



# Full wwPDB X-ray Structure Validation Report ⓘ

Mar 12, 2025 – 02:11 AM JST

PDB ID : 8YPA  
Title : Human mitochondrial ClpP in complex with TR89  
Authors : Li, Q.-N.; Sun, H.-Y.; Xiao, Y.-B.  
Deposited on : 2024-03-16  
Resolution : 2.67 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 : 4.02b-467  
Mogul : 1.8.5 (274361), CSD as541be (2020)  
Xtriage (Phenix) : 1.21  
EDS : 3.0  
buster-report : 1.1.7 (2018)  
Percentile statistics : 20231227.v01 (using entries in the PDB archive December 27th 2023)  
CCP4 : 9.0.004 (Gargrove)  
Density-Fitness : 1.0.11  
Ideal geometry (proteins) : Engh & Huber (2001)  
Ideal geometry (DNA, RNA) : Parkinson et al. (1996)  
Validation Pipeline (wwPDB-VP) : 2.41.4

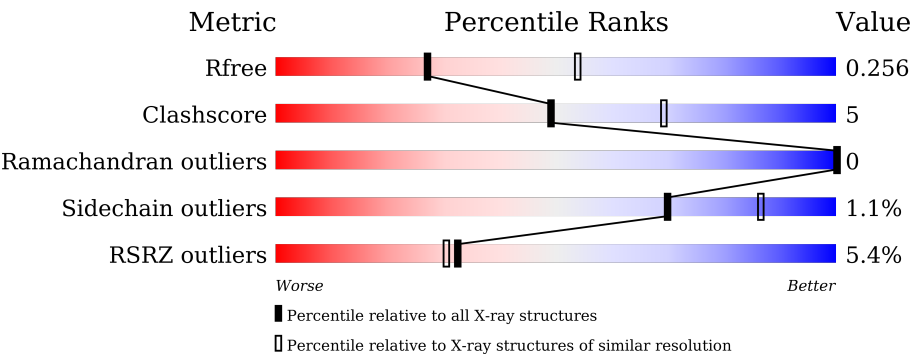
# 1 Overall quality at a glance i

The following experimental techniques were used to determine the structure:

*X-RAY DIFFRACTION*

The reported resolution of this entry is 2.67 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))
$R_{free}$	164625	4708 (2.70-2.66)
Clashscore	180529	5138 (2.70-2.66)
Ramachandran outliers	177936	5071 (2.70-2.66)
Sidechain outliers	177891	5071 (2.70-2.66)
RSRZ outliers	164620	4708 (2.70-2.66)

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	A	223	<div><div>3%</div><div>67%</div><div>12%</div><div>20%</div></div>
1	B	223	<div><div>4%</div><div>70%</div><div>10%</div><div>20%</div></div>
1	C	223	<div><div>4%</div><div>65%</div><div>15%</div><div>20%</div></div>
1	D	223	<div><div>5%</div><div>70%</div><div>9%</div><div>20%</div></div>
1	E	223	<div><div>4%</div><div>69%</div><div>11%</div><div>20%</div></div>
1	F	223	<div><div>5%</div><div>69%</div><div>12%</div><div>20%</div></div>

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Mol	Chain	Length	Quality of chain
1	G	223	<div><div>5%</div><div>69%</div><div>11%</div><div>20%</div></div>

## 2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 9773 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 ATP-dependent Clp protease proteolytic subunit, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	178	Total	C	N	O	S	0	0	0
			1370	873	232	252	13			
1	B	178	Total	C	N	O	S	0	0	0
			1368	874	229	252	13			
1	C	178	Total	C	N	O	S	0	0	0
			1369	875	231	250	13			
1	D	178	Total	C	N	O	S	0	0	0
			1349	861	228	247	13			
1	E	178	Total	C	N	O	S	0	0	0
			1356	866	230	247	13			
1	F	179	Total	C	N	O	S	0	0	0
			1360	867	230	250	13			
1	G	179	Total	C	N	O	S	0	0	0
			1370	871	234	252	13			

There are 21 discrepancies between the modelled and reference sequences:

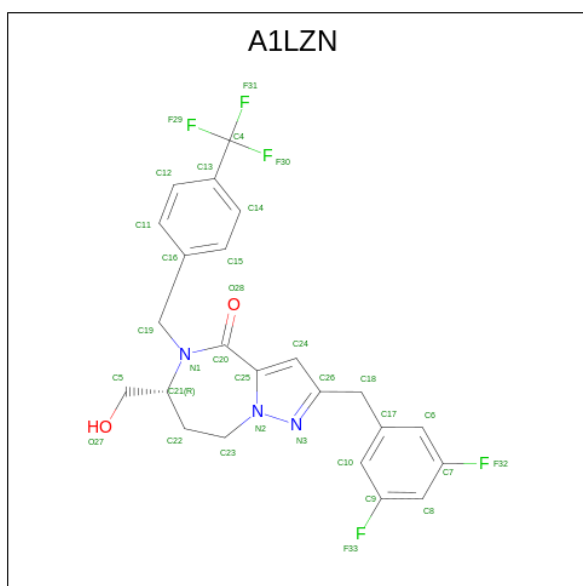
Chain	Residue	Modelled	Actual	Comment	Reference
A	55	GLY	-	expression tag	UNP Q16740
A	56	SER	-	expression tag	UNP Q16740
A	57	SER	-	expression tag	UNP Q16740
B	55	GLY	-	expression tag	UNP Q16740
B	56	SER	-	expression tag	UNP Q16740
B	57	SER	-	expression tag	UNP Q16740
C	55	GLY	-	expression tag	UNP Q16740
C	56	SER	-	expression tag	UNP Q16740
C	57	SER	-	expression tag	UNP Q16740
D	55	GLY	-	expression tag	UNP Q16740
D	56	SER	-	expression tag	UNP Q16740
D	57	SER	-	expression tag	UNP Q16740
E	55	GLY	-	expression tag	UNP Q16740
E	56	SER	-	expression tag	UNP Q16740

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Chain	Residue	Modelled	Actual	Comment	Reference
E	57	SER	-	expression tag	UNP Q16740
F	55	GLY	-	expression tag	UNP Q16740
F	56	SER	-	expression tag	UNP Q16740
F	57	SER	-	expression tag	UNP Q16740
G	55	GLY	-	expression tag	UNP Q16740
G	56	SER	-	expression tag	UNP Q16740
G	57	SER	-	expression tag	UNP Q16740

- Molecule 2 is (6 {R})-2-[[3,5-bis(fluoranyl)phenyl]methyl]-6-(hydroxymethyl)-5-[[4-(trifluoromethyl)phenyl]methyl]-7,8-dihydro-6 {H}-pyrazolo[1,5-a][1,4]diazepin-4-one (three-letter code: A1LZN) (formula: C<sub>23</sub>H<sub>20</sub>F<sub>5</sub>N<sub>3</sub>O<sub>2</sub>) (labeled as "Ligand of Interest" by depositor).

