 0%)

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Length	Quality of chain
3	C	162	<p>% 81% 6% 13%</p>
3	F	162	<p>2% 80% 9% 11%</p>
3	I	162	<p>% 85% • • 12%</p>
3	L	162	<p>6% 80% 9% 12%</p>
4	H	97	<p>4% 79% 10% • 9%</p>
4	K	97	<p>6% 84% 5% • • 9%</p>

## 2 Entry composition [i](#)

There are 6 unique types of molecules in this entry. The entry contains 11271 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 Transcription elongation factor B polypeptide 2.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	As	C	N	O	S			
1	A	103	809	2	514	136	152	5	0	0	0
1	D	102	794	2	506	132	149	5	0	0	0
1	G	103	816	2	517	136	156	5	0	0	0
1	J	103	812	2	515	136	154	5	0	0	0

- Molecule 2 is a protein called Transcription elongation factor B polypeptide 1.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	As	C	N	O	S			
2	B	86	685	1	442	109	127	6	0	0	0
2	E	88	692	1	446	111	128	6	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
B	16	MET	-	initiating methionine	UNP Q15369
E	16	MET	-	initiating methionine	UNP Q15369

- Molecule 3 is a protein called Von Hippel-Lindau disease tumor suppressor.

Mol	Chain	Residues	Atoms						ZeroOcc	AltConf	Trace
			Total	As	C	N	O	S			
3	C	141	1134	1	723	203	205	2	0	1	0
3	F	144	1139	1	727	202	207	2	0	0	0
3	I	143	1150	1	733	209	205	2	0	0	0

*Continued on next page...*

Continued from previous page...

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace	
			Total	As	C	N	O				S
3	L	143	1149	1	733	209	204	2	0	0	0

There are 8 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
C	52	GLY	-	expression tag	UNP P40337
C	53	SER	-	expression tag	UNP P40337
F	52	GLY	-	expression tag	UNP P40337
F	53	SER	-	expression tag	UNP P40337
I	52	GLY	-	expression tag	UNP P40337
I	53	SER	-	expression tag	UNP P40337
L	52	GLY	-	expression tag	UNP P40337
L	53	SER	-	expression tag	UNP P40337

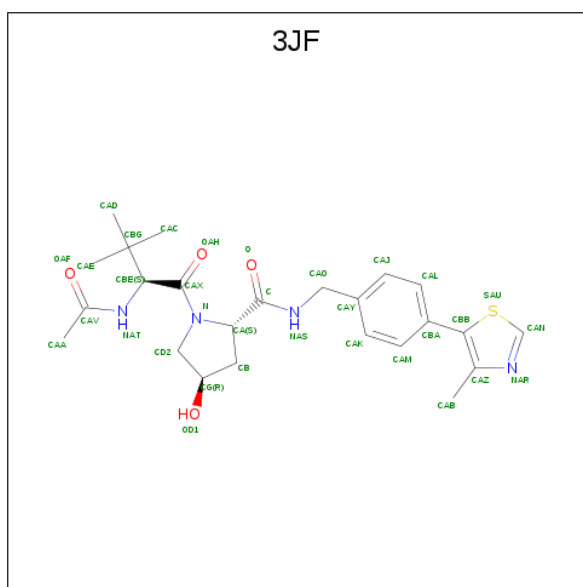
- Molecule 4 is a protein called Transcription elongation factor B polypeptide 1.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
			Total	C	N	O	S			
4	H	88	690	446	112	126	6	0	0	0
4	K	88	694	449	112	126	7	0	0	0

There are 2 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
H	16	MET	-	initiating methionine	UNP Q15369
K	16	MET	-	initiating methionine	UNP Q15369

- Molecule 5 is N-acetyl-3-methyl-L-valyl-(4R)-4-hydroxy-N-[4-(4-methyl-1,3-thiazol-5-yl)benzyl]-L-prolinamide (three-letter code: 3JF) (formula: C<sub>24</sub>H<sub>32</sub>N<sub>4</sub>O<sub>4</sub>S).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
			Total	C	N	O	S		
5	C	1	Total	C	N	O	S	0	0
			33	24	4	4	1		
5	F	1	Total	C	N	O	S	0	0
			33	24	4	4	1		
5	I	1	Total	C	N	O	S	0	0
			33	24	4	4	1		
5	L	1	Total	C	N	O	S	0	0
			33	24	4	4	1		

- Molecule 6 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
6	A	61	Total	O	0	0
			61	61		
6	B	32	Total	O	0	0
			32	32		
6	C	55	Total	O	0	0
			55	55		
6	D	40	Total	O	0	0
			40	40		
6	E	28	Total	O	0	0
			28	28		
6	F	44	Total	O	0	0
			44	44		
6	G	51	Total	O	0	0
			51	51		
6	H	41	Total	O	0	0
			41	41		

*Continued on next page...*

*Continued from previous page...*

<b>Mol</b>	<b>Chain</b>	<b>Residues</b>	<b>Atoms</b>	<b>ZeroOcc</b>	<b>AltConf</b>
6	I	60	Total O 60 60	0	0
6	J	76	Total O 76 76	0	0
6	K	37	Total O 37 37	0	0
6	L	50	Total O 50 50	0	0

### 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 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.

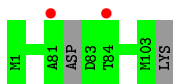
- Molecule 1: Transcription elongation factor B polypeptide 2

Chain A: 




- Molecule 1: Transcription elongation factor B polypeptide 2

Chain D: 




- Molecule 1: Transcription elongation factor B polypeptide 2

Chain G: 




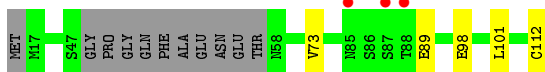
- Molecule 1: Transcription elongation factor B polypeptide 2

Chain J: 



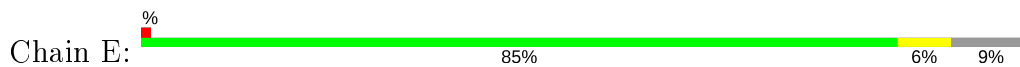
- Molecule 2: Transcription elongation factor B polypeptide 1

Chain B: 

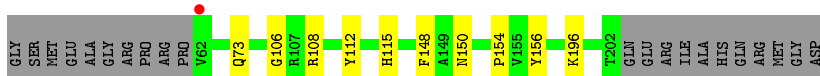
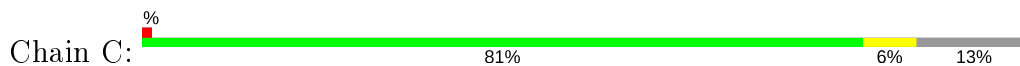


