



Full wwPDB X-ray Structure Validation Report ⓘ

Mar 8, 2026 – 05:09 PM UTC

PDB ID : 8W7C / pdb_00008w7c
Title : Activation of mitochondrial Caseinolytic Protease P (ClpP) induces selective cancer cell lethality
Authors : Jiang, J.-X.; Ding, H.; Lu, M.-L.; Chen, M.-R.; Sun, H.-Y.; Xiao, Y.-B.
Deposited on : 2023-08-30
Resolution : 3.00 Å(reported)

This is a Full wwPDB X-ray Structure Validation Report for a publicly released PDB entry.

We welcome your comments at validation@mail.wwpdb.org

A user guide is available at

<https://www.wwpdb.org/validation/2017/XrayValidationReportHelp>

with specific help available everywhere you see the ⓘ symbol.

The types of validation reports are described at

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

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

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

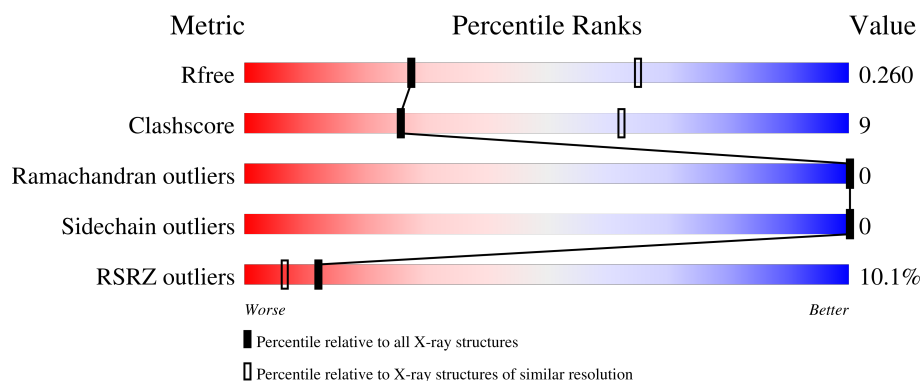
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 3.00 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	2672 (3.00-3.00)
Clashscore	190562	2977 (3.00-3.00)
Ramachandran outliers	187476	2877 (3.00-3.00)
Sidechain outliers	187428	2880 (3.00-3.00)
RSRZ outliers	180081	2671 (3.00-3.00)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments of the lower bar indicate the fraction of residues that contain outliers for ≥ 3 , 2, 1 and 0 types of geometric quality criteria respectively. A grey segment represents the fraction of residues that are not modelled. The numeric value for each fraction is indicated below the corresponding segment, with a dot representing fractions $\leq 5\%$. The upper red bar (where present) indicates the fraction of residues that have poor fit to the electron density. The numeric value is given above the bar.

Mol	Chain	Length	Quality of chain
1	A	223	7% 59% 19% 22%
1	B	223	9% 64% 14% 22%
1	C	223	8% 56% 22% 22%
1	D	223	7% 64% 15% 22%
1	E	223	7% 58% 21% 22%

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Mol	Chain	Length	Quality of chain
1	F	223	9% 62% 16% 22%
1	G	223	8% 62% 16% 22%

2 Entry composition

There are 2 unique types of molecules in this entry. The entry contains 9669 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	174	Total	C	N	O	S	0	0	0
			1350	862	229	246	13			
1	B	174	Total	C	N	O	S	0	0	0
			1350	862	229	246	13			
1	C	174	Total	C	N	O	S	0	1	0
			1354	865	230	245	14			
1	D	175	Total	C	N	O	S	0	0	0
			1341	856	224	248	13			
1	E	175	Total	C	N	O	S	0	0	0
			1353	862	230	248	13			
1	F	174	Total	C	N	O	S	0	1	0
			1348	861	230	243	14			
1	G	173	Total	C	N	O	S	0	0	0
			1342	856	228	245	13			

There are 21 discrepancies between the modelled and reference sequences:

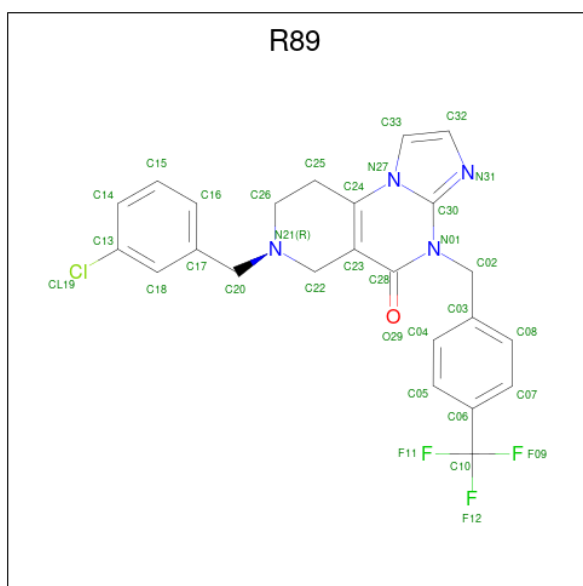
Chain	Residue	Modelled	Actual	Comment	Reference
A	55	GLY	-	linker	UNP Q16740
A	56	SER	-	linker	UNP Q16740
A	57	SER	-	linker	UNP Q16740
B	55	GLY	-	linker	UNP Q16740
B	56	SER	-	linker	UNP Q16740
B	57	SER	-	linker	UNP Q16740
C	55	GLY	-	linker	UNP Q16740
C	56	SER	-	linker	UNP Q16740
C	57	SER	-	linker	UNP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

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

- Molecule 2 is 11-[(3-chlorophenyl)methyl]-7-[[4-(trifluoromethyl)phenyl]methyl]-2,5,7,11-tetrazatricyclo[7.4.0.0^{2,6}]trideca-1(9),3,5-trien-8-one (CCD ID: R89) (formula: C₂₄H₂₀ClF₃N₄O).

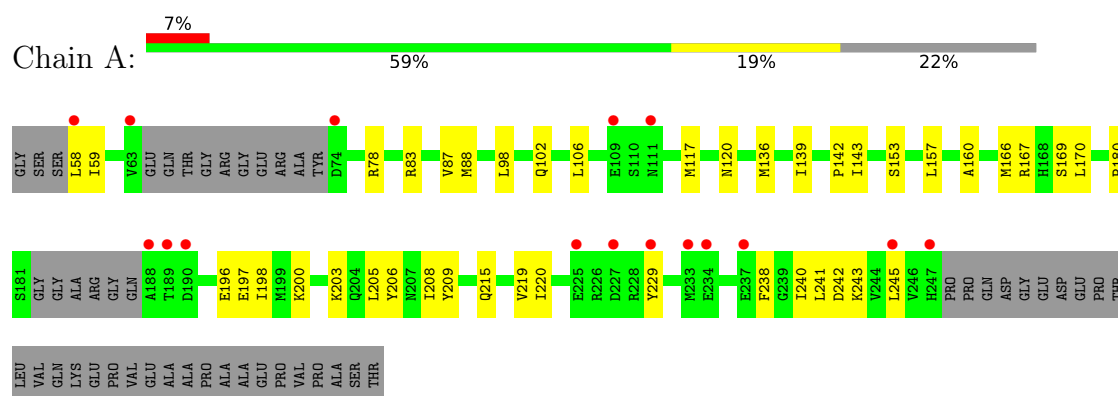


Mol	Chain	Residues	Atoms						ZeroOcc	AltConf
2	A	1	Total 33	C 24	Cl 1	F 3	N 4	O 1	0	0
2	B	1	Total 33	C 24	Cl 1	F 3	N 4	O 1	0	0
2	C	1	Total 33	C 24	Cl 1	F 3	N 4	O 1	0	0
2	D	1	Total 33	C 24	Cl 1	F 3	N 4	O 1	0	0
2	E	1	Total 33	C 24	Cl 1	F 3	N 4	O 1	0	0
2	F	1	Total 33	C 24	Cl 1	F 3	N 4	O 1	0	0
2	G	1	Total 33	C 24	Cl 1	F 3	N 4	O 1	0	0

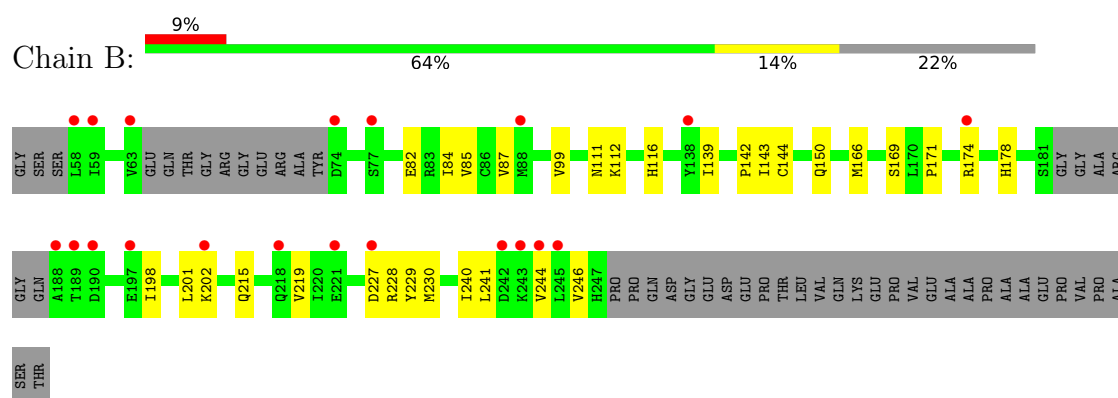
3 Residue-property plots [i](#)

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.