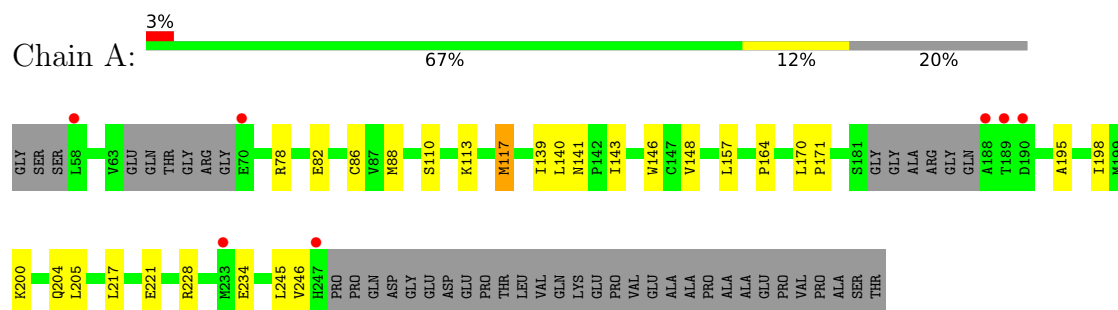


Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			33	23	5	3	2		
2	B	1	Total	C	F	N	O	0	0
			33	23	5	3	2		
2	C	1	Total	C	F	N	O	0	0
			33	23	5	3	2		
2	D	1	Total	C	F	N	O	0	0
			33	23	5	3	2		
2	D	1	Total	C	F	N	O	0	0
			33	23	5	3	2		
2	F	1	Total	C	F	N	O	0	0
			33	23	5	3	2		
2	G	1	Total	C	F	N	O	0	0
			33	23	5	3	2		

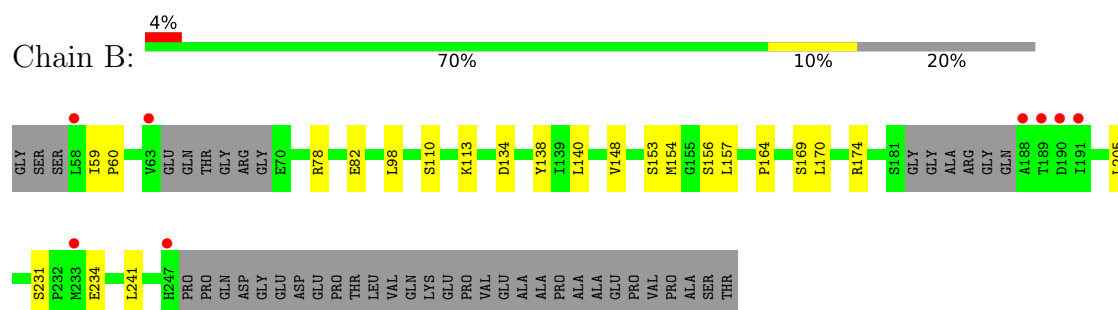
### 3 Residue-property plots [i](#)

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.

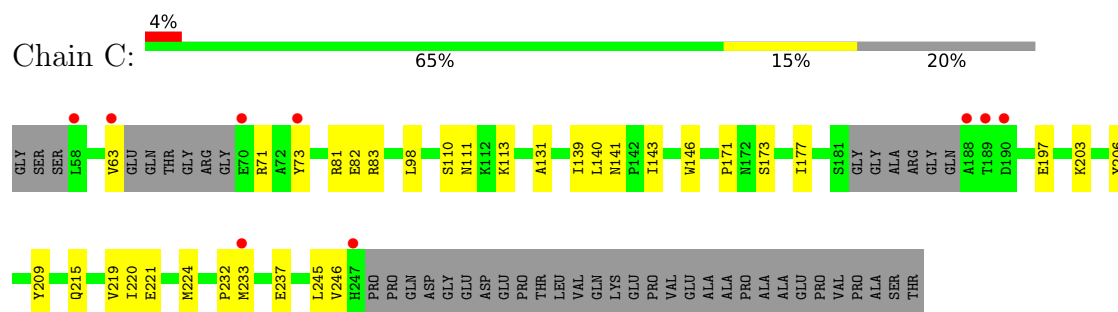
- Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial



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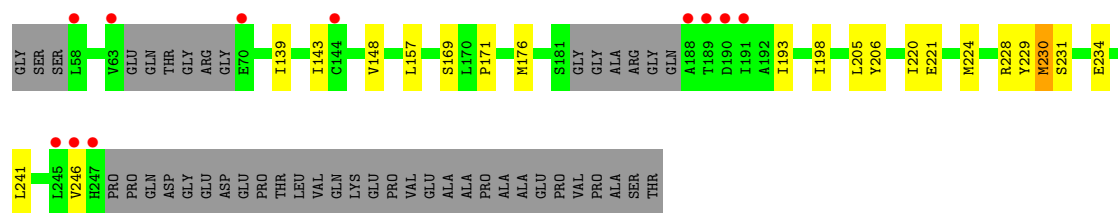


- Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

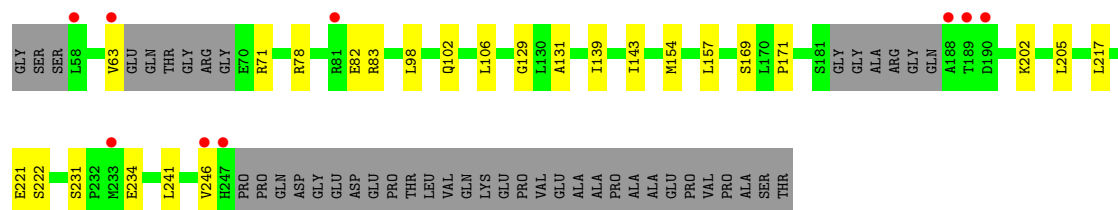


- Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

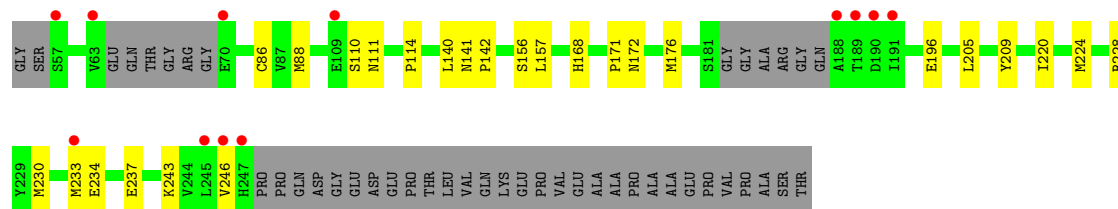




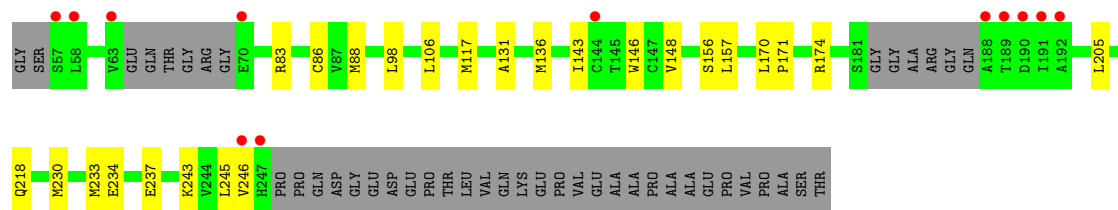
- Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial



- Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial



- Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial



## 4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, $\alpha$ , $\beta$ , $\gamma$	142.88Å 152.42Å 104.45Å 90.00° 118.05° 90.00°	Depositor
Resolution (Å)	46.09 – 2.67 46.09 – 2.67	Depositor EDS
% Data completeness (in resolution range)	99.8 (46.09-2.67) 99.9 (46.09-2.67)	Depositor EDS
$R_{merge}$	0.20	Depositor
$R_{sym}$	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ <sup>1</sup>	1.73 (at 2.69Å)	Xtriage
Refinement program	PHENIX 1.20.1_4487	Depositor
R, $R_{free}$	0.215 , 0.258 0.214 , 0.256	Depositor DCC
$R_{free}$ test set	53969 reflections (3.57%)	wwPDB-VP
Wilson B-factor (Å <sup>2</sup> )	35.8	Xtriage
Anisotropy	0.246	Xtriage
Bulk solvent $k_{sol}$ (e/Å <sup>3</sup> ), $B_{sol}$ (Å <sup>2</sup> )	0.36 , 37.9	EDS
L-test for twinning <sup>2</sup>	$\langle  L  \rangle = 0.51$ , $\langle L^2 \rangle = 0.34$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
$F_o, F_c$ correlation	0.91	EDS
Total number of atoms	9773	wwPDB-VP
Average B, all atoms (Å <sup>2</sup> )	36.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 7.75% 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

### 5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: A1LZN

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	0.45	0/1392	0.62	0/1884
1	B	0.45	0/1391	0.61	0/1883
1	C	0.45	0/1392	0.63	0/1885
1	D	0.46	0/1371	0.63	0/1858
1	E	0.44	0/1379	0.63	0/1869
1	F	0.43	0/1382	0.64	0/1872
1	G	0.44	0/1392	0.62	0/1883
All	All	0.45	0/9699	0.63	0/13134

There are no bond length outliers.