- Molecule 2: Transcription elongation factor B polypeptide 1

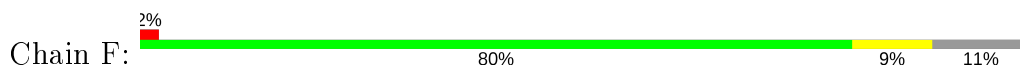




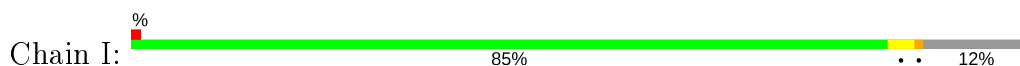
- Molecule 3: Von Hippel-Lindau disease tumor suppressor



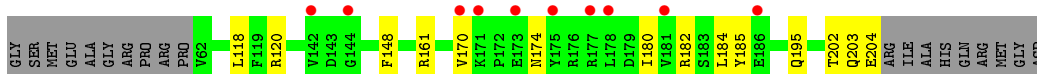
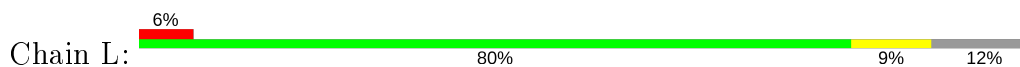
- Molecule 3: Von Hippel-Lindau disease tumor suppressor



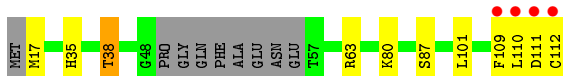
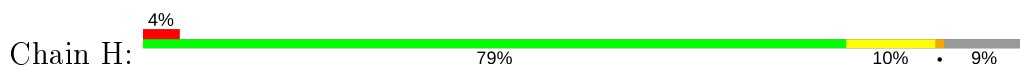
- Molecule 3: Von Hippel-Lindau disease tumor suppressor



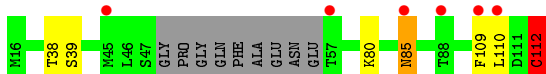
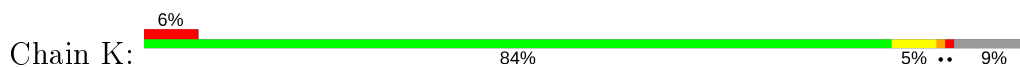
- Molecule 3: Von Hippel-Lindau disease tumor suppressor



- Molecule 4: Transcription elongation factor B polypeptide 1



- Molecule 4: Transcription elongation factor B polypeptide 1



## 4 Data and refinement statistics

Property	Value	Source
Space group	P 41 2 2	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	92.98Å 92.98Å 364.37Å 90.00° 90.00° 90.00°	Depositor
Resolution (Å)	93.10 – 2.10 48.82 – 2.10	Depositor EDS
% Data completeness (in resolution range)	99.9 (93.10-2.10) 99.9 (48.82-2.10)	Depositor EDS
$R_{merge}$	(Not available)	Depositor
$R_{sym}$	0.10	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	2.13 (at 2.10Å)	Xtrriage
Refinement program	REFMAC 5.8.0073	Depositor
R, $R_{free}$	0.210 , 0.253 0.217 , 0.259	Depositor DCC
$R_{free}$ test set	4784 reflections (5.07%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	33.3	Xtrriage
Anisotropy	0.262	Xtrriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.33 , 43.2	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.48$ , $\langle L^2 \rangle = 0.31$	Xtrriage
Estimated twinning fraction	No twinning to report.	Xtrriage
$F_o, F_c$ correlation	0.95	EDS
Total number of atoms	11271	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	41.0	wwPDB-VP

Xtrriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 29.79 % of the origin peak, indicating pseudo-translational symmetry. The chance of finding a peak of this or larger height randomly in a structure without pseudo-translational symmetry is equal to 1.4604e-03. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

<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: CAS, 3JF

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	0.38	0/805	0.64	0/1086
1	D	0.37	0/789	0.59	0/1063
1	G	0.39	0/812	0.62	0/1095
1	J	0.41	0/808	0.63	0/1090
2	B	0.39	0/689	0.56	0/932
2	E	0.38	0/696	0.56	0/941
3	C	0.36	0/1156	0.61	0/1579
3	F	0.37	0/1159	0.64	0/1587
3	I	0.40	0/1170	0.65	0/1598
3	L	0.42	0/1169	0.68	1/1597 (0.1%)
4	H	0.44	0/704	0.61	0/949
4	K	0.46	0/708	0.67	1/955 (0.1%)
All	All	0.40	0/10665	0.63	2/14472 (0.0%)

There are no bond length outliers.

All (2) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
4	K	112	CYS	CA-CB-SG	8.74	129.72	114.00
3	L	161	ARG	NE-CZ-NH2	-5.17	117.71	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	809	0	800	1	0
1	D	794	0	778	0	0
1	G	816	0	806	6	0
1	J	812	0	802	4	0
2	B	685	0	672	4	0
2	E	692	0	672	5	0
3	C	1134	0	1114	5	0
3	F	1139	0	1097	8	0
3	I	1150	0	1130	5	0
3	L	1149	0	1127	6	0
4	H	690	0	683	9	0
4	K	694	0	689	4	0
5	C	33	0	32	0	0
5	F	33	0	32	0	0
5	I	33	0	32	0	0
5	L	33	0	32	0	0
6	A	61	0	0	0	0
6	B	32	0	0	2	0
6	C	55	0	0	1	0
6	D	40	0	0	0	0
6	E	28	0	0	1	0
6	F	44	0	0	0	0
6	G	51	0	0	0	0
6	H	41	0	0	1	0
6	I	60	0	0	1	0
6	J	76	0	0	0	0
6	K	37	0	0	0	0
6	L	50	0	0	0	0
All	All	11271	0	10498	51	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 2.