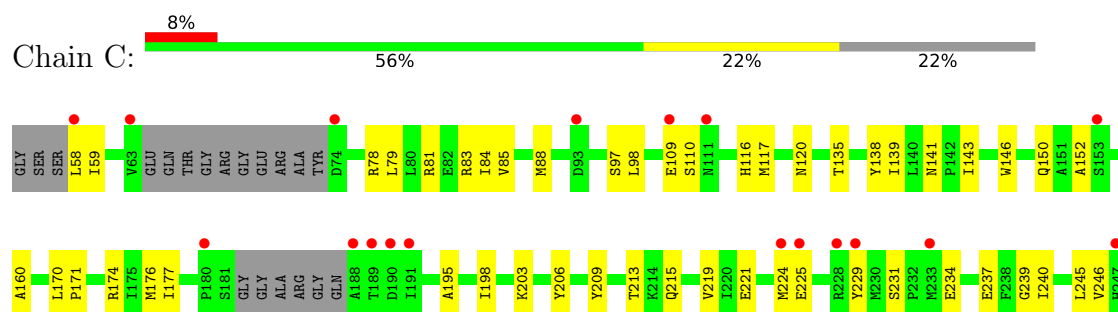
- Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial



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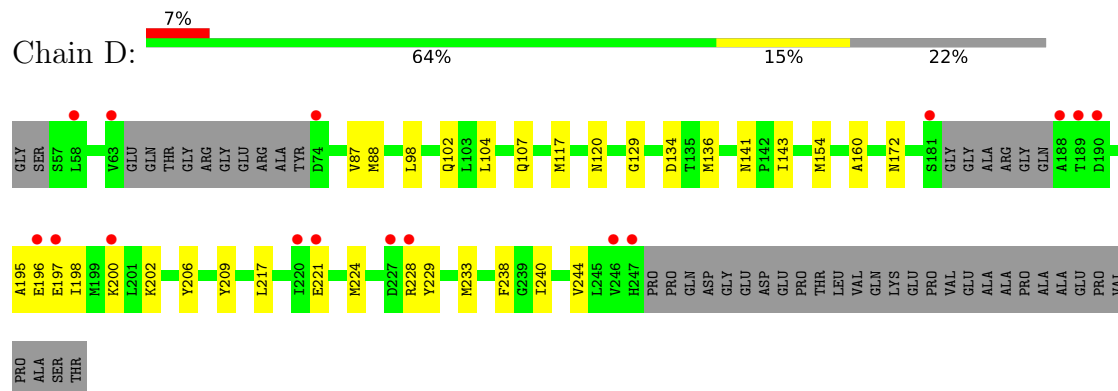


- Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

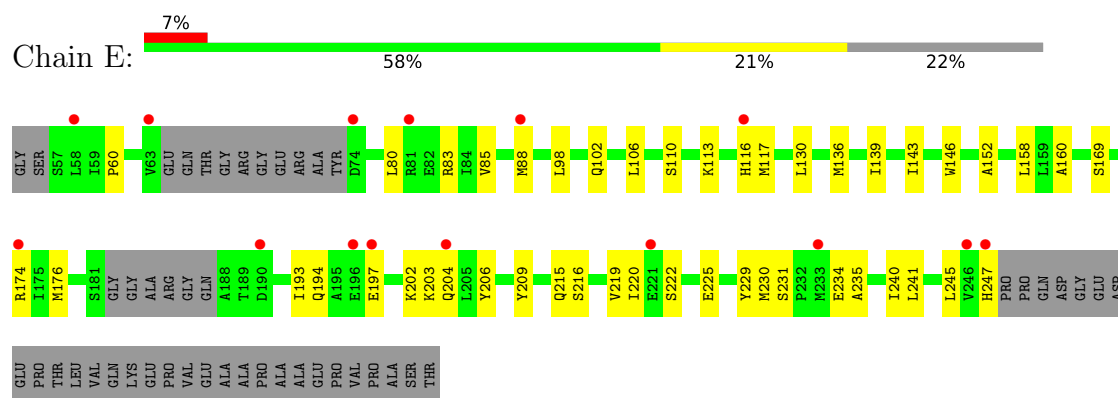


PRO
PRO
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GLY
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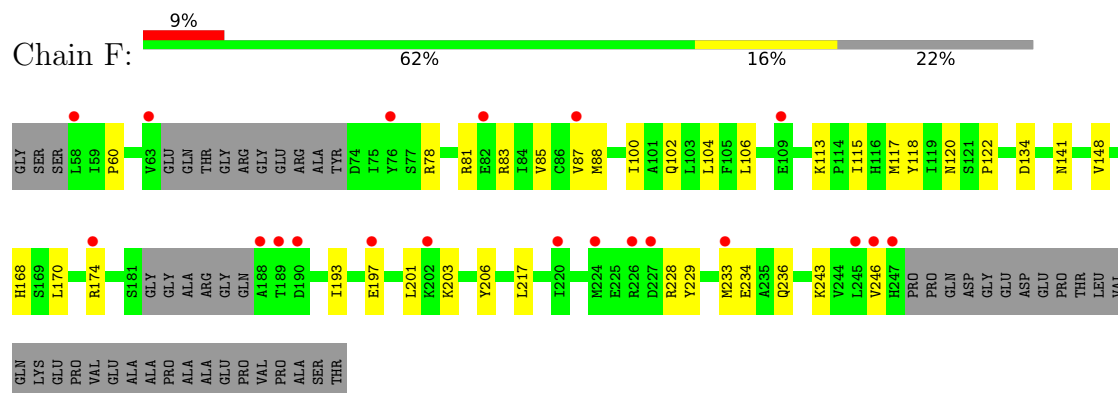
- Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial



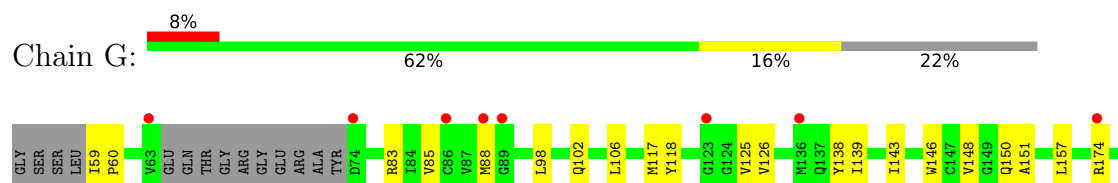
- Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

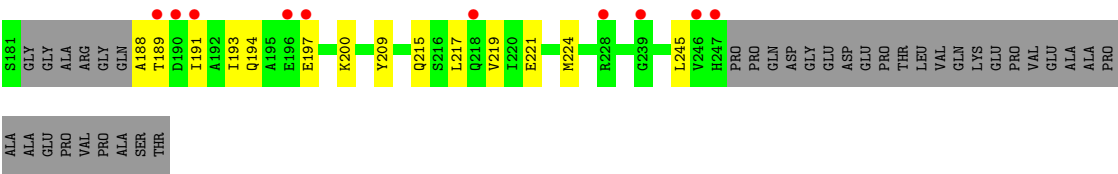


- Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial



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4 Data and refinement statistics

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α , β , γ	142.25Å 153.59Å 104.62Å 90.00° 117.96° 90.00°	Depositor
Resolution (Å)	46.20 – 3.00 46.20 – 3.00	Depositor EDS
% Data completeness (in resolution range)	99.3 (46.20-3.00) 92.6 (46.20-3.00)	Depositor EDS
R_{merge}	(Not available)	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	0.98 (at 3.01Å)	Xtriage
Refinement program	PHENIX (1.18.2_3874: ???)	Depositor
R, R_{free}	0.240 , 0.260 0.240 , 0.260	Depositor DCC
R_{free} test set	1995 reflections (5.02%)	wwPDB-VP
Wilson B-factor (Å ²)	59.3	Xtriage
Anisotropy	0.225	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.34 , 33.1	EDS
L-test for twinning ²	$\langle L \rangle = 0.50$, $\langle L^2 \rangle = 0.33$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.90	EDS
Total number of atoms	9669	wwPDB-VP
Average B, all atoms (Å ²)	64.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.01% of the height of the origin peak. No significant pseudotranslation is detected.*

¹Intensities estimated from amplitudes.

²Theoretical values of $\langle |L| \rangle$, $\langle L^2 \rangle$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality

5.1 Standard geometry

Bond lengths and bond angles in the following residue types are not validated in this section: R89

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	0.16	0/1372	0.42	0/1855
1	B	0.20	0/1372	0.46	0/1855
1	C	0.17	0/1376	0.46	0/1860
1	D	0.23	0/1363	0.50	0/1845
1	E	0.19	0/1375	0.49	0/1859
1	F	0.24	0/1370	0.52	0/1852
1	G	0.22	0/1364	0.49	0/1844
All	All	0.20	0/9592	0.48	0/12970

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	1350	0	1396	27	0
1	B	1350	0	1396	23	0
1	C	1354	0	1400	35	0
1	D	1341	0	1370	25	0
1	E	1353	0	1392	34	0
1	F	1348	0	1389	29	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	G	1342	0	1385	27	0
2	A	33	0	0	2	0
2	B	33	0	0	2	0
2	C	33	0	0	1	0
2	D	33	0	0	0	0
2	E	33	0	0	3	0
2	F	33	0	0	0	0
2	G	33	0	0	1	0
All	All	9669	0	9728	184	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 9.

All (184) close contacts within the same asymmetric unit are listed below, sorted by their clash magnitude.

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:A:88:MET:HG3	1:A:120:ASN:HB3	1.51	0.91
1:D:195:ALA:HA	1:D:198:ILE:HG22	1.51	0.90
1:A:170:LEU:HD23	1:F:134:ASP:HB3	1.68	0.75
1:F:233[B]:MET:SD	1:F:236:GLN:NE2	2.61	0.74
1:G:126:VAL:HB	1:G:188:ALA:HB2	1.67	0.74
1:C:84:ILE:HD13	1:C:116:HIS:HB2	1.74	0.69
1:C:177:ILE:HG13	1:C:224:MET:HG2	1.75	0.69
1:F:122:PRO:HB2	1:G:191:ILE:HD11	1.77	0.67
1:G:88:MET:HE2	1:G:118:TYR:HB3	1.78	0.66
1:C:170:LEU:HD23	1:D:134:ASP:HB3	1.77	0.65
1:E:83:ARG:HD2	1:E:106:LEU:HD22	1.77	0.65
1:E:139:ILE:HD11	1:E:143:ILE:HD11	1.78	0.64
1:E:160:ALA:HB2	1:E:240:ILE:HG23	1.79	0.64
1:E:152:ALA:HB1	1:E:176:MET:HE2	1.79	0.64
1:C:139:ILE:HD11	1:C:143:ILE:HD11	1.81	0.62
1:F:78:ARG:HH11	1:F:81:ARG:HD3	1.65	0.62
1:E:230:MET:HE2	1:E:235:ALA:HA	1.82	0.62
1:G:150:GLN:CB	1:G:174:ARG:HB2	2.28	0.62
1:F:60:PRO:HD2	1:G:98:LEU:HD11	1.82	0.61
1:C:152:ALA:HB1	1:C:176:MET:HE2	1.80	0.61
1:A:139:ILE:HD11	1:A:143:ILE:HD11	1.81	0.61
1:D:238:PHE:HD2	1:D:240:ILE:HD11	1.66	0.61
1:C:160:ALA:HB2	1:C:240:ILE:HG23	1.83	0.60
1:D:88:MET:HG2	1:D:120:ASN:HB3	1.82	0.60
1:B:230:MET:HE1	1:B:240:ILE:HD12	1.83	0.60