There are no bond angle outliers.

There are no chirality outliers.

There are no planarity outliers.

### 5.2 Too-close contacts

In the following table, the Non-H and H(model) columns list the number of non-hydrogen atoms and hydrogen atoms in the chain respectively. The H(added) column lists the number of hydrogen atoms added and optimized by MolProbity. The Clashes column lists the number of clashes within the asymmetric unit, whereas Symm-Clashes lists symmetry-related clashes.

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1370	0	1400	19	0
1	B	1368	0	1392	15	0
1	C	1369	0	1397	24	0
1	D	1349	0	1366	13	0
1	E	1356	0	1368	13	0
1	F	1360	0	1375	15	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	G	1370	0	1394	14	0
2	A	33	0	0	0	0
2	B	33	0	0	0	0
2	C	33	0	0	0	0
2	D	66	0	0	0	0
2	F	33	0	0	0	0
2	G	33	0	0	0	0
All	All	9773	0	9692	103	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 5.

All (103) 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:D:230:MET:HB2	1:D:234:GLU:HB2	1.72	0.71
1:F:171:PRO:HG3	1:F:246:VAL:HG22	1.72	0.70
1:B:148:VAL:HG13	1:B:170:LEU:HD12	1.74	0.69
1:C:139:ILE:HD11	1:C:143:ILE:HD11	1.75	0.69
1:C:209:TYR:HB3	1:C:220:ILE:HD12	1.75	0.67
1:E:217:LEU:O	1:E:221:GLU:HG3	1.95	0.66
1:A:140:LEU:HD22	1:B:140:LEU:HD22	1.79	0.65
1:B:231:SER:OG	1:B:234:GLU:HG3	1.98	0.64
1:B:78:ARG:HH12	1:B:82:GLU:HG2	1.63	0.64
1:A:217:LEU:O	1:A:221:GLU:HG3	1.99	0.62
1:C:73:TYR:OH	1:C:81:ARG:NH1	2.33	0.62
1:E:231:SER:OG	1:E:234:GLU:HG3	2.00	0.62
1:C:111:ASN:HD22	1:C:140:LEU:HD12	1.66	0.61
1:A:148:VAL:HG12	1:A:170:LEU:HD12	1.82	0.59
1:F:168:HIS:HD2	1:F:243:LYS:HB2	1.67	0.59
1:G:148:VAL:HG13	1:G:170:LEU:HD12	1.86	0.57
1:G:171:PRO:HG3	1:G:246:VAL:HG22	1.86	0.56
1:G:218:GLN:H	1:G:218:GLN:CD	2.09	0.55
1:G:230:MET:HB3	1:G:234:GLU:HB2	1.89	0.54
1:A:164:PRO:HB2	1:B:113:LYS:HG3	1.90	0.54
1:A:200:LYS:O	1:A:204:GLN:HG3	2.08	0.54
1:E:169:SER:HB2	1:E:241:LEU:HD22	1.89	0.53
1:A:195:ALA:O	1:A:198:ILE:HG22	2.08	0.53
1:A:171:PRO:HG3	1:A:246:VAL:HG22	1.90	0.53
1:D:139:ILE:HD11	1:D:143:ILE:HD11	1.91	0.53
1:C:110:SER:O	1:C:141:ASN:ND2	2.39	0.53

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:146:TRP:CH2	1:G:245:LEU:HD12	2.43	0.53
1:A:86:CYS:HB3	1:A:88:MET:HG3	1.90	0.53
1:A:157:LEU:HD13	1:A:205:LEU:HD22	1.90	0.52
1:C:111:ASN:OD1	1:C:111:ASN:N	2.43	0.52
1:E:171:PRO:HG3	1:E:246:VAL:HG22	1.92	0.52
1:C:197:GLU:HG2	1:D:229:TYR:HD1	1.75	0.52
1:A:110:SER:O	1:A:141:ASN:ND2	2.42	0.51
1:C:177:ILE:HG13	1:C:224:MET:HG2	1.91	0.51
1:D:169:SER:HB2	1:D:241:LEU:HD22	1.93	0.51
1:C:233:MET:O	1:C:237:GLU:HG3	2.10	0.50
1:B:110:SER:OG	1:B:113:LYS:HB2	2.11	0.50
1:D:157:LEU:HD13	1:D:205:LEU:HD22	1.93	0.50
1:G:83:ARG:HG2	1:G:106:LEU:HD22	1.94	0.50
1:C:215:GLN:HB3	1:C:219:VAL:CG2	2.42	0.49
1:D:231:SER:OG	1:D:234:GLU:HG3	2.13	0.49
1:C:146:TRP:CZ3	1:C:245:LEU:HD12	2.47	0.49
1:D:193:ILE:HD11	1:D:198:ILE:HD13	1.94	0.49
1:C:63:VAL:HG12	1:C:71:ARG:O	2.13	0.48
1:G:233:MET:O	1:G:237:GLU:HG3	2.13	0.48
1:A:78:ARG:HH12	1:A:82:GLU:HG2	1.76	0.48
1:G:157:LEU:HD13	1:G:205:LEU:HD22	1.96	0.48
1:E:98:LEU:O	1:E:102:GLN:HG3	2.13	0.48
1:B:153:SER:OG	1:B:154:MET:N	2.46	0.48
1:E:139:ILE:HD11	1:E:143:ILE:HD11	1.96	0.48
1:B:98:LEU:HD12	1:B:98:LEU:HA	1.63	0.47
1:F:111:ASN:HD22	1:F:140:LEU:HD12	1.78	0.47
1:A:146:TRP:CH2	1:A:245:LEU:HD12	2.49	0.47
1:G:136:MET:HG2	1:G:143:ILE:HD13	1.96	0.47
1:D:220:ILE:O	1:D:224:MET:HG3	2.15	0.46
1:C:131:ALA:HB1	1:D:148:VAL:HG12	1.97	0.46
1:F:110:SER:O	1:F:141:ASN:ND2	2.43	0.46
1:C:110:SER:OG	1:C:113:LYS:HB2	2.16	0.46
1:F:86:CYS:HB3	1:F:88:MET:HG3	1.98	0.46
1:E:83:ARG:HG2	1:E:106:LEU:HD22	1.98	0.45
1:D:171:PRO:HG3	1:D:246:VAL:HG22	1.97	0.45
1:E:157:LEU:HD13	1:E:205:LEU:HD22	1.98	0.45
1:A:228:ARG:NH2	1:A:234:GLU:OE1	2.38	0.45
1:D:176:MET:HG3	1:D:228:ARG:O	2.16	0.45
1:C:83:ARG:HD2	1:C:113:LYS:HD3	1.99	0.45
1:A:146:TRP:CZ3	1:A:245:LEU:HD12	2.52	0.45
1:G:243:LYS:HB3	1:G:245:LEU:HD21	2.00	0.44

