



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 6, 2026 – 10:14 AM UTC

PDB ID : 5ZAB / pdb_00005zab
Title : Crystal structure of cf3-aequorin
Authors : Inouye, S.; Tomabechei, Y.; Sekine, S.I.; Shirouzu, M.; Hosoya, T.
Deposited on : 2018-02-07
Resolution : 2.15 Å(reported)

This is a wwPDB X-ray Structure Validation Summary 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

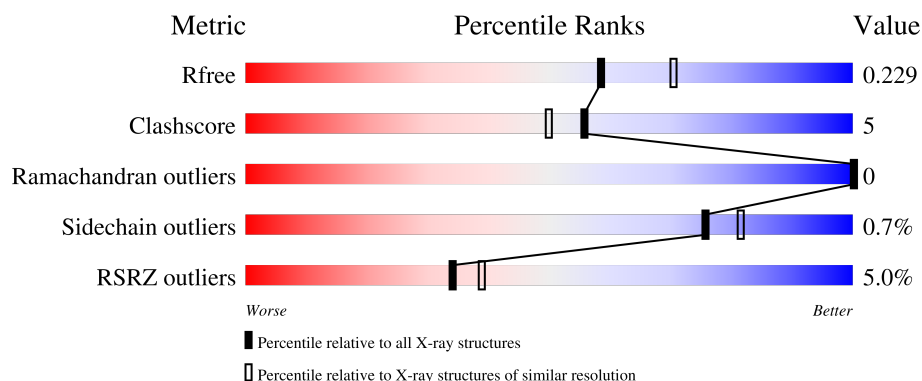
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 2.15 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.



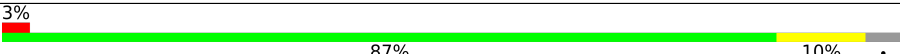
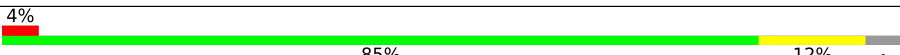
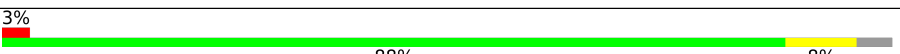
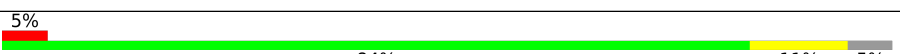
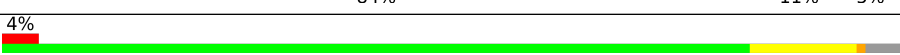
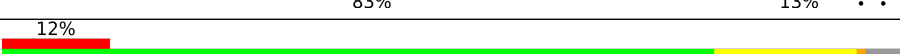
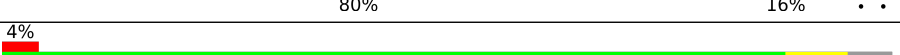
Metric	Whole archive (#Entries)	Similar resolution (#Entries, resolution range(Å))
R_{free}	180053	3689 (2.16-2.12)
Clashscore	190562	3812 (2.16-2.12)
Ramachandran outliers	187476	3773 (2.16-2.12)
Sidechain outliers	187428	3772 (2.16-2.12)
RSRZ outliers	180081	3691 (2.16-2.12)

The table below summarises the geometric issues observed across the polymeric chains and their fit to the electron density. The red, orange, yellow and green segments 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	198	4% 86% 11% .
1	B	198	3% 84% 12% ..
1	C	198	2% 89% 7% .
1	D	198	4% 85% 10% ..
1	E	198	3% 86% 10% .

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Mol	Chain	Length	Quality of chain
1	F	198	
1	G	198	
1	H	198	
1	I	198	
1	J	198	
1	K	198	
1	L	198	
1	M	198	
1	N	198	
1	O	198	
1	P	198	

2 Entry composition

There are 3 unique types of molecules in this entry. The entry contains 26420 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 Aequorin-2.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	191	Total	C	N	O	S	0	0	0
			1529	968	257	296	8			
1	B	192	Total	C	N	O	S	0	0	0
			1539	974	260	297	8			
1	C	191	Total	C	N	O	S	0	0	0
			1529	968	257	296	8			
1	D	191	Total	C	N	O	S	0	0	0
			1529	968	257	296	8			
1	E	191	Total	C	N	O	S	0	0	0
			1529	968	257	296	8			
1	F	192	Total	C	N	O	S	0	0	0
			1539	974	260	297	8			
1	G	190	Total	C	N	O	S	0	0	0
			1519	962	254	295	8			
1	H	191	Total	C	N	O	S	0	0	0
			1529	968	257	296	8			
1	I	191	Total	C	N	O	S	0	0	0
			1529	968	257	296	8			
1	J	191	Total	C	N	O	S	0	0	0
			1529	968	257	296	8			
1	K	191	Total	C	N	O	S	0	0	0
			1529	968	257	296	8			
1	L	188	Total	C	N	O	S	0	0	0
			1505	954	250	293	8			
1	M	191	Total	C	N	O	S	0	0	0
			1529	968	257	296	8			
1	N	191	Total	C	N	O	S	0	0	0
			1529	968	257	296	8			
1	O	191	Total	C	N	O	S	0	0	0
			1529	968	257	296	8			
1	P	188	Total	C	N	O	S	0	0	0
			1505	954	250	293	8			