All (51) 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)
2:B:73:VAL:HG13	2:B:112:CAS:CE2	2.09	0.83
3:C:73:GLN:OE1	3:C:108:ARG:NH1	2.23	0.72
3:C:108:ARG:HD2	6:C:451:HOH:O	1.94	0.67

*Continued on next page...*

*Continued from previous page...*

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:37:ARG:NH1	1:G:41:GLU:OE1	2.30	0.64
4:H:109:PHE:O	4:H:111:ASP:N	2.32	0.63
4:H:38:THR:HG23	4:H:80:LYS:HD3	1.83	0.60
1:G:3:VAL:HG13	1:G:67:ALA:CB	2.34	0.56
3:L:182:ARG:HA	3:L:185:TYR:CE2	2.41	0.56
1:G:3:VAL:HG13	1:G:67:ALA:HB3	1.89	0.54
2:E:77:PHE:HE1	2:E:112:CAS:CE2	2.20	0.54
3:F:107:ARG:HD3	4:H:109:PHE:CE1	2.43	0.53
3:F:180:ILE:HD12	3:F:184:LEU:HB3	1.90	0.52
3:L:202:THR:O	3:L:204:GLU:N	2.42	0.52
3:F:73:GLN:H	3:F:141:ASN:HD21	1.58	0.51
2:B:89:GLU:HA	6:B:223:HOH:O	2.10	0.51
3:L:180:ILE:HD12	3:L:184:LEU:HB2	1.92	0.51
3:I:73:GLN:HG2	3:I:108:ARG:NH2	2.26	0.51
1:J:1:MET:HB3	1:J:64:SER:OG	2.11	0.51
4:H:35:HIS:O	4:H:38:THR:HB	2.11	0.50
1:G:102:VAL:O	3:I:170:VAL:HG23	2.13	0.49
1:J:11:LYS:HG3	1:J:91:GLU:HG3	1.96	0.48
3:F:118:LEU:HD13	3:F:120:ARG:HD3	1.96	0.47
3:C:106:GLY:C	4:K:109:PHE:CE1	2.88	0.47
4:K:38:THR:HG23	4:K:80:LYS:HD3	1.96	0.47
1:G:80:ARG:HA	1:G:85:PHE:HA	1.95	0.47
2:E:98:GLU:HB2	6:E:216:HOH:O	2.15	0.47
4:H:101:LEU:HD22	3:I:180:ILE:HG21	1.96	0.47
2:E:86:SER:O	3:F:132:GLN:NE2	2.48	0.46
3:I:182:ARG:HB3	3:I:182:ARG:CZ	2.45	0.46
1:J:52:ASP:N	1:J:52:ASP:OD1	2.49	0.46
4:K:38:THR:HG23	4:K:80:LYS:CD	2.46	0.46
2:B:98:GLU:HB2	6:B:222:HOH:O	2.16	0.45
4:H:87:SER:HA	6:I:454:HOH:O	2.17	0.45
3:L:170:VAL:CG1	3:L:174:ASN:HB2	2.47	0.45
3:F:79:ARG:NE	3:F:150:ASN:OD1	2.50	0.45
3:C:154:PRO:HG2	3:C:156:TYR:CE1	2.52	0.45
3:F:70:GLU:CD	3:F:113:ARG:HE	2.19	0.44
4:H:38:THR:CG2	4:H:80:LYS:HD3	2.46	0.44
1:A:80:ARG:HA	1:A:85:PHE:HA	1.99	0.44
2:E:17:MET:HA	2:E:17:MET:CE	2.47	0.44
1:G:3:VAL:HG12	1:G:5:LEU:HD21	1.99	0.44
2:E:77:PHE:HE1	2:E:112:CAS:AS	2.61	0.44
3:F:73:GLN:OE1	3:F:108:ARG:NH2	2.51	0.43
2:B:73:VAL:CG1	2:B:112:CAS:CE2	2.89	0.42

*Continued on next page...*

Continued from previous page...

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
4:H:63:ARG:NH2	6:H:210:HOH:O	2.54	0.41
1:J:52:ASP:HB2	1:J:55:LYS:HG2	2.03	0.41
4:K:110:LEU:HB2	4:K:112:CYS:SG	2.61	0.41
3:L:118:LEU:HD13	3:L:120:ARG:HD3	2.04	0.41
4:H:101:LEU:HD22	3:I:180:ILE:CG2	2.52	0.40
3:L:182:ARG:HA	3:L:185:TYR:CD2	2.56	0.40
3:C:112:TYR:HB2	3:C:115:HIS:CE1	2.55	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	99/104 (95%)	96 (97%)	3 (3%)	0	100	100
1	D	96/104 (92%)	95 (99%)	1 (1%)	0	100	100
1	G	99/104 (95%)	96 (97%)	3 (3%)	0	100	100
1	J	99/104 (95%)	94 (95%)	5 (5%)	0	100	100
2	B	82/97 (84%)	80 (98%)	2 (2%)	0	100	100
2	E	84/97 (87%)	82 (98%)	2 (2%)	0	100	100
3	C	139/162 (86%)	134 (96%)	5 (4%)	0	100	100
3	F	141/162 (87%)	138 (98%)	3 (2%)	0	100	100
3	I	140/162 (86%)	138 (99%)	2 (1%)	0	100	100
3	L	140/162 (86%)	135 (96%)	4 (3%)	1 (1%)	22	18
4	H	84/97 (87%)	78 (93%)	5 (6%)	1 (1%)	13	8
4	K	84/97 (87%)	82 (98%)	1 (1%)	1 (1%)	13	8
All	All	1287/1452 (89%)	1248 (97%)	36 (3%)	3 (0%)	47	49

All (3) Ramachandran outliers are listed below:

Mol	Chain	Res	Type
4	H	110	LEU
4	K	85	ASN
3	L	203	GLN

### 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	86/90 (96%)	86 (100%)	0	100	100
1	D	83/90 (92%)	83 (100%)	0	100	100
1	G	88/90 (98%)	88 (100%)	0	100	100
1	J	87/90 (97%)	84 (97%)	3 (3%)	37	39
2	B	75/85 (88%)	74 (99%)	1 (1%)	69	75
2	E	74/85 (87%)	73 (99%)	1 (1%)	67	73
3	C	126/147 (86%)	123 (98%)	3 (2%)	49	53
3	F	124/147 (84%)	123 (99%)	1 (1%)	81	86
3	I	127/147 (86%)	125 (98%)	2 (2%)	62	69
3	L	126/147 (86%)	124 (98%)	2 (2%)	62	69
4	H	75/86 (87%)	72 (96%)	3 (4%)	31	32
4	K	76/86 (88%)	73 (96%)	3 (4%)	32	33
All	All	1147/1290 (89%)	1128 (98%)	19 (2%)	60	67