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:169:SER:HB3	1:B:244:VAL:HG22	1.83	0.59
1:B:139:ILE:HD11	1:B:143:ILE:HD11	1.85	0.59
1:B:171:PRO:HG3	1:B:246:VAL:HG22	1.84	0.59
1:C:58:LEU:HG	1:C:59:ILE:HG13	1.82	0.59
1:F:88:MET:HG2	1:F:120:ASN:HB3	1.85	0.58
1:A:58:LEU:HB3	1:A:59:ILE:HD12	1.83	0.58
1:D:217:LEU:O	1:D:221:GLU:HG2	2.03	0.58
1:G:157:LEU:HA	1:G:209:TYR:HE1	1.69	0.58
1:B:84:ILE:HD13	1:B:116:HIS:HB2	1.86	0.58
1:C:221:GLU:O	1:C:225:GLU:HG3	2.04	0.58
1:E:85:VAL:O	1:E:117:MET:HA	2.05	0.57
1:E:136:MET:HE2	1:E:158:LEU:HD22	1.87	0.57
1:E:80:LEU:HD11	1:E:102:GLN:HB3	1.86	0.57
1:C:135:THR:HA	2:E:301:R89:CL19	2.41	0.57
1:G:217:LEU:O	1:G:221:GLU:HG3	2.05	0.57
1:C:195:ALA:O	1:C:198:ILE:HG22	2.05	0.57
1:E:98:LEU:O	1:E:102:GLN:HG3	2.05	0.56
1:A:209:TYR:HB3	1:A:220:ILE:HD12	1.87	0.56
1:D:196:GLU:O	1:D:200:LYS:HG3	2.05	0.56
1:B:150:GLN:CB	1:B:174:ARG:HB2	2.35	0.56
1:C:174:ARG:HB3	1:C:229:TYR:CD2	2.40	0.56
1:C:171:PRO:HG3	1:C:246:VAL:HG22	1.87	0.55
1:E:83:ARG:HH12	1:E:113:LYS:HB2	1.72	0.55
1:E:203:LYS:HA	1:E:206:TYR:CD2	2.42	0.55
1:A:142:PRO:HB2	1:A:166:MET:HE1	1.88	0.54
1:A:215:GLN:HB3	1:A:219:VAL:CG2	2.38	0.53
1:C:83:ARG:HH12	1:C:109:GLU:HB2	1.74	0.53
1:E:130:LEU:HD13	1:E:204:GLN:NE2	2.24	0.53
1:C:98:LEU:HD11	1:E:60:PRO:HD2	1.91	0.52
1:F:106:LEU:HD13	1:F:115:ILE:HD12	1.91	0.52
1:C:146:TRP:CZ3	1:C:245:LEU:HD21	2.44	0.52
1:A:169:SER:HB2	1:A:241:LEU:HD22	1.92	0.52
1:C:234:GLU:HA	1:C:237:GLU:HG2	1.91	0.52
1:F:88:MET:HE3	1:F:118:TYR:HB3	1.92	0.51
1:E:85:VAL:HG13	1:E:102:GLN:OE1	2.10	0.51
1:E:202:LYS:HG3	1:E:206:TYR:CZ	2.45	0.51
1:A:197:GLU:OE1	1:D:229:TYR:HB2	2.10	0.51
1:B:215:GLN:HB3	1:B:219:VAL:CG2	2.40	0.51
1:A:98:LEU:O	1:A:102:GLN:HG3	2.12	0.50
1:E:83:ARG:NH1	1:E:113:LYS:HB2	2.27	0.50
1:D:209:TYR:CD2	1:D:224:MET:HE1	2.47	0.50

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:F:87:VAL:O	1:F:87:VAL:HG12	2.11	0.50
1:C:203:LYS:HA	1:C:206:TYR:HD2	1.76	0.50
1:G:150:GLN:HB3	1:G:174:ARG:HB2	1.92	0.50
1:D:160:ALA:HB2	1:D:240:ILE:HG23	1.93	0.49
1:A:83:ARG:HG2	1:A:106:LEU:HD22	1.94	0.49
2:A:301:R89:CL19	1:F:100:ILE:HG21	2.48	0.49
1:F:168:HIS:HA	1:F:243:LYS:O	2.13	0.49
1:F:85:VAL:HG13	1:F:102:GLN:NE2	2.28	0.49
1:B:87:VAL:HG12	1:B:87:VAL:O	2.12	0.49
1:C:88:MET:HB2	1:C:120:ASN:HB3	1.94	0.49
1:C:110:SER:O	1:C:141:ASN:ND2	2.45	0.49
1:F:229:TYR:CD1	1:G:197:GLU:HG2	2.48	0.49
1:D:195:ALA:HA	1:D:198:ILE:CG2	2.33	0.48
1:E:209:TYR:HB3	1:E:220:ILE:HD12	1.96	0.48
1:C:138:TYR:HA	1:E:247:HIS:O	2.13	0.48
1:F:228:ARG:NH2	1:F:234:GLU:OE2	2.42	0.48
1:A:243:LYS:HB3	1:A:245:LEU:CD1	2.43	0.48
1:C:215:GLN:HB3	1:C:219:VAL:CG2	2.43	0.48
1:B:198:ILE:O	1:B:202:LYS:HG2	2.13	0.48
1:F:193:ILE:HB	1:F:197:GLU:OE1	2.13	0.48
1:E:222:SER:O	1:E:225:GLU:HG2	2.14	0.48
1:F:203:LYS:HA	1:F:206:TYR:CD2	2.48	0.48
1:A:167:ARG:NH2	1:A:242:ASP:OD1	2.47	0.47
1:B:150:GLN:HB3	1:B:174:ARG:HB2	1.96	0.47
1:C:203:LYS:HA	1:C:206:TYR:CD2	2.49	0.47
1:E:216:SER:HB3	1:E:219:VAL:HG13	1.96	0.47
1:E:193:ILE:HG22	1:E:194:GLN:O	2.14	0.47
1:F:203:LYS:HA	1:F:206:TYR:HD2	1.79	0.47
1:G:85:VAL:O	1:G:117:MET:HA	2.15	0.47
1:A:160:ALA:HB2	1:A:240:ILE:HG23	1.97	0.47
1:E:116:HIS:ND1	2:E:301:R89:C33	2.78	0.47
1:C:231:SER:OG	1:C:234:GLU:HG2	2.14	0.47
1:B:174:ARG:HB3	1:B:229:TYR:CD2	2.49	0.47
1:G:150:GLN:HB2	1:G:174:ARG:HB2	1.97	0.47
1:E:83:ARG:HH12	1:E:110:SER:HB3	1.80	0.46
1:B:84:ILE:HD11	2:B:301:R89:C33	2.45	0.46
1:A:153:SER:HB2	1:A:180:PRO:HD3	1.97	0.46
1:B:228:ARG:HH12	1:B:230:MET:HG2	1.80	0.46
1:C:209:TYR:O	1:C:213:THR:OG1	2.28	0.46
1:C:229:TYR:HB2	1:D:197:GLU:OE1	2.16	0.46
1:F:148:VAL:HG23	1:F:170:LEU:HD12	1.98	0.46

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:G:98:LEU:O	1:G:102:GLN:HG3	2.15	0.46
1:C:88:MET:HE2	1:C:88:MET:HB3	1.88	0.46
1:E:146:TRP:HZ3	1:E:245:LEU:HD21	1.81	0.46
1:E:215:GLN:HB3	1:E:219:VAL:CG2	2.45	0.46
1:G:189:THR:O	1:G:189:THR:HG22	2.16	0.46
1:F:197:GLU:O	1:F:201:LEU:HG	2.15	0.45
1:G:139:ILE:HD11	1:G:143:ILE:HD11	1.97	0.45
1:G:215:GLN:HB3	1:G:219:VAL:CG2	2.46	0.45
1:B:150:GLN:HB2	1:B:174:ARG:HB2	1.98	0.45
1:D:233:MET:SD	1:D:244:VAL:HG21	2.56	0.45
1:E:169:SER:HB2	1:E:241:LEU:HD22	1.98	0.45
1:F:206:TYR:HB3	1:F:217:LEU:HD11	1.99	0.45
1:G:59:ILE:HA	1:G:60:PRO:HD3	1.81	0.45
1:E:231:SER:OG	1:E:234:GLU:HG2	2.16	0.45
1:G:146:TRP:HZ3	1:G:245:LEU:HD21	1.82	0.45
1:D:87:VAL:HG12	1:D:87:VAL:O	2.16	0.45
1:C:229:TYR:HB2	1:D:197:GLU:CD	2.41	0.44
1:A:229:TYR:HD1	1:F:197:GLU:CD	2.25	0.44
1:F:174:ARG:NH2	1:G:200:LYS:HD3	2.32	0.44
1:B:201:LEU:HD23	1:B:201:LEU:HA	1.85	0.44
1:C:84:ILE:HD11	2:C:301:R89:C33	2.47	0.44
1:C:85:VAL:O	1:C:117:MET:HA	2.18	0.44
1:D:117:MET:SD	1:D:136:MET:HE3	2.58	0.44
1:E:174:ARG:HB3	1:E:229:TYR:HD2	1.83	0.43
1:G:148:VAL:HG11	2:G:301:R89:CL19	2.56	0.43
1:B:144:CYS:SG	1:B:166:MET:HE2	2.58	0.43
1:D:141:ASN:O	1:D:143:ILE:HD12	2.19	0.43
1:D:228:ARG:HG2	1:D:229:TYR:O	2.19	0.43
1:A:98:LEU:HD12	1:A:98:LEU:HA	1.86	0.43
1:B:82:GLU:HG3	2:B:301:R89:C07	2.49	0.43
1:F:246:VAL:O	1:G:138:TYR:HA	2.18	0.43
1:A:203:LYS:HA	1:A:206:TYR:CD2	2.54	0.43
1:D:98:LEU:HG	1:D:102:GLN:HE21	1.84	0.43
1:E:193:ILE:CG2	1:E:197:GLU:HB2	2.48	0.43
1:A:208:ILE:HD11	1:D:172:ASN:ND2	2.34	0.43
1:D:107:GLN:HG3	1:D:141:ASN:OD1	2.19	0.43
1:D:129:GLY:HA3	1:D:154:MET:HE2	2.01	0.43
1:B:178:HIS:CD2	1:B:227:ASP:HB3	2.54	0.42
1:C:97:SER:HB2	1:E:88:MET:HG3	2.01	0.42
1:F:83:ARG:HG2	1:F:106:LEU:HD22	1.99	0.42
1:G:224:MET:HE2	1:G:224:MET:HB3	1.82	0.42