There are 160 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	-8	ALA	-	expression tag	UNP P02592
A	-7	ASN	-	expression tag	UNP P02592
A	-6	SER	-	expression tag	UNP P02592
A	-5	HIS	-	expression tag	UNP P02592
A	-4	HIS	-	expression tag	UNP P02592
A	-3	HIS	-	expression tag	UNP P02592
A	-2	HIS	-	expression tag	UNP P02592
A	-1	HIS	-	expression tag	UNP P02592
A	0	HIS	-	expression tag	UNP P02592
A	1	GLY	-	linker	UNP P02592
B	-8	ALA	-	expression tag	UNP P02592
B	-7	ASN	-	expression tag	UNP P02592
B	-6	SER	-	expression tag	UNP P02592
B	-5	HIS	-	expression tag	UNP P02592
B	-4	HIS	-	expression tag	UNP P02592
B	-3	HIS	-	expression tag	UNP P02592
B	-2	HIS	-	expression tag	UNP P02592
B	-1	HIS	-	expression tag	UNP P02592
B	0	HIS	-	expression tag	UNP P02592
B	1	GLY	-	linker	UNP P02592
C	-8	ALA	-	expression tag	UNP P02592
C	-7	ASN	-	expression tag	UNP P02592
C	-6	SER	-	expression tag	UNP P02592
C	-5	HIS	-	expression tag	UNP P02592
C	-4	HIS	-	expression tag	UNP P02592
C	-3	HIS	-	expression tag	UNP P02592
C	-2	HIS	-	expression tag	UNP P02592
C	-1	HIS	-	expression tag	UNP P02592
C	0	HIS	-	expression tag	UNP P02592
C	1	GLY	-	linker	UNP P02592
D	-8	ALA	-	expression tag	UNP P02592
D	-7	ASN	-	expression tag	UNP P02592
D	-6	SER	-	expression tag	UNP P02592
D	-5	HIS	-	expression tag	UNP P02592
D	-4	HIS	-	expression tag	UNP P02592
D	-3	HIS	-	expression tag	UNP P02592
D	-2	HIS	-	expression tag	UNP P02592
D	-1	HIS	-	expression tag	UNP P02592
D	0	HIS	-	expression tag	UNP P02592
D	1	GLY	-	linker	UNP P02592
E	-8	ALA	-	expression tag	UNP P02592
E	-7	ASN	-	expression tag	UNP P02592

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Chain	Residue	Modelled	Actual	Comment	Reference
E	-6	SER	-	expression tag	UNP P02592
E	-5	HIS	-	expression tag	UNP P02592
E	-4	HIS	-	expression tag	UNP P02592
E	-3	HIS	-	expression tag	UNP P02592
E	-2	HIS	-	expression tag	UNP P02592
E	-1	HIS	-	expression tag	UNP P02592
E	0	HIS	-	expression tag	UNP P02592
E	1	GLY	-	linker	UNP P02592
F	-8	ALA	-	expression tag	UNP P02592
F	-7	ASN	-	expression tag	UNP P02592
F	-6	SER	-	expression tag	UNP P02592
F	-5	HIS	-	expression tag	UNP P02592
F	-4	HIS	-	expression tag	UNP P02592
F	-3	HIS	-	expression tag	UNP P02592
F	-2	HIS	-	expression tag	UNP P02592
F	-1	HIS	-	expression tag	UNP P02592
F	0	HIS	-	expression tag	UNP P02592
F	1	GLY	-	linker	UNP P02592
G	-8	ALA	-	expression tag	UNP P02592
G	-7	ASN	-	expression tag	UNP P02592
G	-6	SER	-	expression tag	UNP P02592
G	-5	HIS	-	expression tag	UNP P02592
G	-4	HIS	-	expression tag	UNP P02592
G	-3	HIS	-	expression tag	UNP P02592
G	-2	HIS	-	expression tag	UNP P02592
G	-1	HIS	-	expression tag	UNP P02592
G	0	HIS	-	expression tag	UNP P02592
G	1	GLY	-	linker	UNP P02592
H	-8	ALA	-	expression tag	UNP P02592
H	-7	ASN	-	expression tag	UNP P02592
H	-6	SER	-	expression tag	UNP P02592
H	-5	HIS	-	expression tag	UNP P02592
H	-4	HIS	-	expression tag	UNP P02592
H	-3	HIS	-	expression tag	UNP P02592
H	-2	HIS	-	expression tag	UNP P02592
H	-1	HIS	-	expression tag	UNP P02592
H	0	HIS	-	expression tag	UNP P02592
H	1	GLY	-	linker	UNP P02592
I	-8	ALA	-	expression tag	UNP P02592
I	-7	ASN	-	expression tag	UNP P02592
I	-6	SER	-	expression tag	UNP P02592
I	-5	HIS	-	expression tag	UNP P02592