All (19) residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
2	B	101	LEU
3	C	148	PHE
3	C	150	ASN
3	C	196	LYS
2	E	58	ASN
3	F	195	GLN
4	H	17	MET
4	H	38	THR

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type
4	H	112	CYS
3	I	73	GLN
3	I	148	PHE
1	J	37	ARG
1	J	52	ASP
1	J	83	ASP
4	K	39	SER
4	K	85	ASN
4	K	112	CYS
3	L	148	PHE
3	L	195	GLN

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

Mol	Chain	Res	Type
3	C	174	ASN
2	E	35	HIS
3	F	141	ASN
3	F	174	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](#)

14 non-standard protein/DNA/RNA residues are 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	$\# Z  > 2$
1	CAS	A	89	1	5,8,9	1.20	0	1,9,11	0.49	0
1	CAS	J	89	1	5,8,9	1.24	0	1,9,11	0.19	0
3	CAS	C	77	3	5,8,9	0.54	0	1,9,11	0.66	0



Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z  > 2	Counts	RMSZ	# Z  > 2
1	CAS	G	89	1	5,8,9	1.15	0	1,9,11	0.10	0
2	CAS	E	112	2	4,9,9	1.33	0	1,11,11	1.35	0
1	CAS	D	60	1	5,8,9	0.64	0	1,9,11	0.48	0
3	CAS	F	77	3	5,8,9	0.61	0	1,9,11	0.82	0
1	CAS	G	60	1	5,8,9	0.82	0	1,9,11	0.99	0
1	CAS	A	60	1	5,8,9	0.84	0	1,9,11	0.58	0
3	CAS	L	77	3	5,8,9	0.61	0	1,9,11	0.48	0
2	CAS	B	112	2	4,9,9	0.87	0	1,11,11	1.52	0
1	CAS	D	89	1	5,8,9	1.22	0	1,9,11	0.31	0
3	CAS	I	77	3	5,8,9	0.66	0	1,9,11	0.55	0
1	CAS	J	60	1	5,8,9	0.65	0	1,9,11	0.74	0

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
1	CAS	A	89	1	-	0/0/7/9	-
1	CAS	J	89	1	-	0/0/7/9	-
3	CAS	C	77	3	-	0/0/7/9	-
1	CAS	G	89	1	-	0/0/7/9	-
2	CAS	E	112	2	-	0/2/9/9	-
1	CAS	D	60	1	-	0/0/7/9	-
3	CAS	F	77	3	-	0/0/7/9	-
1	CAS	G	60	1	-	0/0/7/9	-
1	CAS	A	60	1	-	0/0/7/9	-
3	CAS	L	77	3	-	0/0/7/9	-
2	CAS	B	112	2	-	0/2/9/9	-
1	CAS	D	89	1	-	0/0/7/9	-
3	CAS	I	77	3	-	0/0/7/9	-
1	CAS	J	60	1	-	0/0/7/9	-

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.

2 monomers are involved in 4 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	112	CAS	2	0
2	B	112	CAS	2	0

## 5.5 Carbohydrates [i](#)

There are no carbohydrates in this entry.

## 5.6 Ligand geometry [i](#)

4 ligands are 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
5	3JF	C	301	-	30,35,35	2.78	4 (13%)	39,51,51	1.05	2 (5%)
5	3JF	L	301	-	30,35,35	2.63	4 (13%)	39,51,51	1.11	1 (2%)
5	3JF	F	301	-	30,35,35	2.73	6 (20%)	39,51,51	1.01	2 (5%)
5	3JF	I	301	-	30,35,35	2.59	4 (13%)	39,51,51	1.04	2 (5%)

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
5	3JF	C	301	-	-	0/31/43/43	0/3/3/3
5	3JF	L	301	-	-	0/31/43/43	0/3/3/3
5	3JF	F	301	-	-	0/31/43/43	0/3/3/3
5	3JF	I	301	-	-	0/31/43/43	0/3/3/3

All (18) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	C	301	3JF	CBA-CBB	-12.73	1.35	1.48

*Continued on next page...*

Continued from previous page...

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
5	F	301	3JF	CBA-CBB	-12.27	1.36	1.48
5	L	301	3JF	CBA-CBB	-11.58	1.36	1.48
5	I	301	3JF	CBA-CBB	-11.44	1.37	1.48
5	I	301	3JF	CA-C	-5.37	1.40	1.52
5	L	301	3JF	CA-C	-5.14	1.40	1.52
5	F	301	3JF	CA-C	-4.83	1.41	1.52
5	C	301	3JF	CA-C	-4.74	1.41	1.52
5	C	301	3JF	CAO-CAY	-3.68	1.43	1.51
5	I	301	3JF	CAO-CAY	-3.58	1.43	1.51
5	L	301	3JF	CAO-CAY	-3.57	1.43	1.51
5	L	301	3JF	CA-N	3.55	1.54	1.47
5	F	301	3JF	CAO-CAY	-3.29	1.44	1.51
5	I	301	3JF	CA-N	3.21	1.53	1.47
5	F	301	3JF	CA-N	3.20	1.53	1.47
5	C	301	3JF	CA-N	3.01	1.53	1.47
5	F	301	3JF	CAB-CAZ	2.20	1.54	1.50
5	F	301	3JF	CD2-N	2.16	1.50	1.47

All (7) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
5	L	301	3JF	CAX-CBE-NAT	-2.56	104.54	107.34
5	I	301	3JF	CG-CD2-N	2.56	105.80	103.08
5	C	301	3JF	CAX-CBE-NAT	-2.41	104.72	107.34
5	C	301	3JF	CD2-N-CA	-2.37	108.28	111.70
5	F	301	3JF	CG-CB-CA	2.27	106.87	103.97
5	F	301	3JF	CAX-CBE-NAT	-2.21	104.93	107.34
5	I	301	3JF	CAY-CAO-NAS	-2.11	108.53	113.05

There are no chirality outliers.