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Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:B:111:ASN:OD1	1:B:112:LYS:HG2	2.19	0.42
1:B:85:VAL:HG11	1:B:99:VAL:HG13	2.01	0.42
1:C:88:MET:CB	1:C:120:ASN:HB3	2.49	0.42
1:A:238:PHE:HD1	1:A:240:ILE:HG13	1.83	0.42
1:E:116:HIS:CE1	2:E:301:R89:C33	3.02	0.42
1:G:151:ALA:N	1:G:174:ARG:O	2.49	0.42
1:C:150:GLN:HB3	1:C:174:ARG:HB2	2.02	0.42
1:E:230:MET:HB2	1:E:234:GLU:HG3	2.02	0.42
1:A:196:GLU:O	1:A:200:LYS:HG3	2.19	0.42
1:B:241:LEU:C	1:B:241:LEU:HD12	2.45	0.42
1:D:98:LEU:HG	1:D:102:GLN:NE2	2.35	0.42
1:E:174:ARG:HB3	1:E:229:TYR:CD2	2.55	0.42
1:G:193:ILE:HG22	1:G:194:GLN:N	2.35	0.42
1:A:87:VAL:HG12	1:A:87:VAL:O	2.20	0.42
1:C:213:THR:HG22	1:C:239:GLY:C	2.45	0.41
1:F:85:VAL:O	1:F:117:MET:HA	2.19	0.41
1:A:142:PRO:HB3	1:B:142:PRO:HG3	2.03	0.41
1:D:224:MET:HB2	1:D:224:MET:HE3	1.87	0.41
1:E:230:MET:HE2	1:E:235:ALA:CA	2.49	0.41
1:C:78:ARG:O	1:C:81:ARG:HB3	2.20	0.41
2:A:301:R89:C08	1:F:104:LEU:HB3	2.51	0.41
1:G:125:VAL:HG13	1:G:188:ALA:HA	2.02	0.41
1:G:146:TRP:CZ3	1:G:245:LEU:HD21	2.56	0.41
1:F:217:LEU:HA	1:F:217:LEU:HD12	1.77	0.41
1:F:113:LYS:O	1:F:141:ASN:ND2	2.52	0.41
1:D:202:LYS:HE2	1:D:206:TYR:CE1	2.56	0.40
1:A:117:MET:HE1	1:A:136:MET:HG2	2.04	0.40
1:A:157:LEU:HD13	1:A:205:LEU:HD22	2.03	0.40
1:B:241:LEU:HD13	1:B:244:VAL:HG23	2.03	0.40
1:C:79:LEU:O	1:C:84:ILE:HB	2.22	0.40
1:F:170:LEU:HD23	1:F:170:LEU:HA	1.85	0.40
1:A:78:ARG:HA	1:A:78:ARG:HD2	1.90	0.40
1:A:198:ILE:HD12	1:A:198:ILE:HA	1.94	0.40
1:D:104:LEU:HD23	1:D:104:LEU:HA	1.94	0.40
1:G:83:ARG:HG2	1:G:106:LEU:HD22	2.03	0.40
1:G:193:ILE:CG2	1:G:197:GLU:HB3	2.51	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	168/223 (75%)	165 (98%)	3 (2%)	0	100	100
1	B	168/223 (75%)	164 (98%)	4 (2%)	0	100	100
1	C	169/223 (76%)	165 (98%)	4 (2%)	0	100	100
1	D	169/223 (76%)	166 (98%)	3 (2%)	0	100	100
1	E	169/223 (76%)	165 (98%)	4 (2%)	0	100	100
1	F	169/223 (76%)	166 (98%)	3 (2%)	0	100	100
1	G	167/223 (75%)	163 (98%)	4 (2%)	0	100	100
All	All	1179/1561 (76%)	1154 (98%)	25 (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%)	151 (100%)	0	100	100
1	B	151/186 (81%)	151 (100%)	0	100	100
1	C	151/186 (81%)	151 (100%)	0	100	100
1	D	149/186 (80%)	149 (100%)	0	100	100
1	E	151/186 (81%)	151 (100%)	0	100	100
1	F	149/186 (80%)	149 (100%)	0	100	100
1	G	150/186 (81%)	150 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
All	All	1052/1302 (81%)	1052 (100%)	0	100	100

There are no protein residues with a non-rotameric sidechain to report.

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. All (9) such sidechains are listed below:

Mol	Chain	Res	Type
1	B	137	GLN
1	C	172	ASN
1	D	102	GLN
1	E	120	ASN
1	E	204	GLN
1	F	102	GLN
1	F	179	GLN
1	F	218	GLN
1	G	102	GLN

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	R89	D	301	-	36,37,37	6.18	27 (75%)	49,55,55	2.40	12 (24%)
2	R89	B	301	-	36,37,37	6.19	26 (72%)	49,55,55	2.10	13 (26%)
2	R89	A	301	-	36,37,37	6.15	26 (72%)	49,55,55	2.27	13 (26%)
2	R89	F	301	-	36,37,37	6.16	26 (72%)	49,55,55	1.89	13 (26%)
2	R89	G	301	-	36,37,37	6.14	27 (75%)	49,55,55	1.94	13 (26%)
2	R89	E	301	-	36,37,37	6.18	26 (72%)	49,55,55	1.94	13 (26%)
2	R89	C	301	-	36,37,37	6.13	25 (69%)	49,55,55	2.05	13 (26%)

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	R89	D	301	-	-	2/14/23/23	0/5/5/5
2	R89	B	301	-	-	0/14/23/23	0/5/5/5
2	R89	A	301	-	-	1/14/23/23	0/5/5/5
2	R89	F	301	-	-	0/14/23/23	0/5/5/5
2	R89	G	301	-	-	2/14/23/23	0/5/5/5
2	R89	E	301	-	-	2/14/23/23	0/5/5/5
2	R89	C	301	-	-	2/14/23/23	0/5/5/5

All (183) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301	R89	C22-N21	12.59	1.58	1.46
2	E	301	R89	C22-N21	12.51	1.57	1.46
2	D	301	R89	C22-N21	12.15	1.57	1.46
2	F	301	R89	C22-N21	11.91	1.57	1.46
2	G	301	R89	C22-N21	11.90	1.57	1.46
2	C	301	R89	C22-N21	11.64	1.57	1.46
2	A	301	R89	C22-N21	11.44	1.56	1.46
2	A	301	R89	C20-N21	-11.29	1.26	1.47
2	D	301	R89	C20-N21	-11.19	1.26	1.47
2	C	301	R89	C20-N21	-11.07	1.26	1.47
2	B	301	R89	C20-N21	-10.98	1.26	1.47
2	E	301	R89	C20-N21	-10.89	1.26	1.47
2	G	301	R89	C20-N21	-10.68	1.27	1.47
2	F	301	R89	C20-N21	-10.67	1.27	1.47
2	F	301	R89	C18-C13	9.47	1.53	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	G	301	R89	C18-C13	9.36	1.53	1.38
2	C	301	R89	C18-C13	9.27	1.53	1.38
2	E	301	R89	C18-C13	9.26	1.53	1.38
2	A	301	R89	C08-C07	9.05	1.53	1.38
2	A	301	R89	C18-C13	9.05	1.53	1.38
2	F	301	R89	C08-C07	9.01	1.53	1.38
2	D	301	R89	C08-C07	8.99	1.53	1.38
2	E	301	R89	C05-C04	8.98	1.53	1.38
2	D	301	R89	C18-C13	8.97	1.52	1.38
2	C	301	R89	C08-C07	8.94	1.53	1.38
2	D	301	R89	C05-C04	8.85	1.53	1.38
2	E	301	R89	C08-C07	8.79	1.53	1.38
2	G	301	R89	C05-C04	8.79	1.53	1.38
2	B	301	R89	C18-C13	8.78	1.52	1.38
2	A	301	R89	C05-C04	8.76	1.53	1.38
2	G	301	R89	C08-C07	8.75	1.53	1.38
2	C	301	R89	C05-C04	8.74	1.52	1.38
2	F	301	R89	C05-C04	8.74	1.52	1.38
2	B	301	R89	C08-C07	8.73	1.52	1.38
2	B	301	R89	C05-C04	8.69	1.52	1.38
2	A	301	R89	C07-C06	8.54	1.53	1.39
2	G	301	R89	C26-N21	-8.52	1.23	1.46
2	F	301	R89	C26-N21	-8.51	1.23	1.46
2	D	301	R89	C07-C06	8.48	1.53	1.39
2	A	301	R89	C26-N21	-8.48	1.24	1.46
2	C	301	R89	C26-N21	-8.44	1.24	1.46
2	F	301	R89	C18-C17	8.35	1.53	1.39
2	B	301	R89	C07-C06	8.35	1.53	1.39
2	F	301	R89	C07-C06	8.35	1.53	1.39
2	C	301	R89	C07-C06	8.33	1.53	1.39
2	B	301	R89	C15-C14	8.32	1.53	1.38
2	B	301	R89	C26-N21	-8.32	1.24	1.46
2	E	301	R89	C05-C06	8.31	1.53	1.39
2	G	301	R89	C18-C17	8.30	1.53	1.39
2	D	301	R89	C26-N21	-8.30	1.24	1.46
2	E	301	R89	C07-C06	8.28	1.53	1.39
2	G	301	R89	C05-C06	8.28	1.53	1.39
2	D	301	R89	C05-C06	8.27	1.53	1.39
2	B	301	R89	C15-C16	8.27	1.53	1.38
2	E	301	R89	C26-N21	-8.24	1.24	1.46
2	F	301	R89	C15-C16	8.24	1.53	1.38
2	G	301	R89	C14-C13	8.22	1.53	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	B	301	R89	C05-C06	8.21	1.53	1.39
2	A	301	R89	C15-C14	8.21	1.52	1.38
2	A	301	R89	C14-C13	8.21	1.53	1.38
2	D	301	R89	C15-C14	8.19	1.52	1.38
2	G	301	R89	C07-C06	8.19	1.53	1.39
2	C	301	R89	C15-C16	8.19	1.52	1.38
2	G	301	R89	C15-C16	8.17	1.52	1.38
2	F	301	R89	C05-C06	8.16	1.52	1.39
2	E	301	R89	C15-C16	8.16	1.52	1.38
2	E	301	R89	C14-C13	8.15	1.53	1.38
2	D	301	R89	C15-C16	8.14	1.52	1.38
2	E	301	R89	C15-C14	8.12	1.52	1.38
2	D	301	R89	C14-C13	8.12	1.52	1.38
2	F	301	R89	C14-C13	8.10	1.52	1.38
2	A	301	R89	C15-C16	8.10	1.52	1.38
2	A	301	R89	C05-C06	8.09	1.52	1.39
2	C	301	R89	C05-C06	8.08	1.52	1.39
2	C	301	R89	C14-C13	8.07	1.52	1.38
2	C	301	R89	C15-C14	8.05	1.52	1.38
2	F	301	R89	C15-C14	8.04	1.52	1.38
2	G	301	R89	C15-C14	8.03	1.52	1.38
2	C	301	R89	C18-C17	8.00	1.52	1.39
2	E	301	R89	C18-C17	7.99	1.52	1.39
2	B	301	R89	C14-C13	7.99	1.52	1.38
2	B	301	R89	C25-C24	-7.97	1.37	1.49
2	B	301	R89	C18-C17	7.96	1.52	1.39
2	D	301	R89	C18-C17	7.91	1.52	1.39
2	A	301	R89	C18-C17	7.87	1.52	1.39
2	A	301	R89	C25-C24	-7.51	1.38	1.49
2	C	301	R89	C25-C24	-7.48	1.38	1.49
2	B	301	R89	C30-N01	7.38	1.52	1.38
2	E	301	R89	C16-C17	7.37	1.53	1.38
2	F	301	R89	C30-N01	7.36	1.52	1.38
2	D	301	R89	C30-N01	7.35	1.52	1.38
2	A	301	R89	C30-N01	7.34	1.52	1.38
2	F	301	R89	C08-C03	7.34	1.53	1.38
2	B	301	R89	C16-C17	7.32	1.53	1.38
2	E	301	R89	C04-C03	7.30	1.53	1.38
2	E	301	R89	C25-C24	-7.29	1.38	1.49
2	D	301	R89	C04-C03	7.28	1.53	1.38
2	A	301	R89	C04-C03	7.28	1.53	1.38
2	B	301	R89	C04-C03	7.28	1.53	1.38