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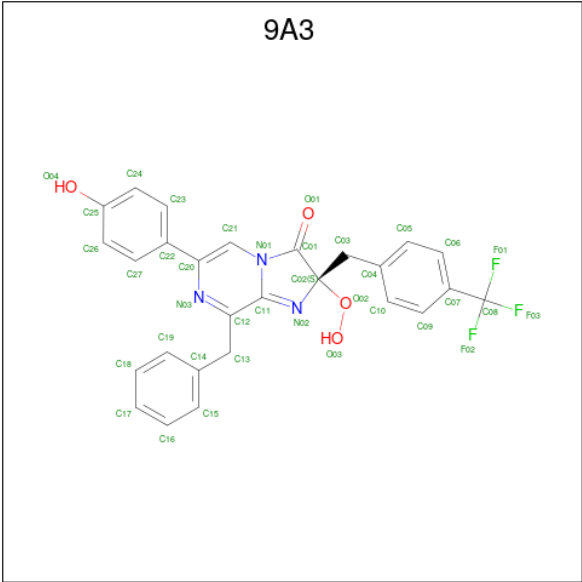
Chain	Residue	Modelled	Actual	Comment	Reference
I	-4	HIS	-	expression tag	UNP P02592
I	-3	HIS	-	expression tag	UNP P02592
I	-2	HIS	-	expression tag	UNP P02592
I	-1	HIS	-	expression tag	UNP P02592
I	0	HIS	-	expression tag	UNP P02592
I	1	GLY	-	linker	UNP P02592
J	-8	ALA	-	expression tag	UNP P02592
J	-7	ASN	-	expression tag	UNP P02592
J	-6	SER	-	expression tag	UNP P02592
J	-5	HIS	-	expression tag	UNP P02592
J	-4	HIS	-	expression tag	UNP P02592
J	-3	HIS	-	expression tag	UNP P02592
J	-2	HIS	-	expression tag	UNP P02592
J	-1	HIS	-	expression tag	UNP P02592
J	0	HIS	-	expression tag	UNP P02592
J	1	GLY	-	linker	UNP P02592
K	-8	ALA	-	expression tag	UNP P02592
K	-7	ASN	-	expression tag	UNP P02592
K	-6	SER	-	expression tag	UNP P02592
K	-5	HIS	-	expression tag	UNP P02592
K	-4	HIS	-	expression tag	UNP P02592
K	-3	HIS	-	expression tag	UNP P02592
K	-2	HIS	-	expression tag	UNP P02592
K	-1	HIS	-	expression tag	UNP P02592
K	0	HIS	-	expression tag	UNP P02592
K	1	GLY	-	linker	UNP P02592
L	-8	ALA	-	expression tag	UNP P02592
L	-7	ASN	-	expression tag	UNP P02592
L	-6	SER	-	expression tag	UNP P02592
L	-5	HIS	-	expression tag	UNP P02592
L	-4	HIS	-	expression tag	UNP P02592
L	-3	HIS	-	expression tag	UNP P02592
L	-2	HIS	-	expression tag	UNP P02592
L	-1	HIS	-	expression tag	UNP P02592
L	0	HIS	-	expression tag	UNP P02592
L	1	GLY	-	linker	UNP P02592
M	-8	ALA	-	expression tag	UNP P02592
M	-7	ASN	-	expression tag	UNP P02592
M	-6	SER	-	expression tag	UNP P02592
M	-5	HIS	-	expression tag	UNP P02592
M	-4	HIS	-	expression tag	UNP P02592
M	-3	HIS	-	expression tag	UNP P02592