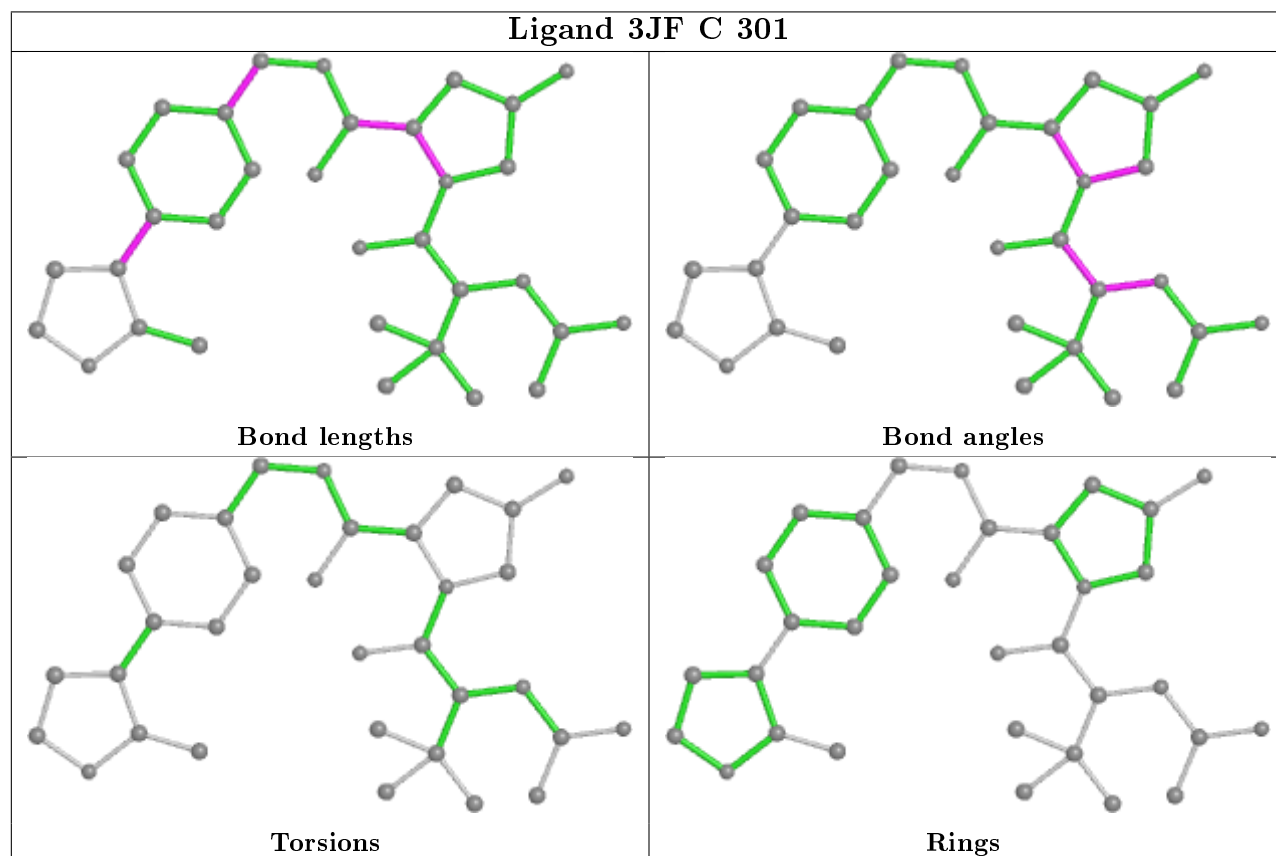
There are no torsion outliers.