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:86:CYS:HB3	1:G:88:MET:HG2	1.99	0.44
1:C:197:GLU:HG2	1:D:229:TYR:CD1	2.52	0.44
1:E:131:ALA:HB1	1:G:148:VAL:HG12	1.99	0.44
1:C:215:GLN:HB3	1:C:219:VAL:HG21	2.00	0.44
1:A:110:SER:OG	1:A:113:LYS:HB2	2.18	0.44
1:F:233:MET:O	1:F:237:GLU:HG3	2.18	0.44
1:E:63:VAL:HG12	1:E:71:ARG:O	2.17	0.43
1:A:117:MET:HE3	1:A:143:ILE:HG21	2.00	0.43
1:E:98:LEU:HD23	1:E:98:LEU:HA	1.87	0.43
1:F:176:MET:HG3	1:F:228:ARG:O	2.19	0.43
1:B:169:SER:HB2	1:B:241:LEU:HD22	2.00	0.43
1:A:139:ILE:HD11	1:A:143:ILE:HD11	1.99	0.43
1:A:113:LYS:HG3	1:B:164:PRO:HB2	2.01	0.43
1:D:206:TYR:CZ	1:D:221:GLU:HG2	2.54	0.43
1:F:157:LEU:HD13	1:F:205:LEU:HD22	2.00	0.42
1:C:82:GLU:O	1:C:82:GLU:HG3	2.19	0.42
1:C:171:PRO:HG3	1:C:246:VAL:HG22	2.01	0.42
1:C:171:PRO:O	1:C:232:PRO:HG2	2.19	0.42
1:E:129:GLY:HA3	1:E:154:MET:HE2	2.02	0.42
1:C:206:TYR:CE2	1:C:221:GLU:HG2	2.55	0.42
1:B:138:TYR:HA	1:F:246:VAL:O	2.20	0.42
1:B:157:LEU:HD13	1:B:205:LEU:HD22	2.02	0.42
1:F:230:MET:HB3	1:F:234:GLU:HB2	2.02	0.41
1:F:114:PRO:HA	1:F:142:PRO:O	2.20	0.41
1:C:173:SER:O	1:C:232:PRO:HD3	2.20	0.41
1:G:98:LEU:HD12	1:G:98:LEU:HA	1.83	0.41
1:C:98:LEU:HD12	1:C:98:LEU:HA	1.81	0.41
1:E:78:ARG:NH1	1:E:82:GLU:HG2	2.36	0.41
1:B:134:ASP:OD2	1:F:172:ASN:HB2	2.20	0.41
1:F:220:ILE:O	1:F:224:MET:HG3	2.21	0.41
1:A:78:ARG:NH1	1:A:82:GLU:HG2	2.36	0.41
1:F:196:GLU:OE1	1:F:196:GLU:N	2.52	0.41
1:B:148:VAL:HG12	1:G:131:ALA:HB1	2.02	0.40
1:F:209:TYR:HB3	1:F:220:ILE:HD12	2.02	0.40
1:C:206:TYR:HE1	1:C:224:MET:HE2	1.86	0.40
1:B:59:ILE:HA	1:B:60:PRO:HD3	1.93	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	172/223 (77%)	168 (98%)	4 (2%)	0	100	100
1	B	172/223 (77%)	167 (97%)	5 (3%)	0	100	100
1	C	172/223 (77%)	168 (98%)	4 (2%)	0	100	100
1	D	172/223 (77%)	168 (98%)	4 (2%)	0	100	100
1	E	172/223 (77%)	168 (98%)	4 (2%)	0	100	100
1	F	173/223 (78%)	168 (97%)	5 (3%)	0	100	100
1	G	173/223 (78%)	169 (98%)	4 (2%)	0	100	100
All	All	1206/1561 (77%)	1176 (98%)	30 (2%)	0	100	100

There are no Ramachandran outliers to report.

### 5.3.2 Protein sidechains

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	151/186 (81%)	150 (99%)	1 (1%)	81	92
1	B	150/186 (81%)	148 (99%)	2 (1%)	65	84
1	C	150/186 (81%)	149 (99%)	1 (1%)	81	92
1	D	146/186 (78%)	145 (99%)	1 (1%)	81	92
1	E	146/186 (78%)	144 (99%)	2 (1%)	62	82
1	F	147/186 (79%)	146 (99%)	1 (1%)	81	92
1	G	150/186 (81%)	147 (98%)	3 (2%)	50	76

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
All	All	1040/1302 (80%)	1029 (99%)	11 (1%)	70 86

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

Mol	Chain	Res	Type
1	A	117	MET
1	B	156	SER
1	B	174	ARG
1	C	203	LYS
1	D	230	MET
1	E	202	LYS
1	E	222	SER
1	F	156	SER
1	G	117	MET
1	G	156	SER
1	G	174	ARG

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (1) such sidechains are listed below:

Mol	Chain	Res	Type
1	F	168	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](#)

7 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
2	A1LZN	C	301	-	33,36,36	0.69	1 (3%)	40,53,53	1.26	6 (15%)
2	A1LZN	D	302	-	33,36,36	0.67	0	40,53,53	1.53	5 (12%)
2	A1LZN	D	301	-	33,36,36	0.62	1 (3%)	40,53,53	0.86	2 (5%)
2	A1LZN	F	301	-	33,36,36	0.60	1 (3%)	40,53,53	0.80	1 (2%)
2	A1LZN	G	301	-	33,36,36	0.59	1 (3%)	40,53,53	0.74	1 (2%)
2	A1LZN	A	301	-	33,36,36	0.63	1 (3%)	40,53,53	0.91	1 (2%)
2	A1LZN	B	301	-	33,36,36	0.73	1 (3%)	40,53,53	1.28	6 (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	A1LZN	C	301	-	-	3/15/33/33	0/3/4/4
2	A1LZN	D	302	-	-	1/15/33/33	0/3/4/4
2	A1LZN	D	301	-	-	1/15/33/33	0/3/4/4
2	A1LZN	F	301	-	-	1/15/33/33	0/3/4/4
2	A1LZN	G	301	-	-	1/15/33/33	0/3/4/4
2	A1LZN	A	301	-	-	1/15/33/33	0/3/4/4
2	A1LZN	B	301	-	-	2/15/33/33	0/3/4/4

All (6) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301	A1LZN	C18-C26	-2.39	1.46	1.51
2	C	301	A1LZN	C18-C26	-2.32	1.46	1.51
2	A	301	A1LZN	C18-C26	-2.25	1.47	1.51
2	D	301	A1LZN	C18-C26	-2.17	1.47	1.51
2	F	301	A1LZN	C18-C26	-2.12	1.47	1.51
2	G	301	A1LZN	C18-C26	-2.04	1.47	1.51

All (22) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	302	A1LZN	C22-C23-N2	-5.04	107.24	111.17
2	C	301	A1LZN	C25-C20-N1	4.84	126.68	117.94
2	D	302	A1LZN	C25-C20-N1	4.84	126.67	117.94
2	B	301	A1LZN	C25-C20-N1	4.68	126.39	117.94
2	D	302	A1LZN	O28-C20-N1	-4.27	116.98	121.95
2	A	301	A1LZN	C16-C19-N1	4.15	121.14	113.54
2	D	301	A1LZN	C16-C19-N1	3.63	120.19	113.54
2	C	301	A1LZN	O28-C20-N1	-3.23	118.19	121.95
2	B	301	A1LZN	O28-C20-N1	-3.21	118.22	121.95
2	B	301	A1LZN	C22-C23-N2	-2.92	108.90	111.17
2	F	301	A1LZN	C16-C19-N1	2.91	118.88	113.54
2	B	301	A1LZN	C5-C21-N1	2.79	115.13	110.77
2	C	301	A1LZN	O28-C20-C25	-2.78	115.13	119.98
2	G	301	A1LZN	C16-C19-N1	2.77	118.61	113.54
2	B	301	A1LZN	O28-C20-C25	-2.64	115.39	119.98
2	D	302	A1LZN	C25-C24-C26	2.59	107.20	103.30
2	D	301	A1LZN	C5-C21-N1	2.44	114.58	110.77
2	C	301	A1LZN	C25-C24-C26	2.32	106.79	103.30
2	C	301	A1LZN	C22-C23-N2	-2.24	109.43	111.17
2	C	301	A1LZN	C5-C21-N1	2.18	114.18	110.77
2	B	301	A1LZN	C25-C24-C26	2.11	106.48	103.30
2	D	302	A1LZN	O28-C20-C25	-2.08	116.35	119.98

There are no chirality outliers.