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Chain	Residue	Modelled	Actual	Comment	Reference
M	-2	HIS	-	expression tag	UNP P02592
M	-1	HIS	-	expression tag	UNP P02592
M	0	HIS	-	expression tag	UNP P02592
M	1	GLY	-	linker	UNP P02592
N	-8	ALA	-	expression tag	UNP P02592
N	-7	ASN	-	expression tag	UNP P02592
N	-6	SER	-	expression tag	UNP P02592
N	-5	HIS	-	expression tag	UNP P02592
N	-4	HIS	-	expression tag	UNP P02592
N	-3	HIS	-	expression tag	UNP P02592
N	-2	HIS	-	expression tag	UNP P02592
N	-1	HIS	-	expression tag	UNP P02592
N	0	HIS	-	expression tag	UNP P02592
N	1	GLY	-	linker	UNP P02592
O	-8	ALA	-	expression tag	UNP P02592
O	-7	ASN	-	expression tag	UNP P02592
O	-6	SER	-	expression tag	UNP P02592
O	-5	HIS	-	expression tag	UNP P02592
O	-4	HIS	-	expression tag	UNP P02592
O	-3	HIS	-	expression tag	UNP P02592
O	-2	HIS	-	expression tag	UNP P02592
O	-1	HIS	-	expression tag	UNP P02592
O	0	HIS	-	expression tag	UNP P02592
O	1	GLY	-	linker	UNP P02592
P	-8	ALA	-	expression tag	UNP P02592
P	-7	ASN	-	expression tag	UNP P02592
P	-6	SER	-	expression tag	UNP P02592
P	-5	HIS	-	expression tag	UNP P02592
P	-4	HIS	-	expression tag	UNP P02592
P	-3	HIS	-	expression tag	UNP P02592
P	-2	HIS	-	expression tag	UNP P02592
P	-1	HIS	-	expression tag	UNP P02592
P	0	HIS	-	expression tag	UNP P02592
P	1	GLY	-	linker	UNP P02592

- Molecule 2 is (2S)-8-benzyl-2-hydroperoxy-6-(4-hydroxyphenyl)-2-{[4-(trifluoromethyl)phenyl]methyl}imidazo[1,2-a]pyrazin-3(2H)-one (CCD ID: 9A3) (formula: C₂₇H₂₀F₃N₃O₄).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	B	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	C	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	D	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	E	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	F	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	G	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	H	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	I	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	J	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	K	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	L	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	M	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	N	1	Total	C	F	N	O	0	0
			37	27	3	3	4		

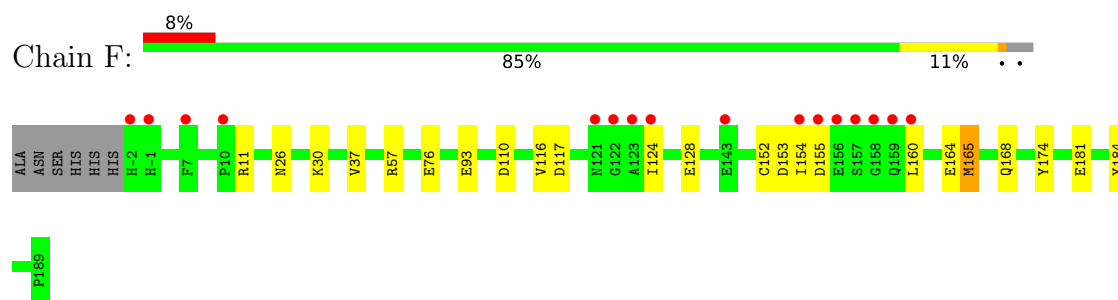
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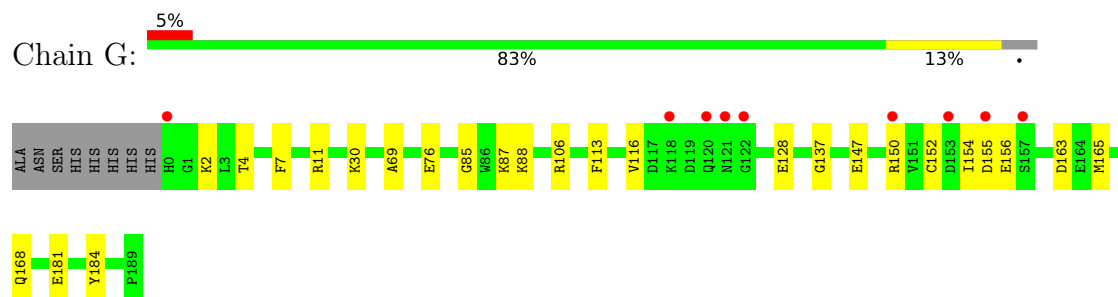
Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	O	1	Total	C	F	N	O	0	0
			37	27	3	3	4		
2	P	1	Total	C	F	N	O	0	0
			37	27	3	3	4		

- Molecule 3 is water.