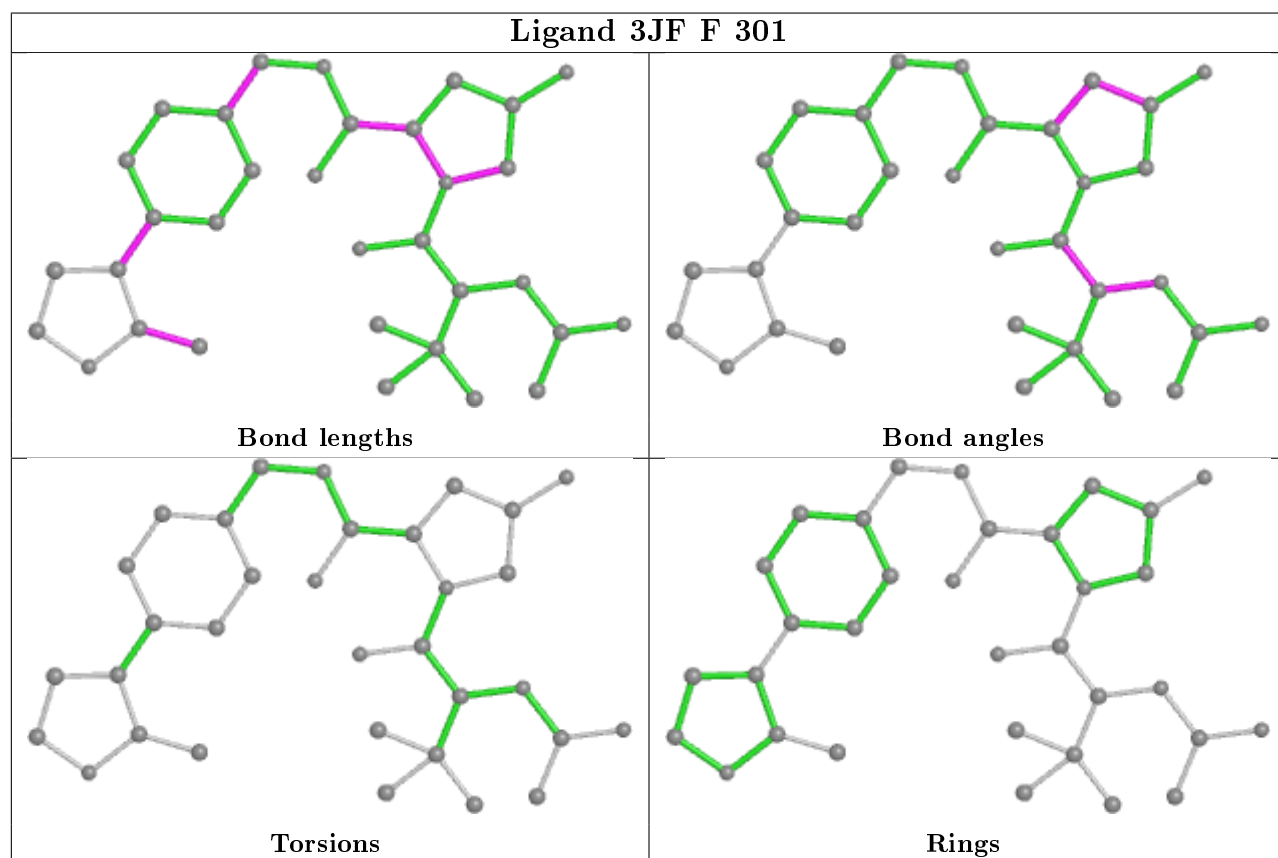
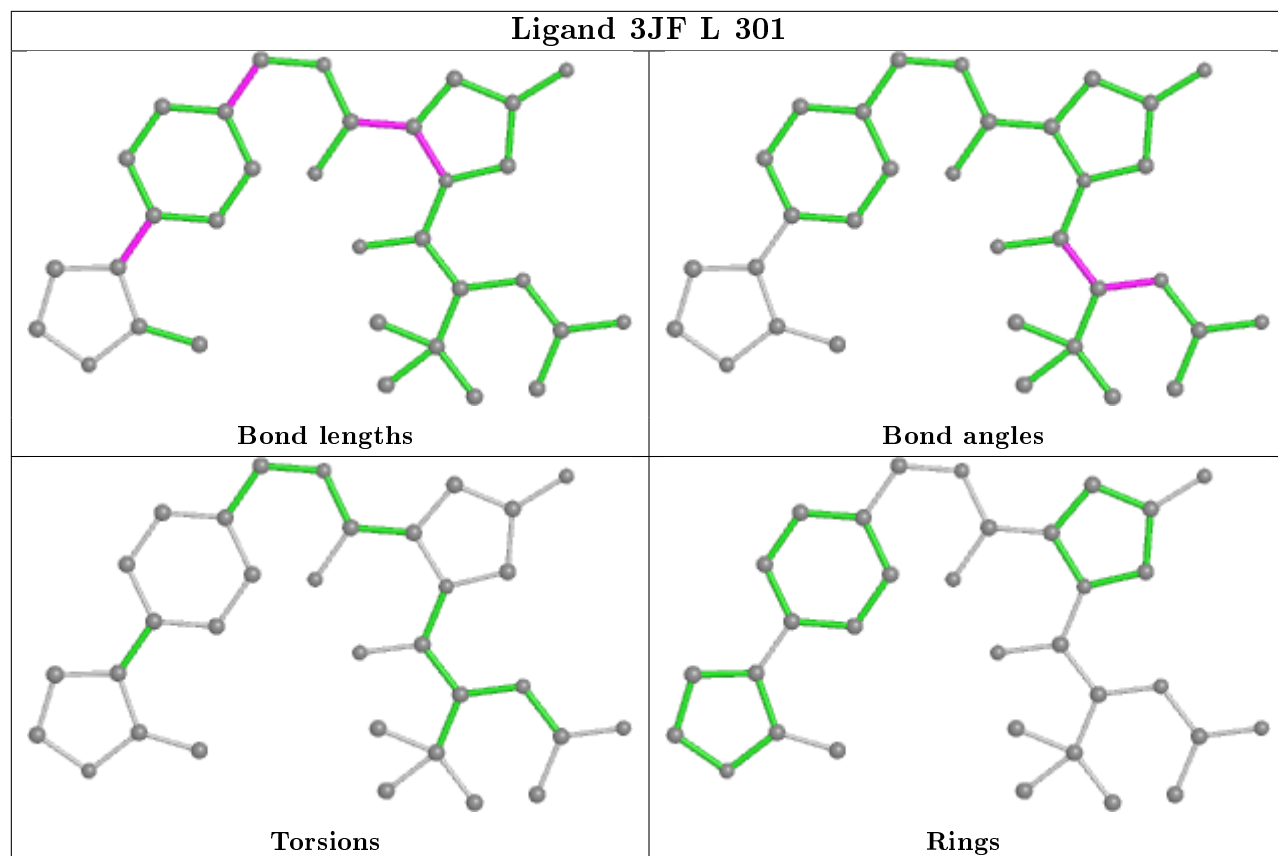
There are no ring outliers.

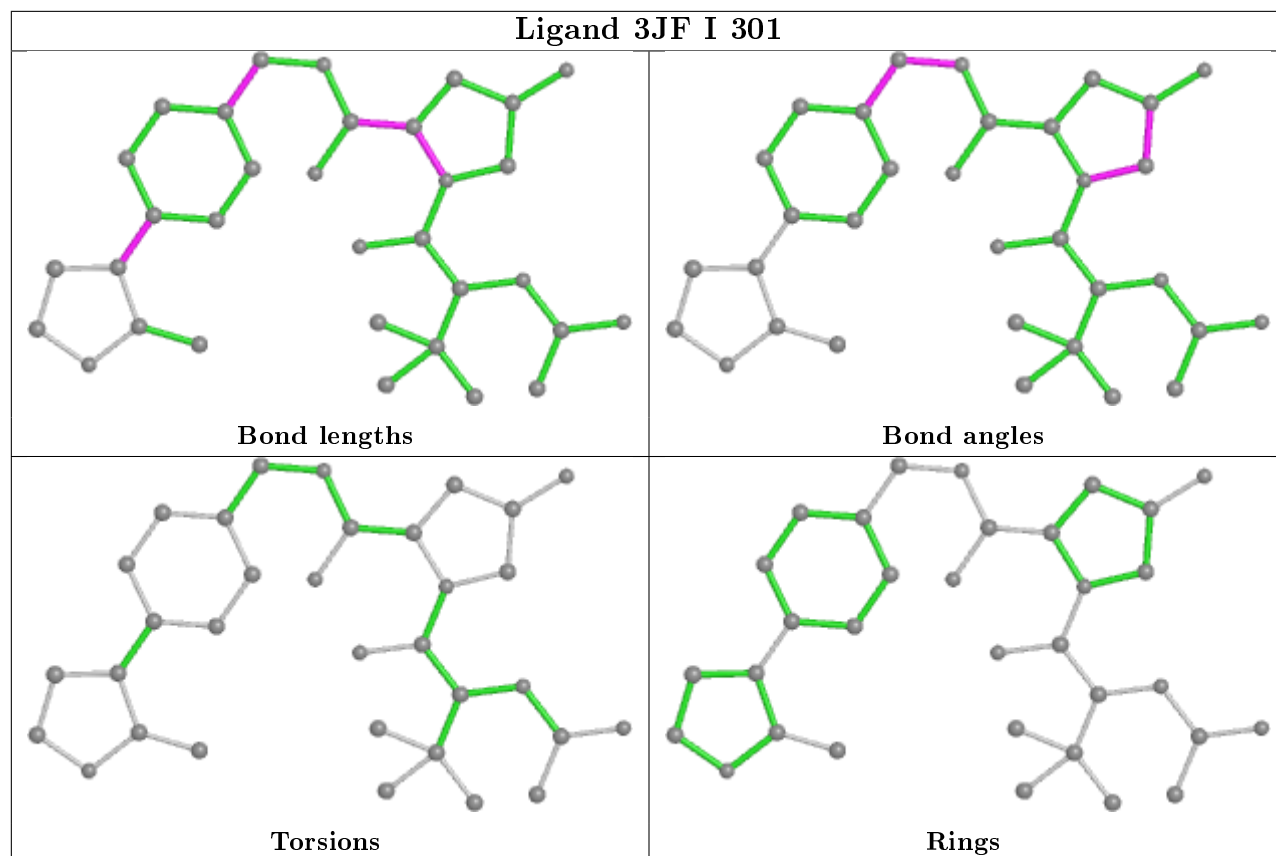
No monomer is involved in short contacts.