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	G	301	R89	C04-C03	7.26	1.53	1.38
2	C	301	R89	C08-C03	7.25	1.53	1.38
2	G	301	R89	C08-C03	7.24	1.53	1.38
2	F	301	R89	C25-C24	-7.22	1.38	1.49
2	D	301	R89	C25-C24	-7.16	1.39	1.49
2	A	301	R89	C16-C17	7.16	1.53	1.38
2	G	301	R89	C30-N01	7.15	1.51	1.38
2	D	301	R89	C08-C03	7.14	1.53	1.38
2	A	301	R89	C08-C03	7.14	1.53	1.38
2	E	301	R89	C08-C03	7.13	1.53	1.38
2	B	301	R89	C08-C03	7.13	1.53	1.38
2	C	301	R89	C30-N01	7.13	1.51	1.38
2	C	301	R89	C16-C17	7.08	1.52	1.38
2	G	301	R89	C16-C17	7.08	1.52	1.38
2	D	301	R89	C16-C17	7.07	1.52	1.38
2	F	301	R89	C16-C17	7.07	1.52	1.38
2	G	301	R89	C25-C24	-7.07	1.39	1.49
2	C	301	R89	C04-C03	7.05	1.52	1.38
2	F	301	R89	C04-C03	6.91	1.52	1.38
2	E	301	R89	C30-N01	6.77	1.51	1.38
2	E	301	R89	C26-C25	5.57	1.66	1.52
2	D	301	R89	C26-C25	5.54	1.66	1.52
2	B	301	R89	C26-C25	5.38	1.65	1.52
2	A	301	R89	C26-C25	5.35	1.65	1.52
2	G	301	R89	C26-C25	5.33	1.65	1.52
2	C	301	R89	C26-C25	5.33	1.65	1.52
2	F	301	R89	C26-C25	5.27	1.65	1.52
2	E	301	R89	C30-N31	4.60	1.36	1.30
2	B	301	R89	C30-N31	4.58	1.36	1.30
2	C	301	R89	C30-N31	4.53	1.36	1.30
2	G	301	R89	C30-N31	4.52	1.36	1.30
2	F	301	R89	C30-N31	4.49	1.36	1.30
2	D	301	R89	C30-N31	4.48	1.36	1.30
2	A	301	R89	C30-N31	4.42	1.36	1.30
2	F	301	R89	C24-C23	4.36	1.47	1.36
2	G	301	R89	C24-C23	4.26	1.47	1.36
2	C	301	R89	C24-C23	4.19	1.47	1.36
2	E	301	R89	C33-N27	-4.10	1.32	1.39
2	A	301	R89	C24-C23	4.07	1.47	1.36
2	E	301	R89	C24-C23	4.02	1.46	1.36
2	D	301	R89	C24-C23	3.98	1.46	1.36
2	B	301	R89	C24-C23	3.89	1.46	1.36

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Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	A	301	R89	C22-C23	-3.81	1.45	1.51
2	D	301	R89	C22-C23	-3.65	1.45	1.51
2	B	301	R89	C33-N27	-3.54	1.33	1.39
2	D	301	R89	C33-N27	-3.45	1.33	1.39
2	C	301	R89	C33-N27	-3.42	1.33	1.39
2	G	301	R89	C33-N27	-3.41	1.33	1.39
2	A	301	R89	C33-N27	-3.39	1.33	1.39
2	C	301	R89	C22-C23	-3.37	1.46	1.51
2	F	301	R89	C33-N27	-3.32	1.33	1.39
2	B	301	R89	C22-C23	-3.17	1.46	1.51
2	F	301	R89	C22-C23	-3.03	1.46	1.51
2	G	301	R89	C22-C23	-2.92	1.46	1.51
2	E	301	R89	C22-C23	-2.78	1.47	1.51
2	D	301	R89	C28-N01	2.56	1.44	1.40
2	B	301	R89	C28-N01	2.55	1.44	1.40
2	F	301	R89	C28-N01	2.55	1.44	1.40
2	C	301	R89	C33-C32	2.50	1.41	1.35
2	G	301	R89	C33-C32	2.48	1.40	1.35
2	G	301	R89	C28-N01	2.45	1.44	1.40
2	B	301	R89	C33-C32	2.43	1.40	1.35
2	D	301	R89	C33-C32	2.42	1.40	1.35
2	A	301	R89	C33-C32	2.42	1.40	1.35
2	F	301	R89	C33-C32	2.41	1.40	1.35
2	C	301	R89	C28-N01	2.40	1.44	1.40
2	E	301	R89	C33-C32	2.40	1.40	1.35
2	E	301	R89	C28-N01	2.35	1.44	1.40
2	F	301	R89	C30-N27	2.24	1.41	1.37
2	D	301	R89	C30-N27	2.23	1.41	1.37
2	G	301	R89	C30-N27	2.21	1.41	1.37
2	A	301	R89	C28-N01	2.19	1.44	1.40
2	E	301	R89	C28-C23	2.17	1.49	1.44
2	B	301	R89	C30-N27	2.17	1.41	1.37
2	E	301	R89	O29-C28	-2.17	1.18	1.23
2	B	301	R89	O29-C28	-2.16	1.18	1.23
2	G	301	R89	O29-C28	-2.15	1.18	1.23
2	A	301	R89	C30-N27	2.13	1.41	1.37
2	F	301	R89	C28-C23	2.08	1.49	1.44
2	D	301	R89	C28-C23	2.07	1.49	1.44
2	A	301	R89	O29-C28	-2.07	1.18	1.23
2	G	301	R89	C28-C23	2.06	1.49	1.44
2	D	301	R89	O29-C28	-2.05	1.18	1.23
2	C	301	R89	O29-C28	-2.00	1.19	1.23

All (90) bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	D	301	R89	C25-C26-N21	8.51	118.79	111.19
2	A	301	R89	C25-C26-N21	8.22	118.52	111.19
2	C	301	R89	C25-C26-N21	6.58	117.06	111.19
2	B	301	R89	C25-C24-N27	6.32	123.53	116.63
2	D	301	R89	C22-N21-C26	5.86	118.52	110.10
2	A	301	R89	N27-C30-N31	-5.71	107.77	113.69
2	B	301	R89	N27-C30-N31	-5.68	107.80	113.69
2	F	301	R89	N27-C30-N31	-5.59	107.89	113.69
2	D	301	R89	N27-C30-N31	-5.53	107.96	113.69
2	G	301	R89	N27-C30-N31	-5.24	108.25	113.69
2	E	301	R89	C25-C24-N27	5.16	122.27	116.63
2	C	301	R89	N27-C30-N31	-5.10	108.40	113.69
2	D	301	R89	C26-C25-C24	5.01	118.29	108.56
2	A	301	R89	C22-N21-C26	4.51	116.58	110.10
2	E	301	R89	N27-C30-N31	-4.39	109.13	113.69
2	G	301	R89	C20-N21-C22	4.37	116.06	110.51
2	A	301	R89	C26-C25-C24	4.37	117.05	108.56
2	E	301	R89	C32-C33-N27	4.21	109.57	105.02
2	D	301	R89	C25-C24-N27	4.19	121.21	116.63
2	G	301	R89	C25-C24-N27	4.02	121.03	116.63
2	A	301	R89	C32-N31-C30	3.96	108.24	103.27
2	B	301	R89	N01-C30-N31	3.92	132.06	126.56
2	A	301	R89	C25-C24-N27	3.91	120.91	116.63
2	B	301	R89	C32-N31-C30	3.87	108.13	103.27
2	C	301	R89	C03-C02-N01	-3.87	106.61	113.09
2	D	301	R89	C32-N31-C30	3.84	108.09	103.27
2	A	301	R89	N01-C30-N31	3.81	131.91	126.56
2	F	301	R89	N01-C30-N31	3.81	131.90	126.56
2	F	301	R89	C32-N31-C30	3.74	107.96	103.27
2	D	301	R89	N01-C30-N31	3.74	131.81	126.56
2	C	301	R89	N01-C30-N31	3.70	131.75	126.56
2	C	301	R89	C26-C25-C24	3.63	115.61	108.56
2	C	301	R89	C25-C24-N27	3.63	120.59	116.63
2	G	301	R89	C32-N31-C30	3.62	107.81	103.27
2	F	301	R89	C25-C24-N27	3.60	120.57	116.63
2	C	301	R89	C32-N31-C30	3.56	107.73	103.27
2	G	301	R89	N01-C30-N31	3.54	131.53	126.56
2	B	301	R89	C03-C02-N01	-3.52	107.20	113.09
2	E	301	R89	C25-C26-N21	3.52	114.33	111.19
2	G	301	R89	C26-C25-C24	3.44	115.25	108.56
2	E	301	R89	C32-N31-C30	3.32	107.44	103.27
2	E	301	R89	C17-C20-N21	3.31	119.93	113.15

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	E	301	R89	N01-C30-N31	3.30	131.19	126.56
2	F	301	R89	C20-N21-C22	3.20	114.57	110.51
2	F	301	R89	C22-N21-C26	3.17	114.66	110.10
2	F	301	R89	C26-C25-C24	3.12	114.63	108.56
2	B	301	R89	C25-C26-N21	3.01	113.87	111.19
2	G	301	R89	C23-C28-N01	3.00	120.37	115.16
2	E	301	R89	C23-C28-N01	2.99	120.35	115.16
2	C	301	R89	C22-N21-C26	2.96	114.35	110.10
2	D	301	R89	C32-C33-N27	2.96	108.22	105.02
2	B	301	R89	C32-C33-N27	2.93	108.19	105.02
2	C	301	R89	C32-C33-N27	2.92	108.18	105.02
2	D	301	R89	C17-C20-N21	-2.91	107.19	113.15
2	G	301	R89	C32-C33-N27	2.90	108.15	105.02
2	G	301	R89	C03-C02-N01	-2.90	108.24	113.09
2	A	301	R89	C17-C20-N21	-2.81	107.40	113.15
2	A	301	R89	C32-C33-N27	2.77	108.01	105.02
2	E	301	R89	O29-C28-C23	-2.76	119.81	125.06
2	B	301	R89	C20-N21-C26	-2.73	105.20	111.07
2	D	301	R89	C23-C28-N01	2.70	119.85	115.16
2	F	301	R89	C17-C20-N21	2.66	118.59	113.15
2	G	301	R89	O29-C28-C23	-2.66	120.00	125.06
2	A	301	R89	O29-C28-C23	-2.66	120.01	125.06
2	B	301	R89	O29-C28-C23	-2.64	120.05	125.06
2	C	301	R89	O29-C28-C23	-2.63	120.05	125.06
2	E	301	R89	C33-C32-N31	-2.63	107.30	110.74
2	E	301	R89	C20-N21-C26	-2.61	105.46	111.07
2	F	301	R89	C32-C33-N27	2.60	107.83	105.02
2	A	301	R89	C23-C28-N01	2.54	119.58	115.16
2	F	301	R89	C25-C26-N21	2.53	113.45	111.19
2	C	301	R89	C23-C28-N01	2.52	119.54	115.16
2	B	301	R89	C23-C28-N01	2.49	119.48	115.16
2	F	301	R89	C23-C28-N01	2.48	119.47	115.16
2	E	301	R89	C02-N01-C28	2.48	121.21	117.72
2	F	301	R89	O29-C28-C23	-2.47	120.36	125.06
2	D	301	R89	O29-C28-C23	-2.47	120.37	125.06
2	B	301	R89	C25-C24-C23	-2.33	116.06	121.89
2	B	301	R89	C22-N21-C26	2.26	113.34	110.10
2	B	301	R89	C33-C32-N31	-2.23	107.82	110.74
2	A	301	R89	C33-C32-N31	-2.19	107.88	110.74
2	F	301	R89	C03-C02-N01	-2.18	109.44	113.09
2	A	301	R89	C02-N01-C30	2.17	120.78	117.95
2	D	301	R89	C33-C32-N31	-2.17	107.90	110.74

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Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	G	301	R89	C17-C20-N21	2.16	117.58	113.15
2	G	301	R89	C22-N21-C26	2.16	113.20	110.10
2	E	301	R89	C26-C25-C24	2.14	112.72	108.56
2	C	301	R89	C33-C32-N31	-2.10	107.98	110.74
2	G	301	R89	C33-C32-N31	-2.02	108.09	110.74
2	C	301	R89	F12-C10-C06	-2.01	108.59	112.90

There are no chirality outliers.