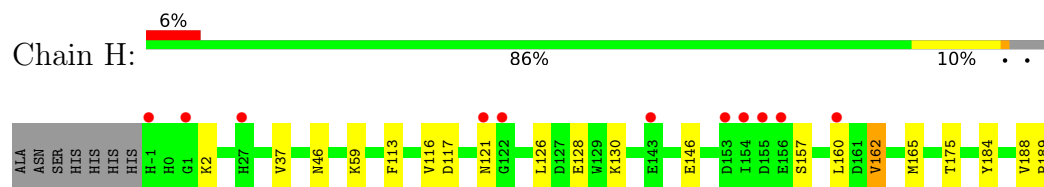
Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
3	A	122	Total	O	0	0
			122	122		
3	B	111	Total	O	0	0
			111	111		
3	C	78	Total	O	0	0
			78	78		
3	D	63	Total	O	0	0
			63	63		
3	E	108	Total	O	0	0
			108	108		
3	F	68	Total	O	0	0
			68	68		
3	G	77	Total	O	0	0
			77	77		
3	H	67	Total	O	0	0
			67	67		
3	I	123	Total	O	0	0
			123	123		
3	J	79	Total	O	0	0
			79	79		
3	K	106	Total	O	0	0
			106	106		
3	L	110	Total	O	0	0
			110	110		
3	M	110	Total	O	0	0
			110	110		
3	N	52	Total	O	0	0
			52	52		
3	O	47	Total	O	0	0
			47	47		
3	P	81	Total	O	0	0
			81	81		



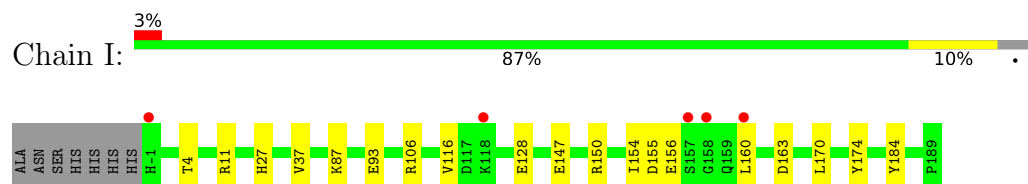
- Molecule 1: Aequorin-2



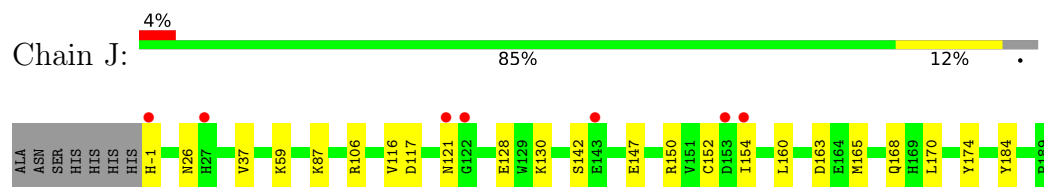
- Molecule 1: Aequorin-2



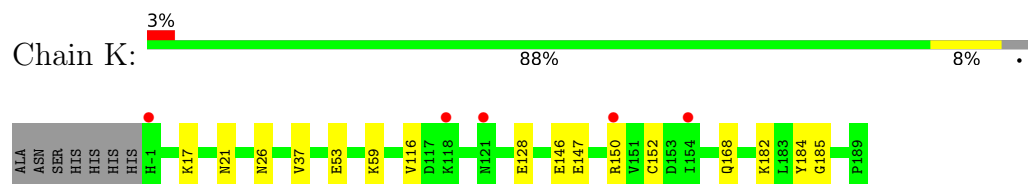
- Molecule 1: Aequorin-2



- Molecule 1: Aequorin-2

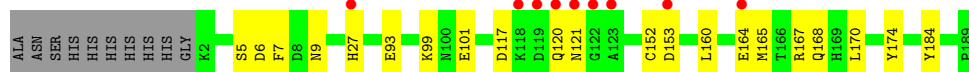


- Molecule 1: Aequorin-2



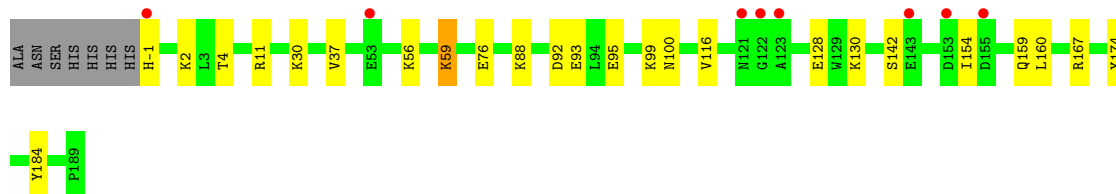
- Molecule 1: Aequorin-2

Chain L: 