All (10) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	A	301	A1LZN	C22-C21-C5-O27
2	C	301	A1LZN	C22-C21-C5-O27
2	D	301	A1LZN	C22-C21-C5-O27
2	D	302	A1LZN	C22-C21-C5-O27
2	F	301	A1LZN	C22-C21-C5-O27
2	G	301	A1LZN	C22-C21-C5-O27
2	B	301	A1LZN	C22-C21-C5-O27
2	C	301	A1LZN	C17-C18-C26-N3
2	C	301	A1LZN	C17-C18-C26-C24
2	B	301	A1LZN	C17-C18-C26-C24

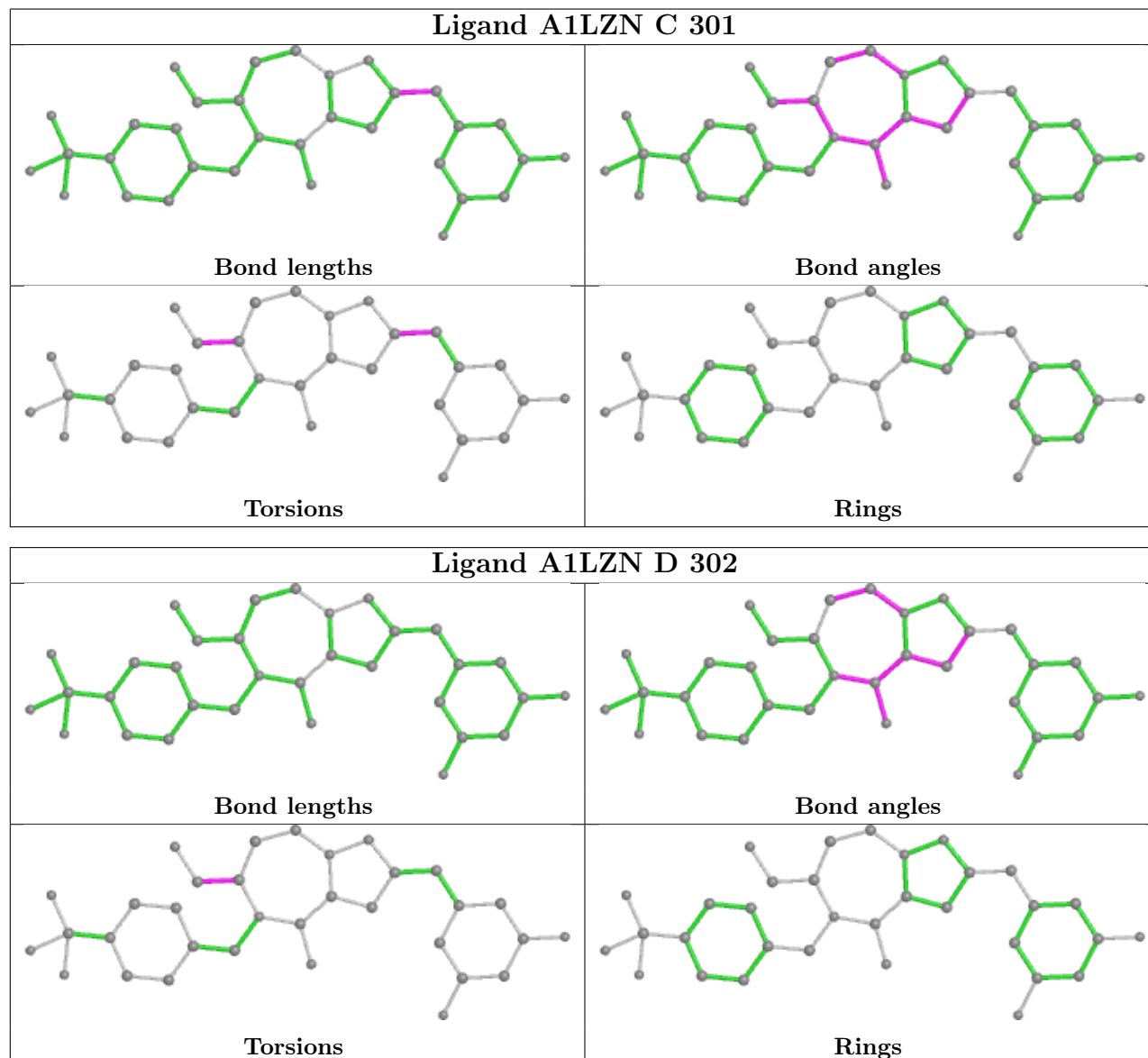
There are no ring outliers.

No monomer is involved in short contacts.

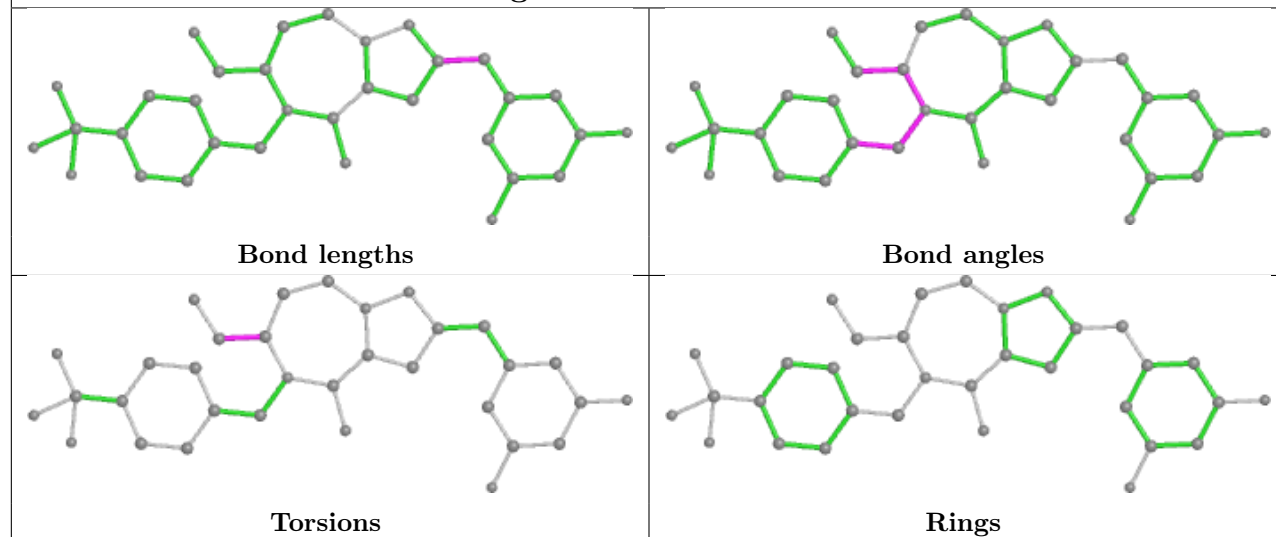
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In



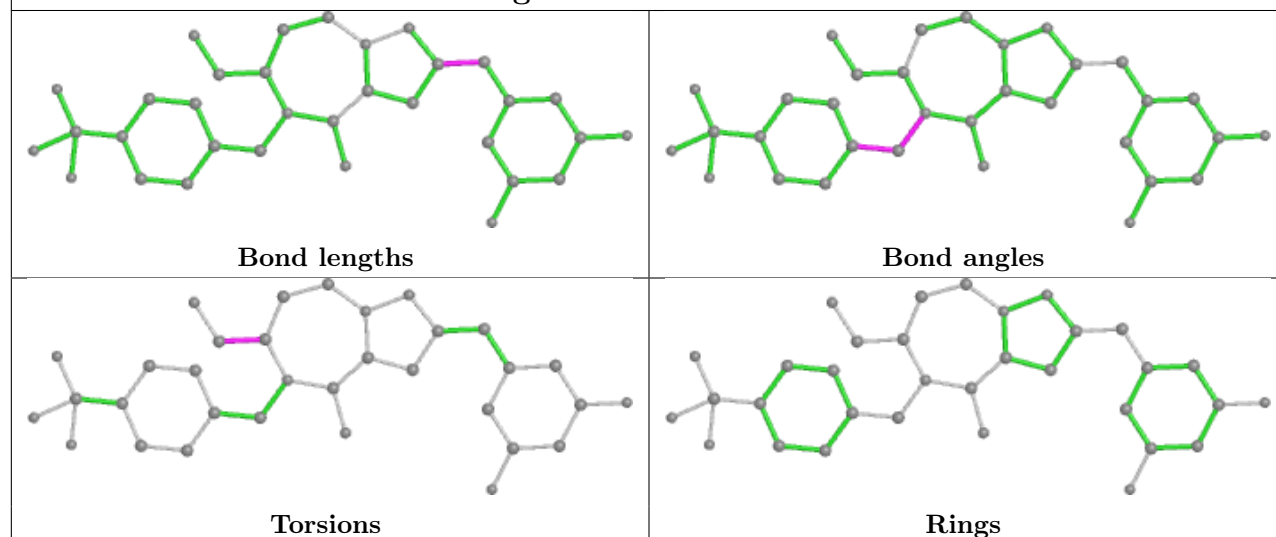
addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. For torsion angles, if less than 5% of the Mogul distribution of torsion angles is within 10 degrees of the torsion angle in question, then that torsion angle is considered an outlier. 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.