All (9) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	301	R89	C17-C20-N21-C26
2	G	301	R89	C17-C20-N21-C22
2	D	301	R89	C17-C20-N21-C22
2	G	301	R89	C17-C20-N21-C26
2	A	301	R89	C17-C20-N21-C26
2	C	301	R89	C17-C20-N21-C26
2	E	301	R89	C18-C17-C20-N21
2	E	301	R89	C16-C17-C20-N21
2	C	301	R89	C17-C20-N21-C22

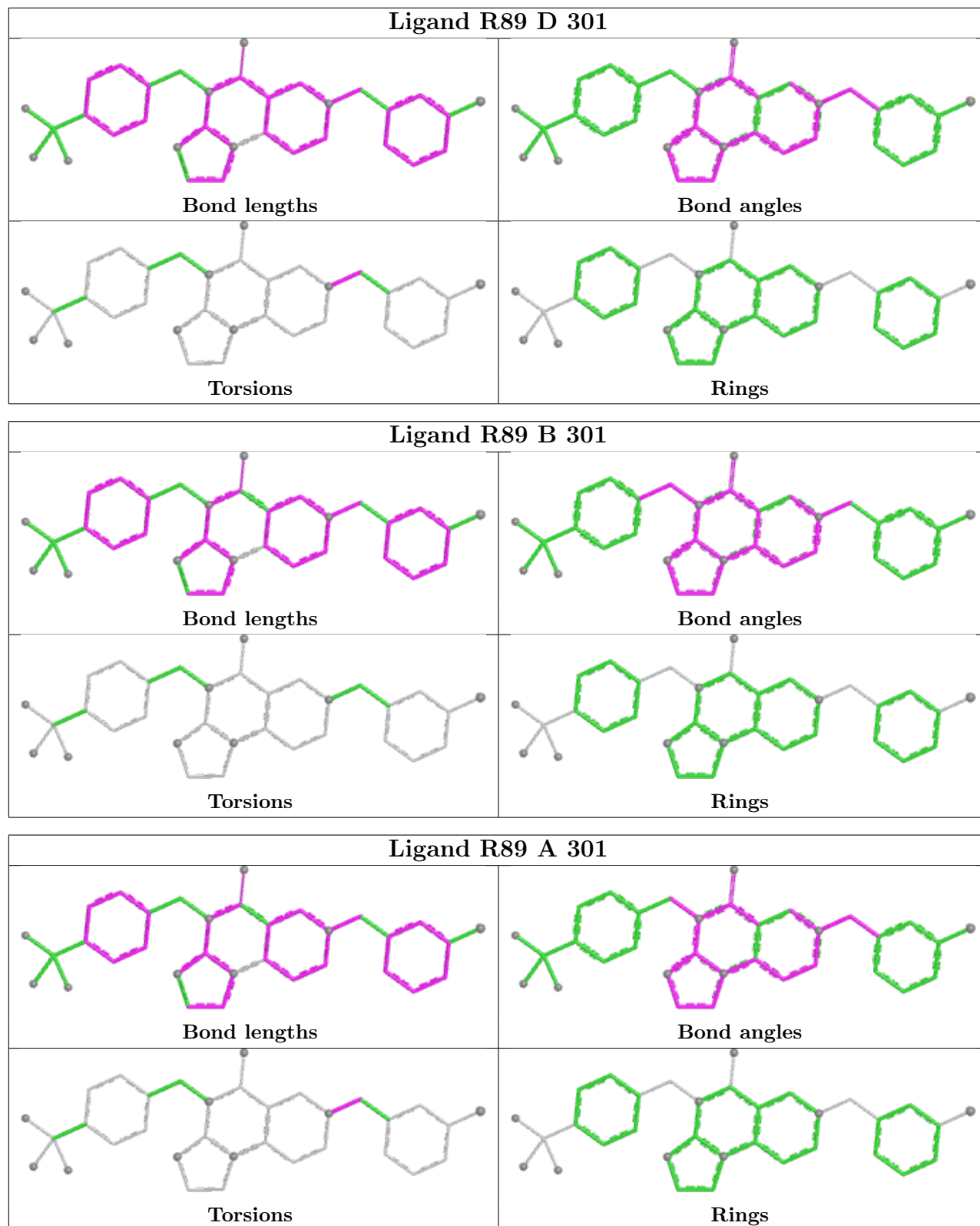
There are no ring outliers.

5 monomers are involved in 9 short contacts:

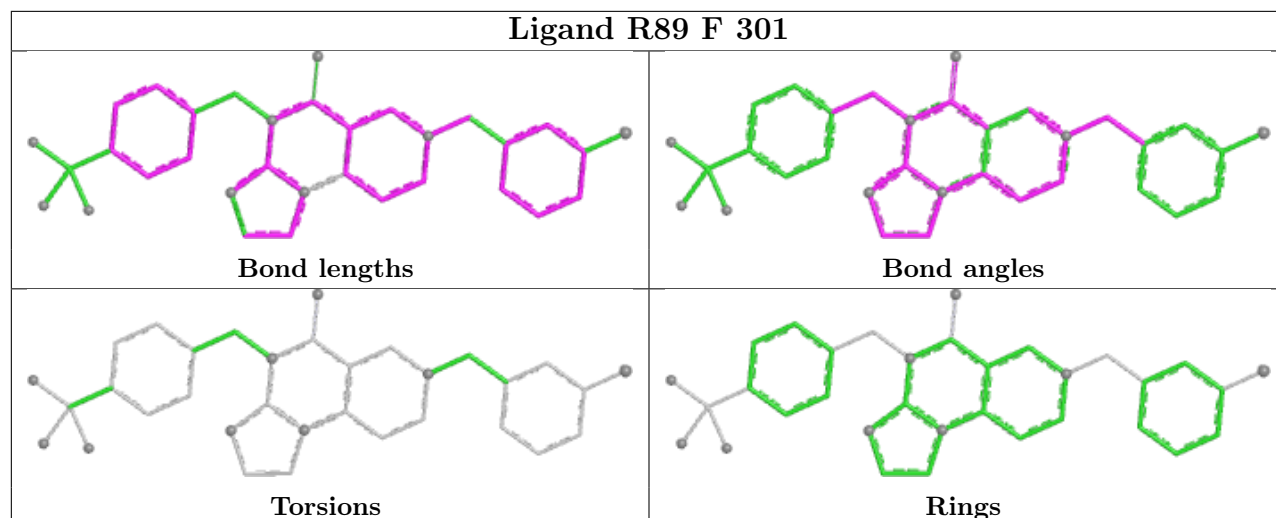
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	B	301	R89	2	0
2	A	301	R89	2	0
2	G	301	R89	1	0
2	E	301	R89	3	0
2	C	301	R89	1	0

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

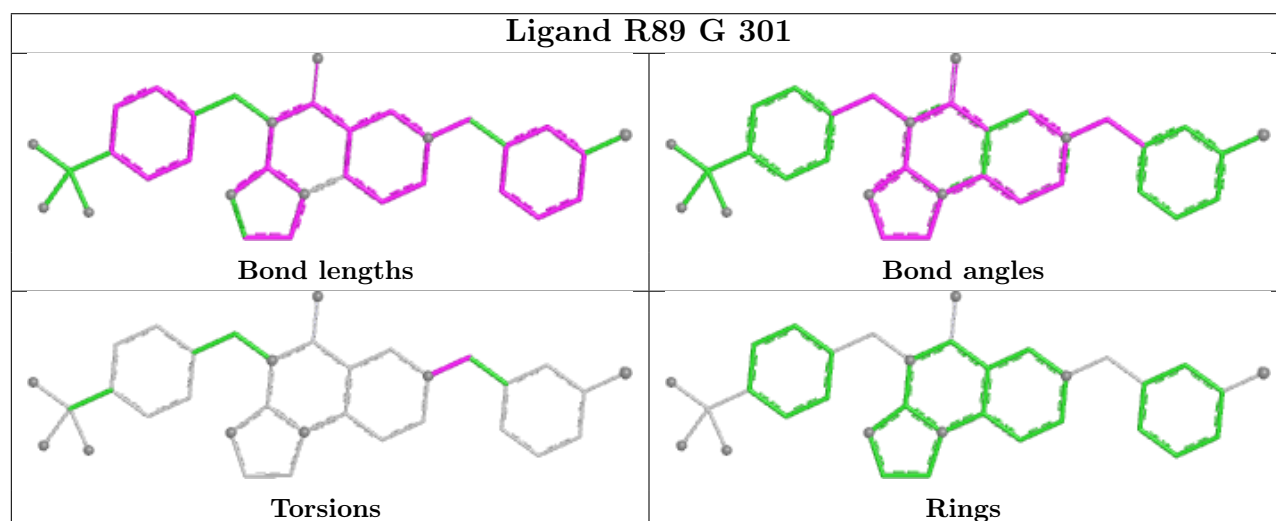
equivalents in the CSD to analyse the geometry.