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, 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	A	101/104 (97%)	-0.44	0 <b>100</b> <b>100</b>	26, 35, 59, 85	0
1	D	100/104 (96%)	-0.25	2 (2%) 65 69	27, 45, 69, 84	0
1	G	101/104 (97%)	-0.32	2 (1%) 65 69	27, 41, 61, 71	0
1	J	101/104 (97%)	-0.23	3 (2%) 50 56	22, 31, 56, 86	0
2	B	85/97 (87%)	-0.20	3 (3%) 44 50	26, 37, 62, 107	0
2	E	87/97 (89%)	-0.23	1 (1%) 80 84	27, 40, 70, 84	0
3	C	140/162 (86%)	-0.22	1 (0%) 87 89	25, 37, 67, 87	0
3	F	143/162 (88%)	-0.22	3 (2%) 63 68	23, 37, 69, 99	0
3	I	142/162 (87%)	-0.24	1 (0%) 87 89	24, 37, 58, 69	0
3	L	142/162 (87%)	-0.02	10 (7%) 16 20	23, 36, 77, 88	0
4	H	88/97 (90%)	-0.02	4 (4%) 33 38	27, 39, 73, 84	0
4	K	88/97 (90%)	-0.04	6 (6%) 17 21	23, 34, 65, 79	0
All	All	1318/1452 (90%)	-0.20	36 (2%) 54 60	22, 38, 69, 107	0

All (36) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
2	B	87	SER	5.8
4	H	110	LEU	5.5
3	L	142	VAL	5.3
3	C	62	VAL	4.9
1	J	102	VAL	4.9
3	F	62	VAL	4.5
4	H	109	PHE	4.3
4	H	111	ASP	3.9
3	L	170	VAL	3.8
3	F	205	ARG	3.6
1	J	101	ASP	3.5

*Continued on next page...*

*Continued from previous page...*

Mol	Chain	Res	Type	RSRZ
3	L	171	LYS	3.4
4	K	85	ASN	3.3
4	H	112	CYS	3.2
3	F	185	TYR	3.1
4	K	88	THR	2.9
3	L	144	GLY	2.9
2	B	88	THR	2.9
1	D	81	ALA	2.9
1	G	81	ALA	2.8
1	J	83	ASP	2.8
4	K	110	LEU	2.8
2	B	85	ASN	2.6
4	K	57	THR	2.5
3	L	173	GLU	2.5
1	D	84	THR	2.4
3	L	181	VAL	2.4
1	G	84	THR	2.3
3	I	62	VAL	2.2
2	E	57	THR	2.2
3	L	175	TYR	2.1
4	K	109	PHE	2.1
4	K	45	MET	2.1
3	L	177	ARG	2.1
3	L	186	GLU	2.0
3	L	178	LEU	2.0

## 6.2 Non-standard residues in protein, DNA, RNA chains [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
2	CAS	E	112	10/10	0.90	0.20	35,42,90,92	0
1	CAS	G	89	9/10	0.91	0.14	32,37,74,78	0
1	CAS	D	89	9/10	0.92	0.16	51,58,92,94	0
2	CAS	B	112	10/10	0.93	0.21	47,54,88,96	0
1	CAS	A	89	9/10	0.94	0.12	40,46,75,75	0
1	CAS	A	60	9/10	0.94	0.10	29,32,53,53	0
1	CAS	J	60	9/10	0.94	0.12	28,32,52,57	0
1	CAS	D	60	9/10	0.96	0.11	31,33,55,58	0

*Continued on next page...*



Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
3	CAS	L	77	9/10	0.98	0.08	26,28,44,48	0
1	CAS	J	89	9/10	0.98	0.10	28,31,52,57	0
1	CAS	G	60	9/10	0.98	0.08	37,39,50,52	0
3	CAS	I	77	9/10	0.98	0.08	26,29,43,45	0
3	CAS	C	77	9/10	0.98	0.08	31,34,54,56	0
3	CAS	F	77	9/10	0.99	0.09	27,29,49,50	0

### 6.3 Carbohydrates [i](#)

There are no carbohydrates in this entry.

### 6.4 Ligands [i](#)

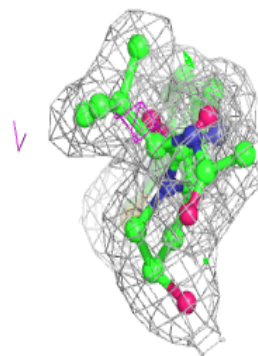
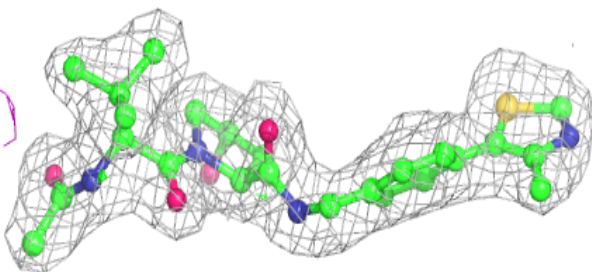
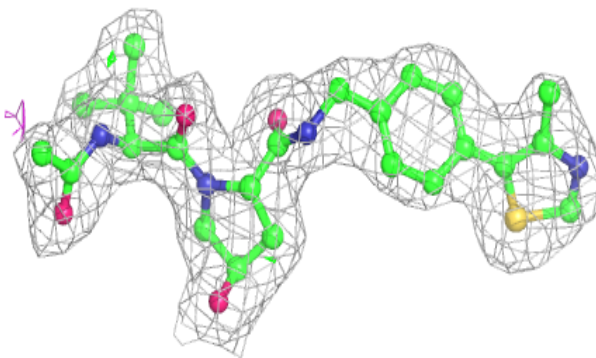
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors( $\text{\AA}^2$ )	Q<0.9
5	3JF	C	301	33/33	0.96	0.09	24,29,40,40	0
5	3JF	L	301	33/33	0.96	0.10	23,29,37,39	0
5	3JF	F	301	33/33	0.96	0.10	24,31,36,37	0
5	3JF	I	301	33/33	0.96	0.09	24,30,36,38	0