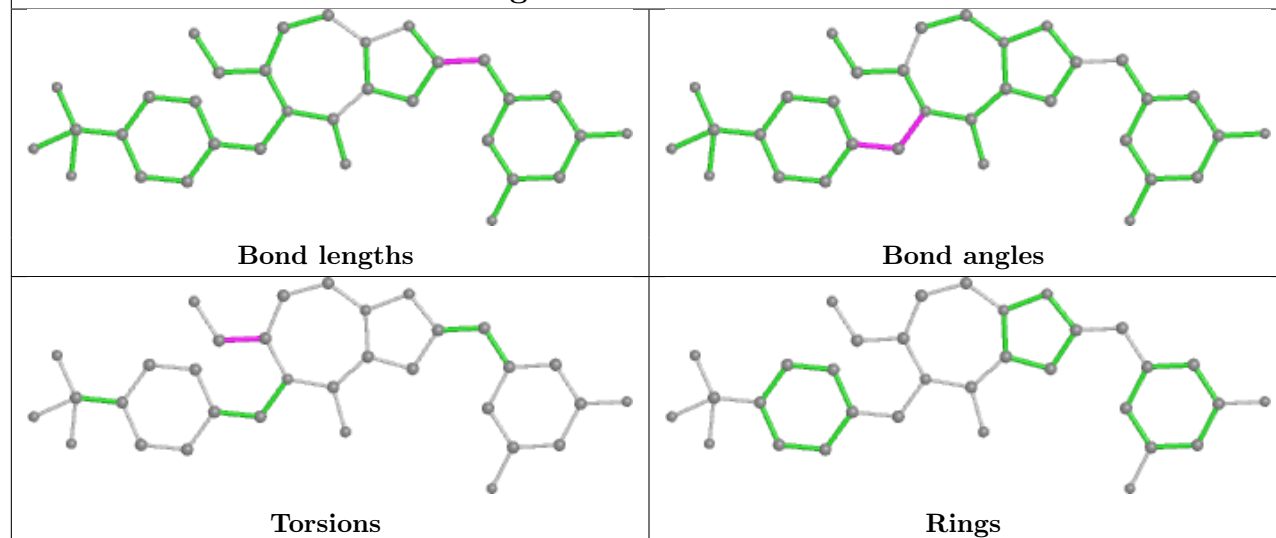
## Ligand A1LZN D 301

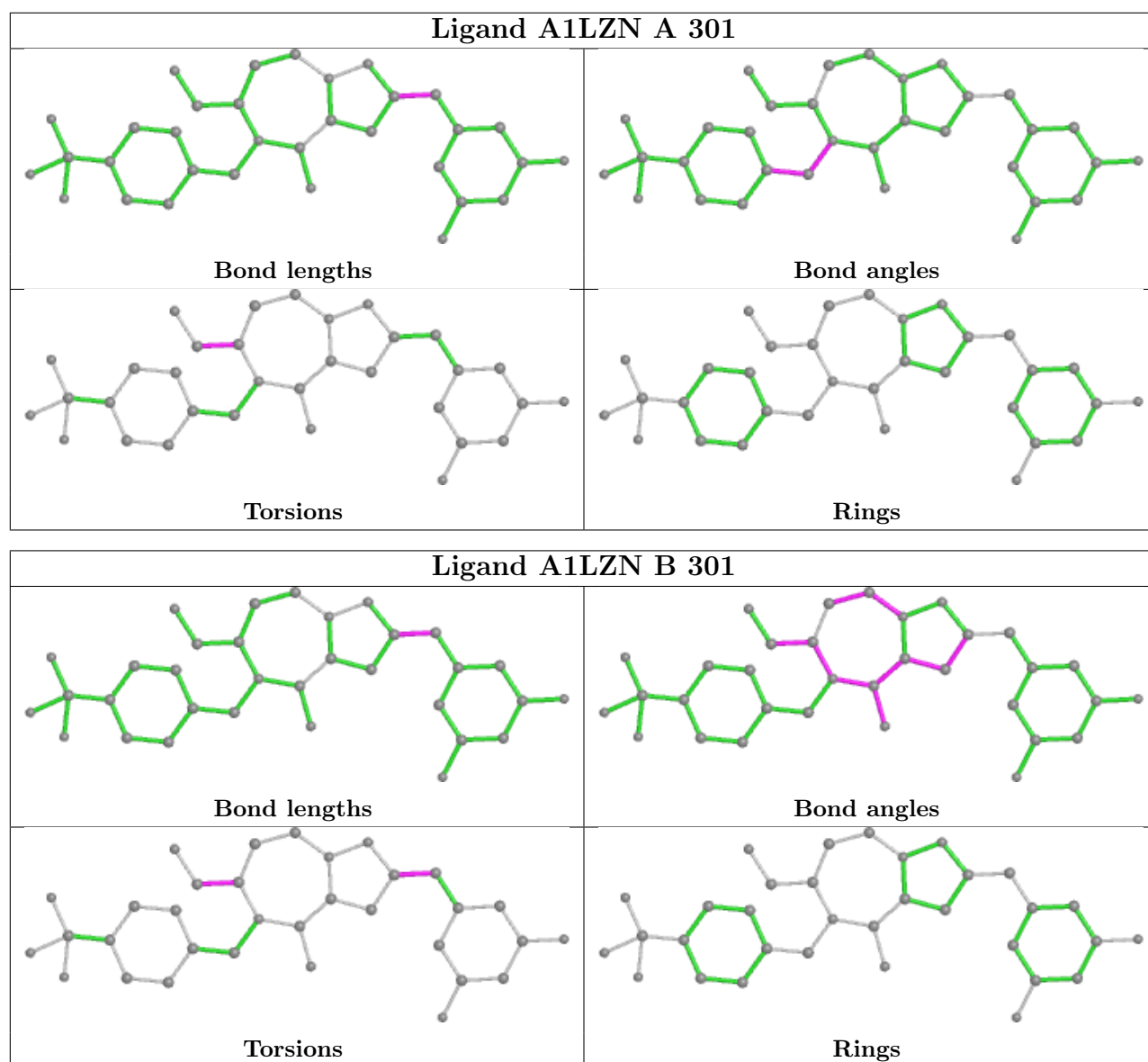


## Ligand A1LZN F 301



## Ligand A1LZN G 301





## 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	178/223 (79%)	0.00	7 (3%) 44 42	24, 33, 56, 83	0
1	B	178/223 (79%)	-0.05	8 (4%) 39 37	23, 33, 55, 92	0
1	C	178/223 (79%)	-0.01	9 (5%) 34 33	23, 33, 52, 89	0
1	D	178/223 (79%)	0.07	11 (6%) 28 26	20, 33, 60, 83	0
1	E	178/223 (79%)	-0.02	9 (5%) 34 33	22, 34, 58, 84	0
1	F	179/223 (80%)	0.08	12 (6%) 25 23	22, 34, 64, 97	0
1	G	179/223 (80%)	0.00	12 (6%) 25 23	23, 35, 58, 89	0
All	All	1248/1561 (79%)	0.01	68 (5%) 32 30	20, 34, 58, 97	0

All (68) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	247	HIS	6.1
1	F	246	VAL	5.2
1	D	190	ASP	5.0
1	D	58	LEU	4.8
1	F	70	GLU	4.7
1	B	188	ALA	4.7
1	F	190	ASP	4.6
1	E	188	ALA	4.6
1	E	189	THR	4.5
1	C	189	THR	4.5
1	D	247	HIS	4.4
1	A	58	LEU	4.3
1	G	189	THR	4.2
1	F	191	ILE	4.2
1	F	57	SER	4.1
1	C	188	ALA	4.0
1	D	188	ALA	4.0