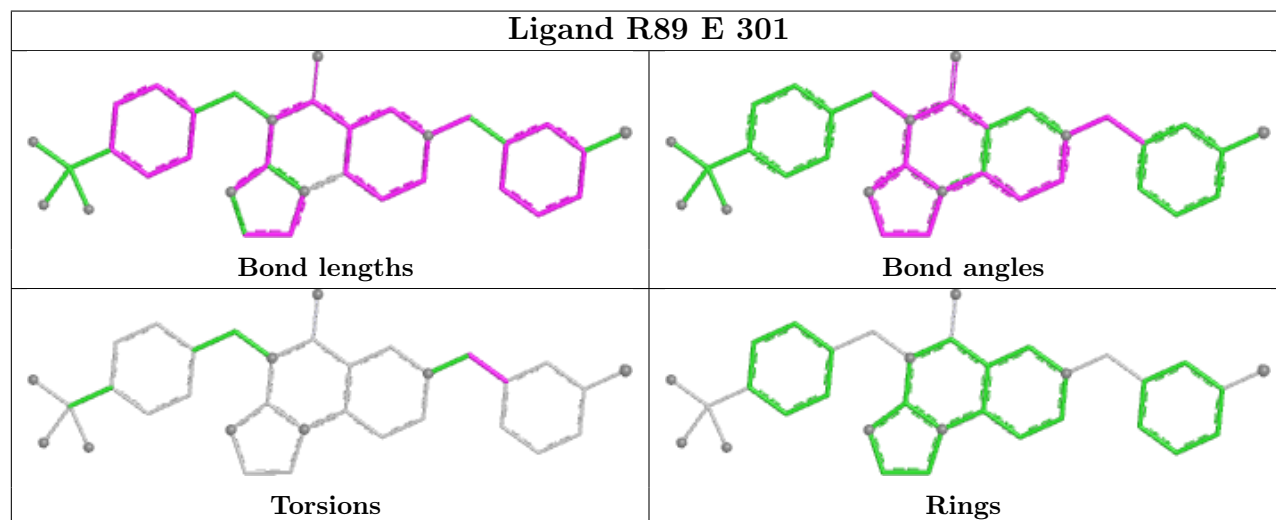
Ligand R89 F 301

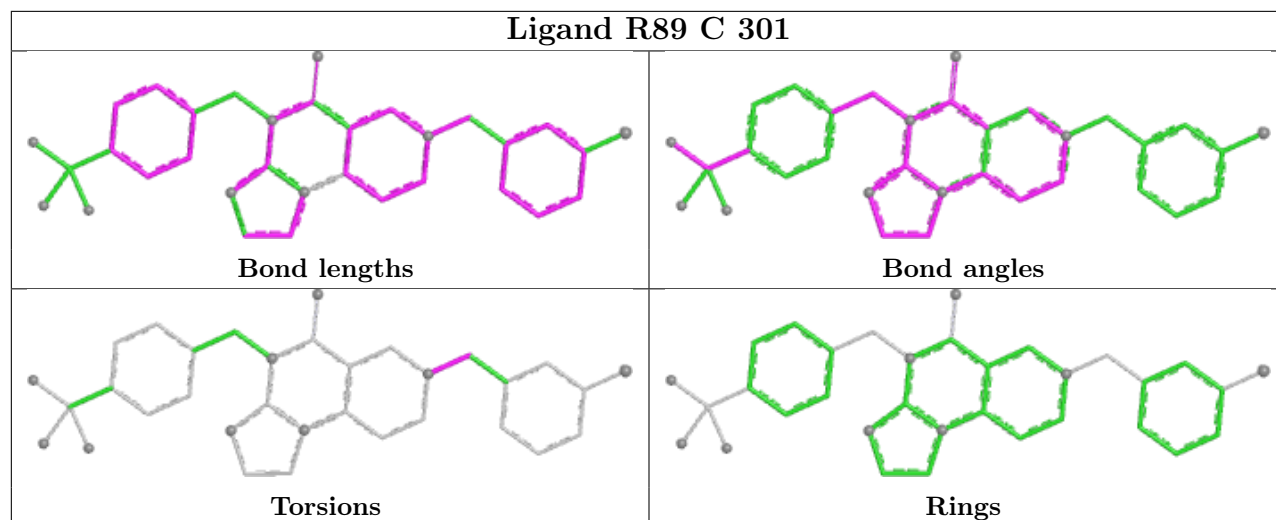


Ligand R89 G 301



Ligand R89 E 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, 95th percentile and maximum values of the occupancy-weighted average B-factor per residue. The column labelled ‘Q < 0.9’ lists the number of (and percentage) of residues with an average occupancy less than 0.9.

Mol	Chain	Analysed	<RSRZ>	#RSRZ>2	OWAB(Å ²)	Q<0.9
1	A	174/223 (78%)	0.67	16 (9%) 14 8	42, 56, 98, 110	0
1	B	174/223 (78%)	0.72	20 (11%) 9 6	45, 58, 100, 136	0
1	C	174/223 (78%)	0.77	18 (10%) 12 6	32, 57, 91, 128	1 (0%)
1	D	175/223 (78%)	0.62	16 (9%) 15 8	42, 57, 99, 153	0
1	E	175/223 (78%)	0.76	15 (8%) 16 8	44, 59, 106, 150	0
1	F	174/223 (78%)	0.84	20 (11%) 9 6	33, 63, 99, 151	1 (0%)
1	G	173/223 (77%)	0.77	18 (10%) 11 6	46, 63, 95, 125	0
All	All	1219/1561 (78%)	0.74	123 (10%) 12 7	32, 59, 98, 153	2 (0%)

All (123) RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	E	247	HIS	6.0
1	F	197	GLU	5.9
1	E	58	LEU	5.2
1	F	58	LEU	4.9
1	E	63	VAL	4.7
1	B	74	ASP	4.7
1	F	63	VAL	4.7
1	F	190	ASP	4.7
1	C	188	ALA	4.7
1	E	246	VAL	4.5
1	F	233[A]	MET	4.4
1	E	204	GLN	4.4
1	B	221	GLU	4.4
1	A	58	LEU	4.3
1	G	63	VAL	4.3
1	D	227	ASP	4.2
1	B	227	ASP	4.2

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Mol	Chain	Res	Type	RSRZ
1	A	225	GLU	4.1
1	E	174	ARG	4.1
1	G	246	VAL	4.0
1	B	245	LEU	4.0
1	F	245	LEU	4.0
1	E	74	ASP	4.0
1	A	233	MET	3.8
1	G	86	CYS	3.8
1	A	188	ALA	3.8
1	E	196	GLU	3.8
1	D	246	VAL	3.8
1	F	174	ARG	3.7
1	C	58	LEU	3.7
1	D	190	ASP	3.6
1	D	247	HIS	3.5
1	C	225	GLU	3.5
1	C	247	HIS	3.5
1	G	190	ASP	3.5
1	B	244	VAL	3.4
1	C	233[A]	MET	3.4
1	G	247	HIS	3.4
1	G	88	MET	3.3
1	C	93	ASP	3.3
1	C	63	VAL	3.3
1	B	243	LYS	3.3
1	E	190	ASP	3.3
1	C	229	TYR	3.2
1	D	189	THR	3.2
1	C	224	MET	3.2
1	B	190	ASP	3.1
1	G	197	GLU	3.1
1	F	188	ALA	3.1
1	E	197	GLU	3.0
1	F	189	THR	3.0
1	A	234	GLU	3.0
1	F	246	VAL	3.0
1	B	242	ASP	3.0
1	C	190	ASP	2.9
1	D	58	LEU	2.9
1	G	196	GLU	2.9
1	A	229	TYR	2.9
1	A	247	HIS	2.8

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Mol	Chain	Res	Type	RSRZ
1	E	88	MET	2.9
1	A	227	ASP	2.8
1	C	111	ASN	2.8
1	A	63	VAL	2.8
1	E	81	ARG	2.8
1	D	63	VAL	2.8
1	A	190	ASP	2.8
1	C	74	ASP	2.8
1	D	181	SER	2.8
1	B	197	GLU	2.7
1	D	74	ASP	2.7
1	D	197	GLU	2.7
1	F	227	ASP	2.7
1	F	224	MET	2.6
1	G	74	ASP	2.6
1	G	228	ARG	2.6
1	C	109	GLU	2.5
1	F	82	GLU	2.5
1	C	180	PRO	2.5
1	B	202	LYS	2.5
1	C	228	ARG	2.5
1	B	188	ALA	2.5
1	F	87	VAL	2.5
1	C	191	ILE	2.4
1	D	196	GLU	2.4
1	D	228	ARG	2.4
1	A	245	LEU	2.4
1	D	200	LYS	2.4
1	A	74	ASP	2.3
1	A	109	GLU	2.3
1	F	247	HIS	2.3
1	C	189	THR	2.3
1	G	89	GLY	2.3
1	G	189	THR	2.3
1	B	218	GLN	2.3
1	B	59	ILE	2.3
1	F	226	ARG	2.2
1	G	191	ILE	2.2
1	E	116	HIS	2.2
1	B	77	SER	2.2
1	B	63	VAL	2.2
1	E	221	GLU	2.2

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Mol	Chain	Res	Type	RSRZ
1	G	123	GLY	2.2
1	G	239	GLY	2.2
1	G	174	ARG	2.2
1	C	153	SER	2.2
1	F	220	ILE	2.2
1	A	111	ASN	2.2
1	E	233	MET	2.1
1	G	218	GLN	2.1
1	A	189	THR	2.1
1	F	202	LYS	2.1
1	B	174	ARG	2.1
1	B	138	TYR	2.1
1	B	189	THR	2.1
1	A	237	GLU	2.1
1	G	136	MET	2.1
1	F	76	TYR	2.1
1	F	109	GLU	2.1
1	B	58	LEU	2.0
1	B	88	MET	2.0
1	D	188	ALA	2.0
1	D	221	GLU	2.0
1	D	220	ILE	2.0

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

There are no non-standard protein/DNA/RNA residues in this entry.

6.3 Carbohydrates [i](#)

There are no oligosaccharides in this entry.

6.4 Ligands [i](#)

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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å ²)	Q<0.9
2	R89	E	301	33/33	0.77	0.21	68,72,74,83	0

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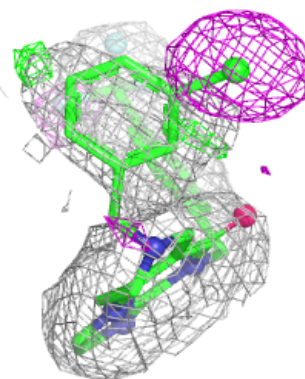
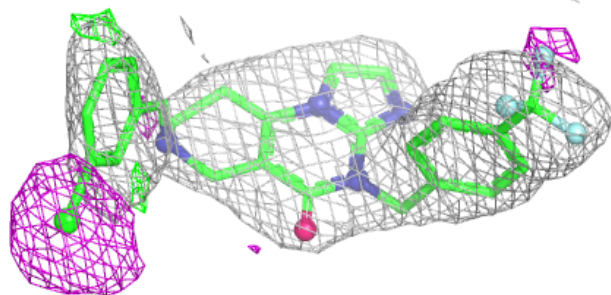
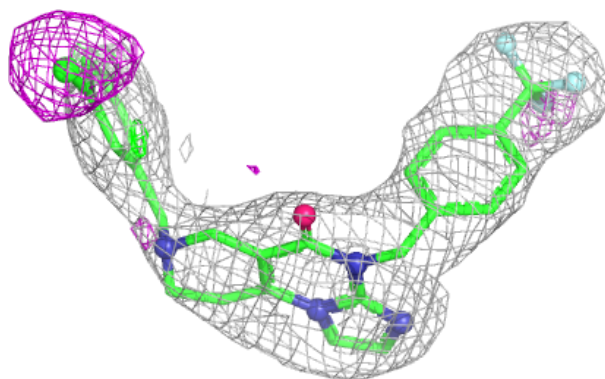
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Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	R89	A	301	33/33	0.84	0.20	64,66,69,72	0
2	R89	F	301	33/33	0.87	0.15	62,64,67,68	0
2	R89	D	301	33/33	0.88	0.15	59,61,61,64	0
2	R89	G	301	33/33	0.89	0.17	70,72,74,75	0
2	R89	C	301	33/33	0.90	0.16	55,58,61,63	0
2	R89	B	301	33/33	0.92	0.13	58,60,62,63	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.