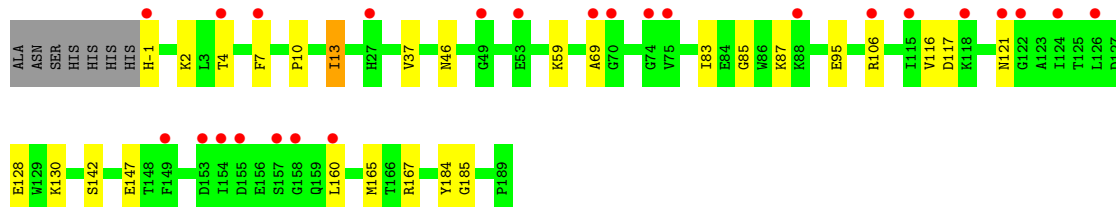
• Molecule 1: Aequorin-2

Chain M: 



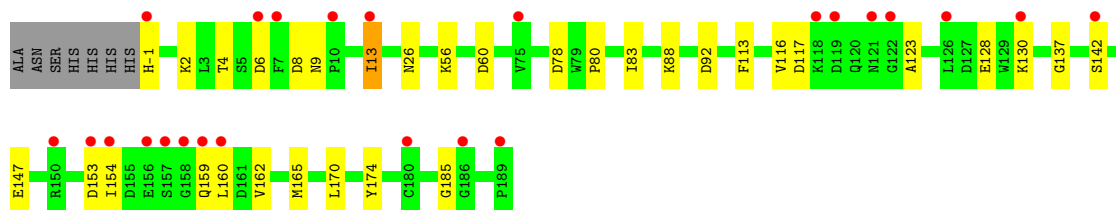
• Molecule 1: Aequorin-2

Chain N: 



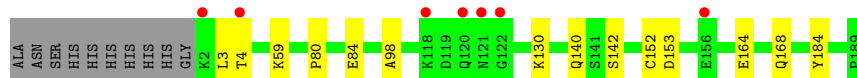
• Molecule 1: Aequorin-2

Chain O: 



• Molecule 1: Aequorin-2

Chain P: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 1	Depositor
Cell constants a, b, c, α , β , γ	91.80Å 97.55Å 121.84Å 77.62° 73.06° 75.17°	Depositor
Resolution (Å)	46.61 – 2.15 46.61 – 2.15	Depositor EDS
% Data completeness (in resolution range)	97.5 (46.61-2.15) 97.6 (46.61-2.15)	Depositor EDS
R_{merge}	0.09	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.55 (at 2.14Å)	Xtriage
Refinement program	PHENIX (1.11.1 _2575: ???)	Depositor
R, R_{free}	0.196 , 0.230 0.199 , 0.229	Depositor DCC
R_{free} test set	2000 reflections (0.95%)	wwPDB-VP
Wilson B-factor (Å ²)	34.6	Xtriage
Anisotropy	0.577	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.38 , 41.4	EDS
L-test for twinning ²	$\langle L \rangle = 0.48$, $\langle L^2 \rangle = 0.31$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	26420	wwPDB-VP
Average B, all atoms (Å ²)	42.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The analyses of the Patterson function reveals a significant off-origin peak that is 46.71 % 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 1.1010e-04. The detected translational NCS is most likely also responsible for the elevated intensity ratio.*

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: 9A3

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	0.36	0/1568	0.52	0/2120
1	B	0.35	0/1579	0.57	0/2135
1	C	0.34	0/1568	0.52	0/2120
1	D	0.28	0/1568	0.48	0/2120
1	E	0.38	1/1568 (0.1%)	0.56	0/2120
1	F	0.33	0/1579	0.54	0/2135
1	G	0.31	0/1557	0.50	0/2105
1	H	0.30	0/1568	0.48	0/2120
1	I	0.38	0/1568	0.52	0/2120
1	J	0.31	0/1568	0.50	0/2120
1	K	0.36	0/1568	0.52	0/2120
1	L	0.36	0/1542	0.58	0/2085
1	M	0.37	0/1568	0.56	0/2120
1	N	0.30	0/1568	0.49	0/2120
1	O	0.34	0/1568	0.55	0/2120
1	P	0.32	0/1542	0.50	0/2085
All	All	0.34	1/25047 (0.0%)	0.53	0/33865

All (1) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	188	VAL	CA-C	5.70	1.57	1.52