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Mol	Chain	Res	Type	RSRZ
1	G	190	ASP	4.0
1	D	191	ILE	4.0
1	D	189	THR	3.9
1	C	58	LEU	3.9
1	B	58	LEU	3.8
1	F	189	THR	3.8
1	C	247	HIS	3.8
1	A	188	ALA	3.7
1	G	70	GLU	3.7
1	A	189	THR	3.6
1	B	189	THR	3.6
1	A	190	ASP	3.6
1	C	70	GLU	3.6
1	A	233	MET	3.4
1	D	246	VAL	3.2
1	D	63	VAL	3.2
1	E	63	VAL	3.2
1	G	247	HIS	3.2
1	E	247	HIS	3.2
1	C	63	VAL	3.2
1	A	247	HIS	3.1
1	B	63	VAL	3.1
1	F	188	ALA	3.0
1	F	63	VAL	3.0
1	B	191	ILE	2.9
1	E	190	ASP	2.9
1	D	70	GLU	2.8
1	E	246	VAL	2.8
1	G	188	ALA	2.8
1	D	245	LEU	2.8
1	B	247	HIS	2.8
1	G	63	VAL	2.7
1	G	57	SER	2.7
1	C	190	ASP	2.7
1	E	233	MET	2.6
1	F	245	LEU	2.5
1	E	58	LEU	2.4
1	F	233	MET	2.4
1	G	191	ILE	2.4
1	G	58	LEU	2.3
1	E	81	ARG	2.3
1	G	246	VAL	2.3

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Mol	Chain	Res	Type	RSRZ
1	C	233	MET	2.3
1	B	233	MET	2.2
1	G	192	ALA	2.2
1	A	70	GLU	2.1
1	G	144	CYS	2.1
1	D	144	CYS	2.1
1	F	109	GLU	2.1
1	B	190	ASP	2.1
1	C	73	TYR	2.1

## 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 monosaccharides in this entry.

## 6.4 Ligands [i](#)

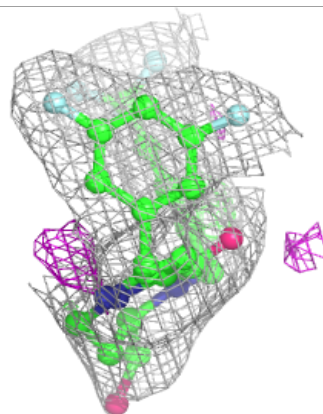
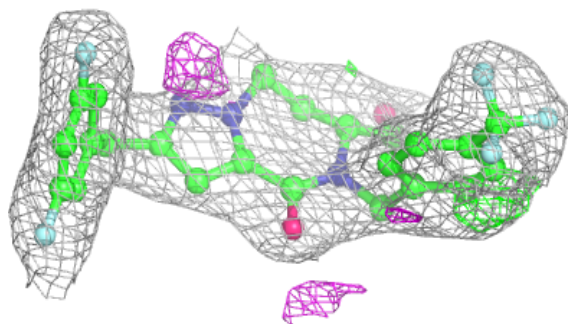
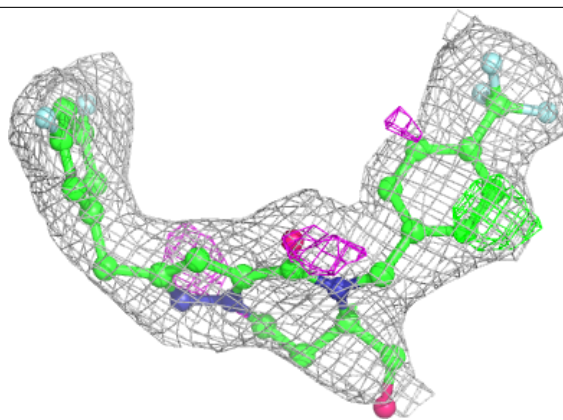
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95<sup>th</sup> percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 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
2	A1LZN	D	302	33/33	0.89	0.13	41,42,43,43	0
2	A1LZN	C	301	33/33	0.90	0.13	42,42,43,43	0
2	A1LZN	A	301	33/33	0.90	0.12	41,41,42,42	0
2	A1LZN	D	301	33/33	0.91	0.11	38,39,39,39	0
2	A1LZN	B	301	33/33	0.91	0.13	39,40,40,40	0
2	A1LZN	F	301	33/33	0.91	0.12	38,38,39,39	0
2	A1LZN	G	301	33/33	0.93	0.10	40,41,41,41	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.

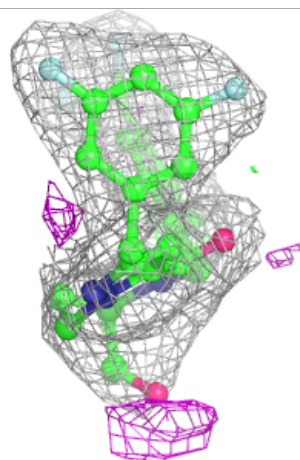
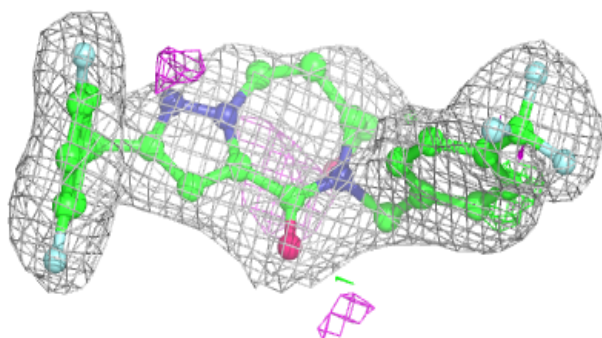
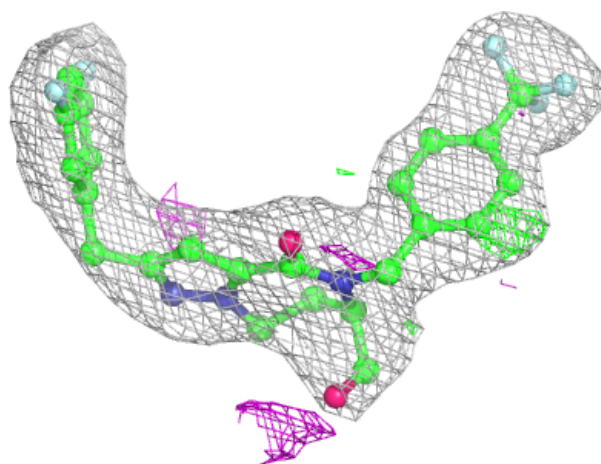
**Electron density around A1LZN D 302:**

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



**Electron density around A1LZN C 301:**

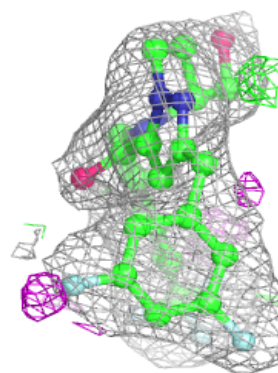
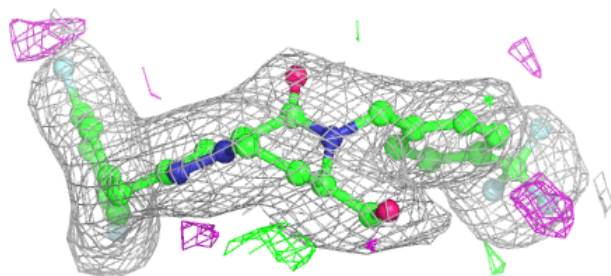
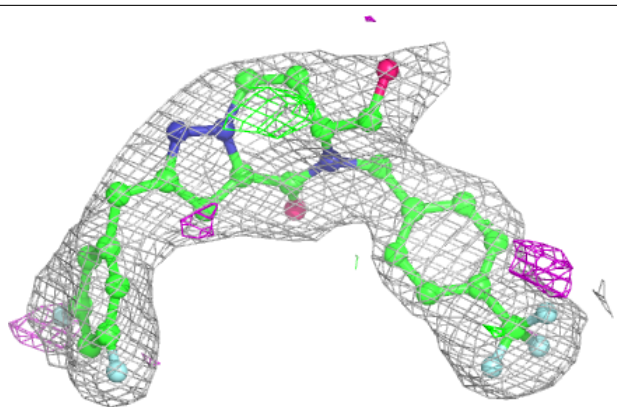
$2mF_o-DF_c$  (at 0.7 rmsd) in gray  
 $mF_o-DF_c$  (at 3 rmsd) in purple (negative)  
and green (positive)