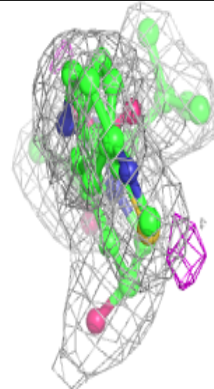
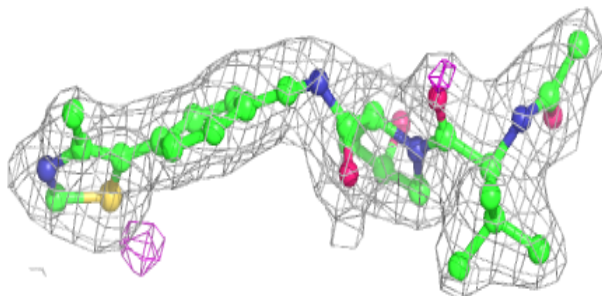
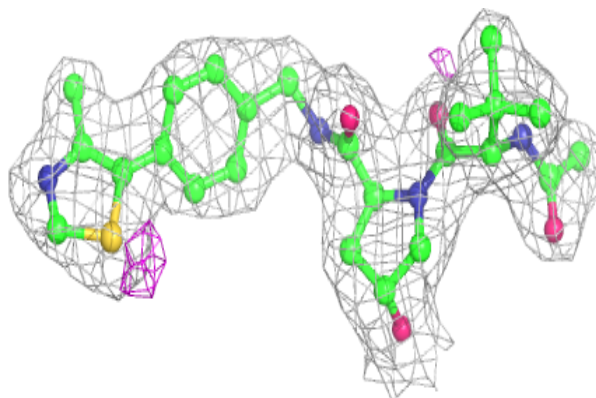
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

**Electron density around 3JF C 301:**

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

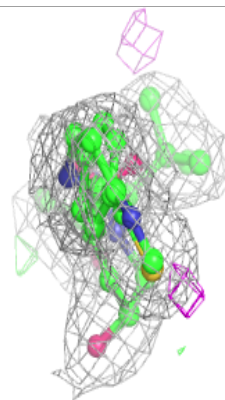
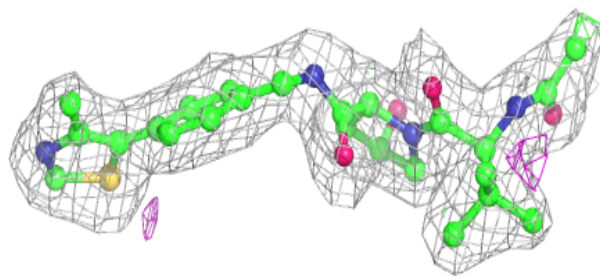
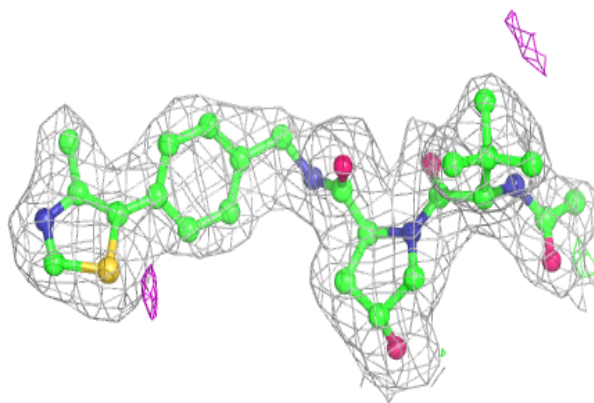
**Electron density around 3JF L 301:**

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

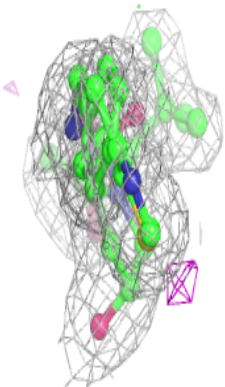
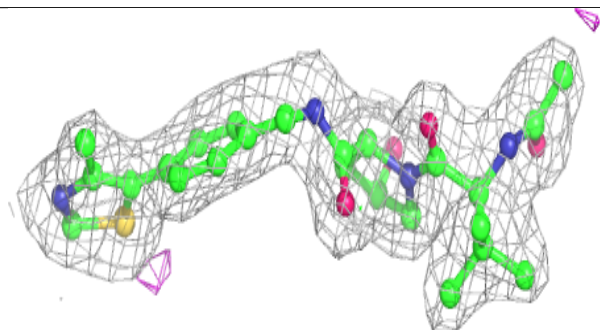
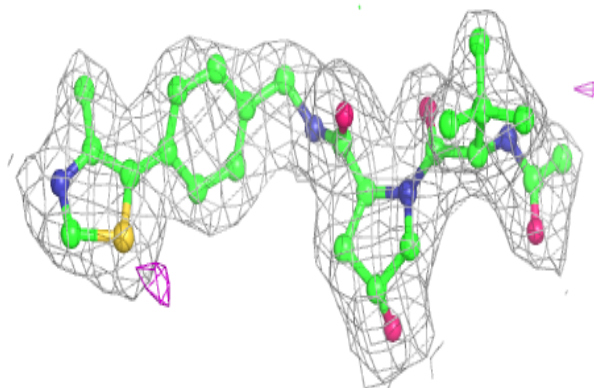


**Electron density around 3JF F 301:**

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

**Electron density around 3JF I 301:**

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



## 6.5 Other polymers

There are no such residues in this entry.