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	1529	0	1448	16	0
1	B	1539	0	1455	21	0
1	C	1529	0	1448	11	1
1	D	1529	0	1448	15	0
1	E	1529	0	1448	13	0
1	F	1539	0	1455	16	0
1	G	1519	0	1441	15	0
1	H	1529	0	1448	12	0
1	I	1529	0	1448	12	0
1	J	1529	0	1448	16	0
1	K	1529	0	1448	12	0
1	L	1505	0	1428	17	0
1	M	1529	0	1448	18	0
1	N	1529	0	1448	23	0
1	O	1529	0	1448	22	1
1	P	1505	0	1428	10	0
2	A	37	0	0	1	0
2	B	37	0	0	1	0
2	C	37	0	0	1	0
2	D	37	0	0	1	0
2	E	37	0	0	1	0
2	F	37	0	0	1	0
2	G	37	0	0	1	0
2	H	37	0	0	1	0
2	I	37	0	0	1	0
2	J	37	0	0	1	0
2	K	37	0	0	1	0
2	L	37	0	0	1	0
2	M	37	0	0	1	0
2	N	37	0	0	1	0
2	O	37	0	0	0	0
2	P	37	0	0	1	0
3	A	122	0	0	5	0
3	B	111	0	0	1	0
3	C	78	0	0	1	0
3	D	63	0	0	1	0
3	E	108	0	0	2	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	F	68	0	0	1	0
3	G	77	0	0	2	0
3	H	67	0	0	1	0
3	I	123	0	0	2	0
3	J	79	0	0	1	0
3	K	106	0	0	1	0
3	L	110	0	0	4	1
3	M	110	0	0	1	1
3	N	52	0	0	0	0
3	O	47	0	0	3	0
3	P	81	0	0	3	0
All	All	26420	0	23135	228	2

The all-atom clashscore is defined as the number of clashes found per 1000 atoms (including hydrogen atoms). The all-atom clashscore for this structure is 5.

The worst 5 of 228 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:M:99:LYS:O	1:N:106:ARG:NH2	1.96	0.99
1:B:153:ASP:OD2	3:B:301:HOH:O	1.93	0.85
1:A:121:ASN:ND2	3:A:302:HOH:O	2.12	0.83
1:E:184:TYR:OH	2:E:201:9A3:O03	1.95	0.83
1:F:184:TYR:OH	2:F:201:9A3:O03	1.97	0.82

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

Atom-1	Atom-2	Interatomic distance (Å)	Clash overlap (Å)
1:C:150:ARG:NH1	1:O:8:ASP:OD2[1_455]	2.15	0.05
3:L:377:HOH:O	3:M:368:HOH:O[1_556]	2.15	0.05

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	189/198 (96%)	188 (100%)	1 (0%)	0	100	100
1	B	190/198 (96%)	189 (100%)	1 (0%)	0	100	100
1	C	189/198 (96%)	188 (100%)	1 (0%)	0	100	100
1	D	189/198 (96%)	187 (99%)	2 (1%)	0	100	100
1	E	189/198 (96%)	188 (100%)	1 (0%)	0	100	100
1	F	190/198 (96%)	188 (99%)	2 (1%)	0	100	100
1	G	188/198 (95%)	186 (99%)	2 (1%)	0	100	100
1	H	189/198 (96%)	188 (100%)	1 (0%)	0	100	100
1	I	189/198 (96%)	188 (100%)	1 (0%)	0	100	100
1	J	189/198 (96%)	188 (100%)	1 (0%)	0	100	100
1	K	189/198 (96%)	188 (100%)	1 (0%)	0	100	100
1	L	186/198 (94%)	185 (100%)	1 (0%)	0	100	100
1	M	189/198 (96%)	188 (100%)	1 (0%)	0	100	100
1	N	189/198 (96%)	187 (99%)	2 (1%)	0	100	100
1	O	189/198 (96%)	188 (100%)	1 (0%)	0	100	100
1	P	186/198 (94%)	185 (100%)	1 (0%)	0	100	100
All	All	3019/3168 (95%)	2999 (99%)	20 (1%)	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	159/165 (96%)	159 (100%)	0	100	100
1	B	160/165 (97%)	159 (99%)	1 (1%)	78	84
1	C	159/165 (96%)	159 (100%)	0	100	100

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	D	159/165 (96%)	156 (98%)	3 (2%)	50	55
1	E	159/165 (96%)	158 (99%)	1 (1%)	78	84
1	F	160/165 (97%)	159 (99%)	1 (1%)	78	84
1	G	158/165 (96%)	157 (99%)	1 (1%)	78	84
1	H	159/165 (96%)	157 (99%)	2 (1%)	61	67
1	I	159/165 (96%)	158 (99%)	1 (1%)	78	84
1	J	159/165 (96%)	158 (99%)	1 (1%)	78	84
1	K	159/165 (96%)	158 (99%)	1 (1%)	78	84
1	L	157/165 (95%)	155 (99%)	2 (1%)	61	67
1	M	159/165 (96%)	157 (99%)	2 (1%)	61	67
1	N	159/165 (96%)	158 (99%)	1 (1%)	78	84
1	O	159/165 (96%)	158 (99%)	1 (1%)	78	84
1	P	157/165 (95%)	157 (100%)	0	100	100
All	All	2541/2640 (96%)	2523 (99%)	18 (1%)	76	81