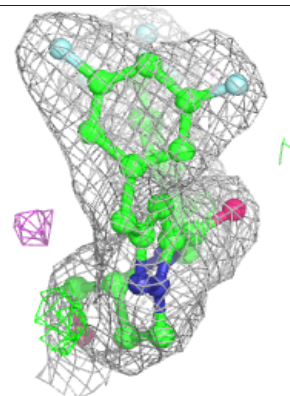
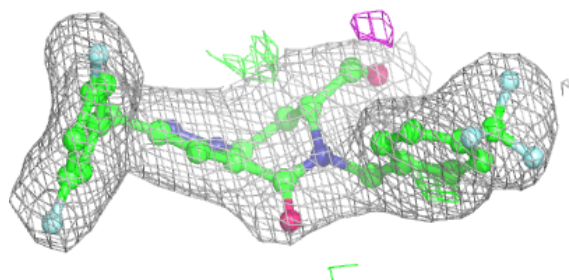
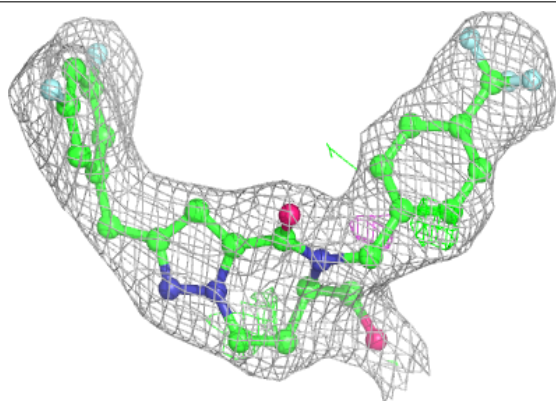


**Electron density around A1LZN A 301:**

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

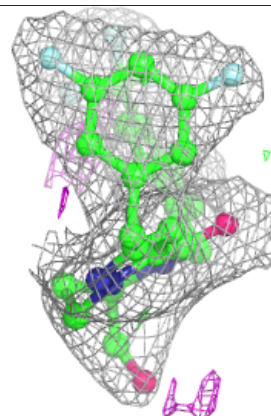
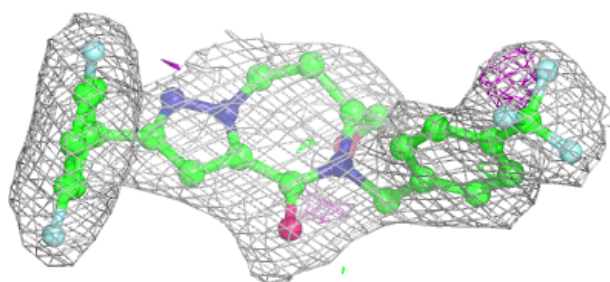
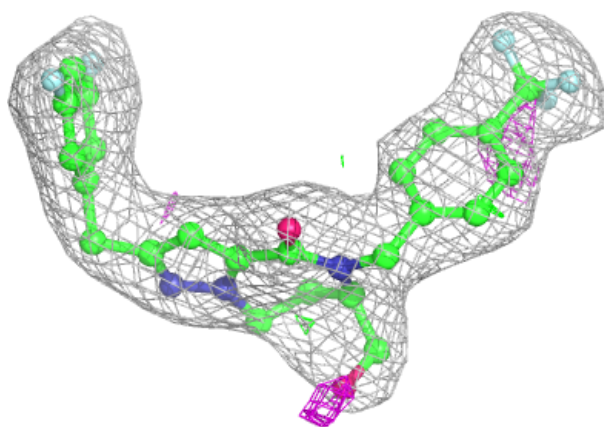
**Electron density around A1LZN D 301:**

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

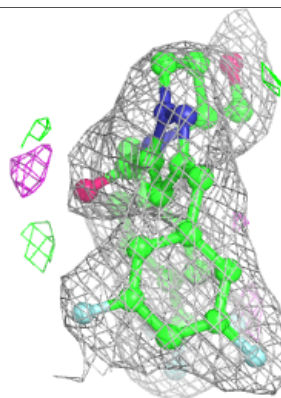
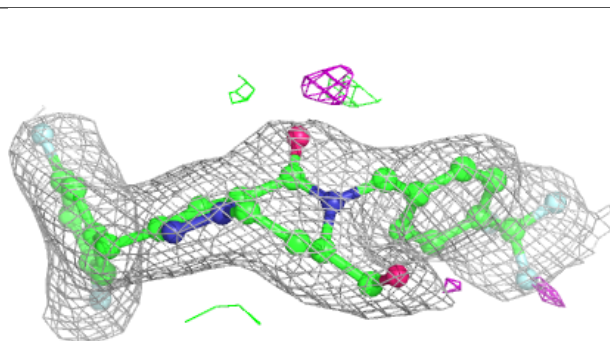
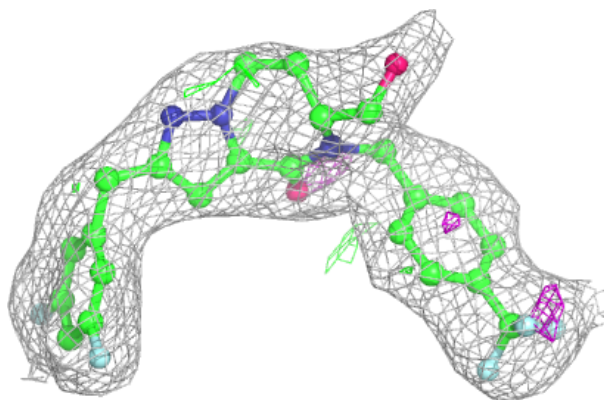


**Electron density around A1LZN B 301:**

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

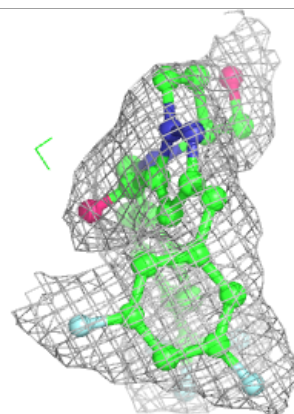
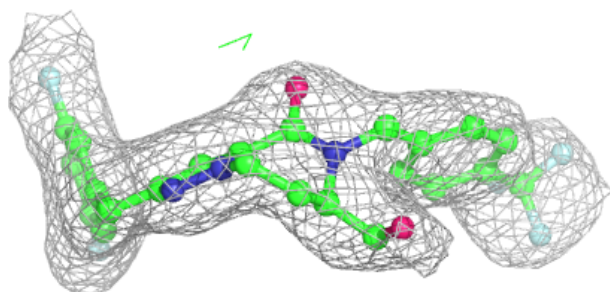
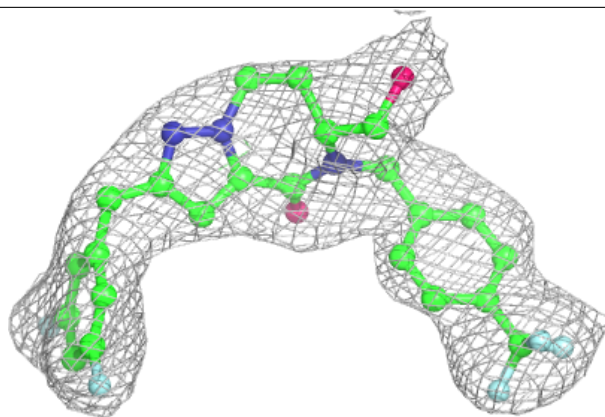
**Electron density around A1LZN F 301:**

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



**Electron density around A1LZN G 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 [i](#)

There are no such residues in this entry.