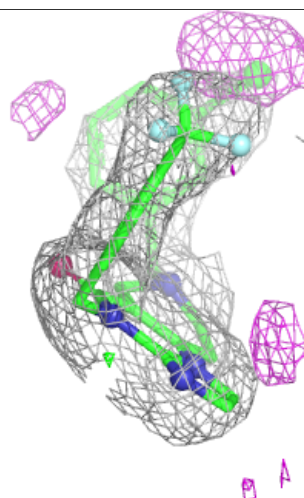
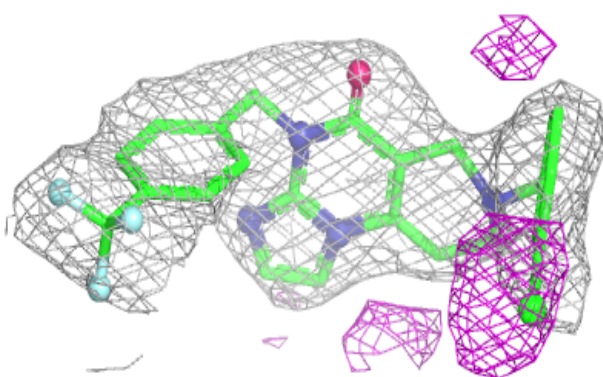
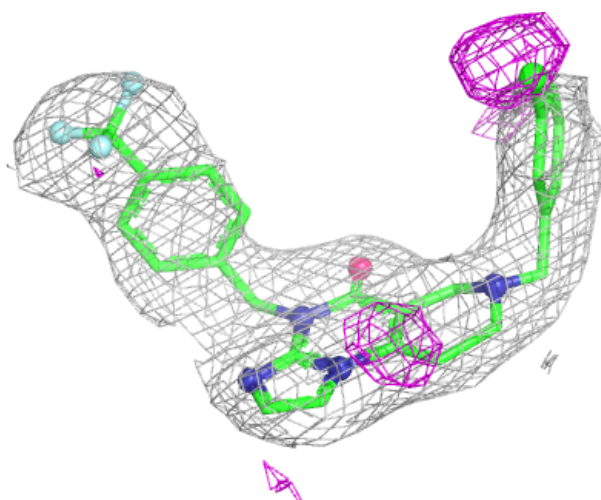
Electron density around R89 E 301:

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



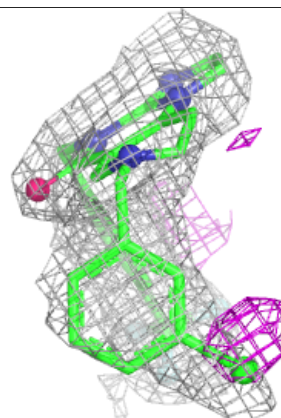
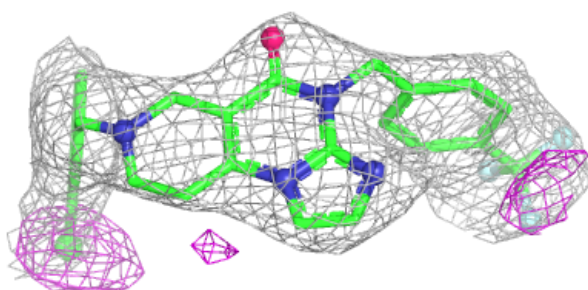
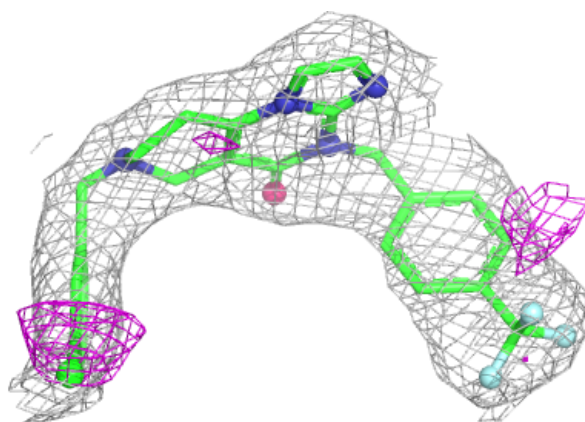
Electron density around R89 A 301:

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

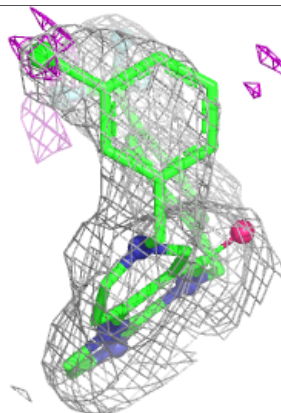
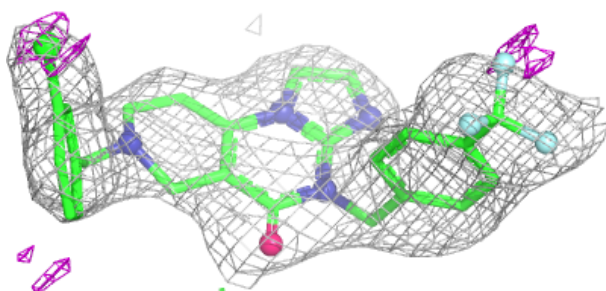
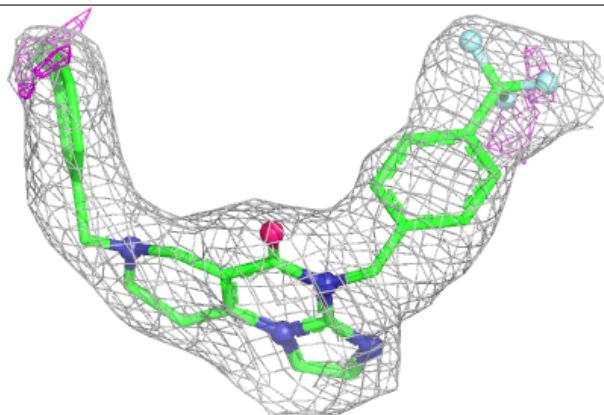


Electron density around R89 F 301:

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

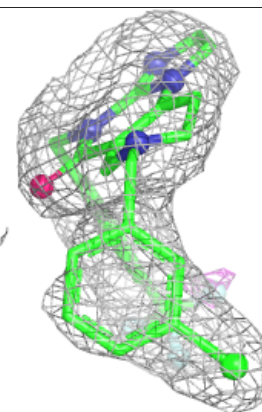
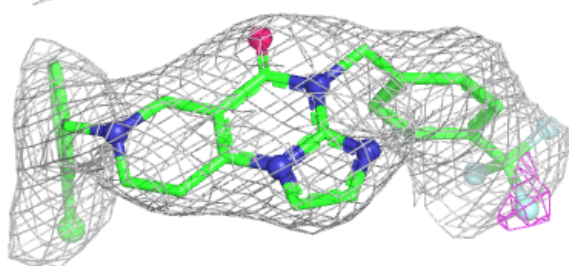
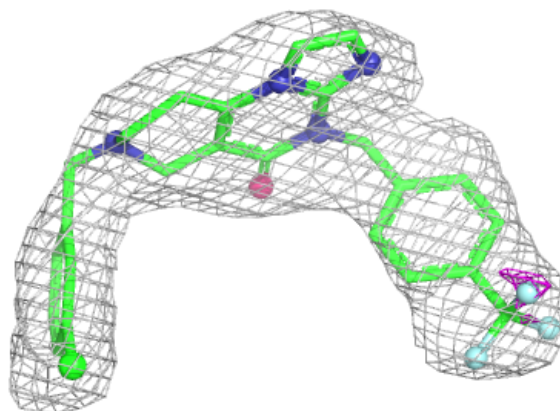
**Electron density around R89 D 301:**

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

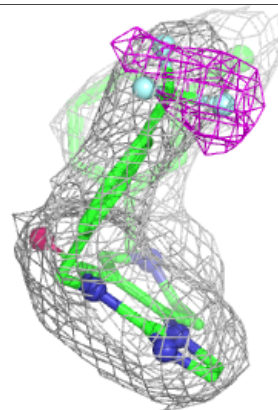
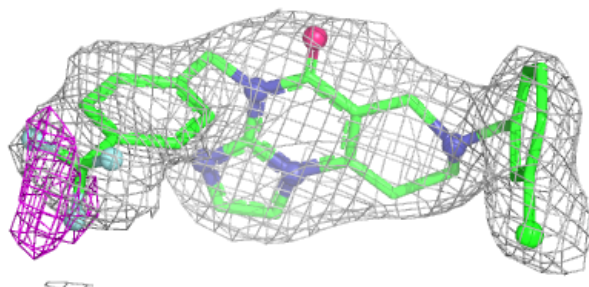
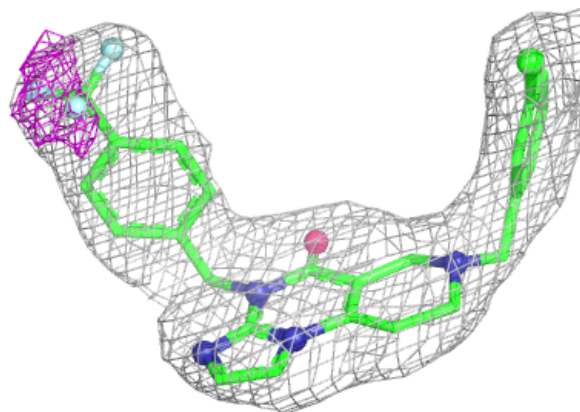


Electron density around R89 G 301:

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

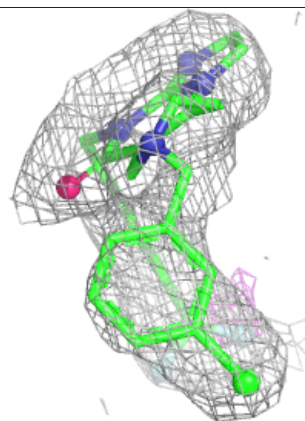
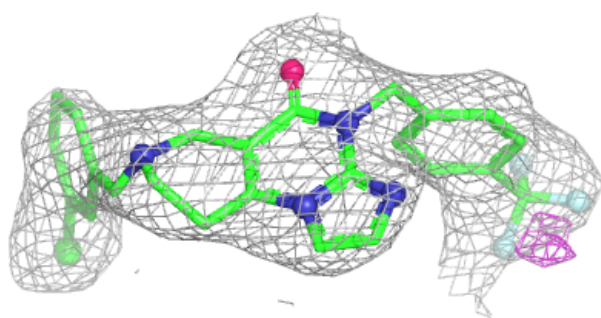
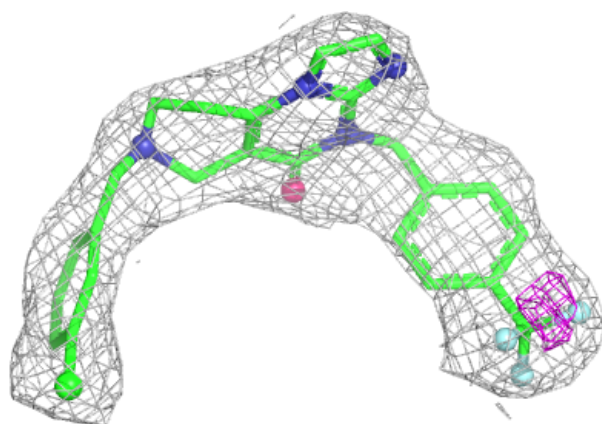
**Electron density around R89 C 301:**

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



Electron density around R89 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)



6.5 Other polymers [i](#)

There are no such residues in this entry.