5 of 18 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	M	37	VAL
1	O	13	ILE
1	N	13	ILE
1	H	162	VAL
1	L	165	MET

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 22 such sidechains are listed below:

Mol	Chain	Res	Type
1	J	159	GLN
1	K	121	ASN
1	K	21	ASN
1	K	159	GLN
1	D	0	HIS

5.3.3 RNA ⓘ

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](#)

16 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	9A3	L	201	-	37,41,41	1.61	5 (13%)	43,61,61	1.08	3 (6%)
2	9A3	O	201	-	37,41,41	1.52	5 (13%)	43,61,61	0.94	2 (4%)
2	9A3	A	201	-	37,41,41	1.62	6 (16%)	43,61,61	0.97	2 (4%)
2	9A3	B	201	-	37,41,41	1.57	6 (16%)	43,61,61	1.07	3 (6%)
2	9A3	I	201	-	37,41,41	1.42	6 (16%)	43,61,61	0.92	1 (2%)
2	9A3	D	201	-	37,41,41	1.54	6 (16%)	43,61,61	1.00	2 (4%)
2	9A3	C	201	-	37,41,41	1.56	6 (16%)	43,61,61	1.13	3 (6%)
2	9A3	E	201	-	37,41,41	1.56	6 (16%)	43,61,61	0.92	1 (2%)
2	9A3	G	201	-	37,41,41	1.49	5 (13%)	43,61,61	1.17	4 (9%)
2	9A3	J	201	-	37,41,41	1.55	6 (16%)	43,61,61	1.02	2 (4%)
2	9A3	M	201	-	37,41,41	1.45	5 (13%)	43,61,61	1.01	2 (4%)
2	9A3	K	201	-	37,41,41	1.63	5 (13%)	43,61,61	1.16	3 (6%)
2	9A3	N	201	-	37,41,41	1.59	6 (16%)	43,61,61	0.86	1 (2%)
2	9A3	P	201	-	37,41,41	1.54	5 (13%)	43,61,61	1.14	3 (6%)
2	9A3	H	201	-	37,41,41	1.48	5 (13%)	43,61,61	1.20	4 (9%)
2	9A3	F	201	-	37,41,41	1.41	6 (16%)	43,61,61	1.02	2 (4%)

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	9A3	L	201	-	-	1/19/37/37	0/5/5/5
2	9A3	O	201	-	-	2/19/37/37	0/5/5/5
2	9A3	A	201	-	-	1/19/37/37	0/5/5/5
2	9A3	B	201	-	-	2/19/37/37	0/5/5/5
2	9A3	I	201	-	-	1/19/37/37	0/5/5/5
2	9A3	D	201	-	-	2/19/37/37	0/5/5/5
2	9A3	C	201	-	-	1/19/37/37	0/5/5/5
2	9A3	E	201	-	-	2/19/37/37	0/5/5/5
2	9A3	G	201	-	-	1/19/37/37	0/5/5/5
2	9A3	J	201	-	-	2/19/37/37	0/5/5/5
2	9A3	M	201	-	-	2/19/37/37	0/5/5/5
2	9A3	K	201	-	-	1/19/37/37	0/5/5/5
2	9A3	N	201	-	-	2/19/37/37	0/5/5/5
2	9A3	P	201	-	-	2/19/37/37	0/5/5/5
2	9A3	H	201	-	-	2/19/37/37	0/5/5/5
2	9A3	F	201	-	-	2/19/37/37	0/5/5/5

The worst 5 of 89 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	K	201	9A3	C01-N01	5.84	1.44	1.38
2	L	201	9A3	C01-N01	5.80	1.44	1.38
2	D	201	9A3	C01-N01	5.63	1.44	1.38
2	O	201	9A3	C01-N01	5.53	1.44	1.38
2	N	201	9A3	C01-N01	5.48	1.44	1.38

The worst 5 of 38 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
2	P	201	9A3	N01-C11-N02	4.09	118.76	112.08
2	K	201	9A3	C22-C20-N03	-4.03	111.32	115.36
2	F	201	9A3	N01-C11-N02	3.71	118.14	112.08
2	D	201	9A3	N01-C11-N02	3.51	117.81	112.08
2	H	201	9A3	N01-C11-N02	3.50	117.80	112.08

There are no chirality outliers.

5 of 26 torsion outliers are listed below:

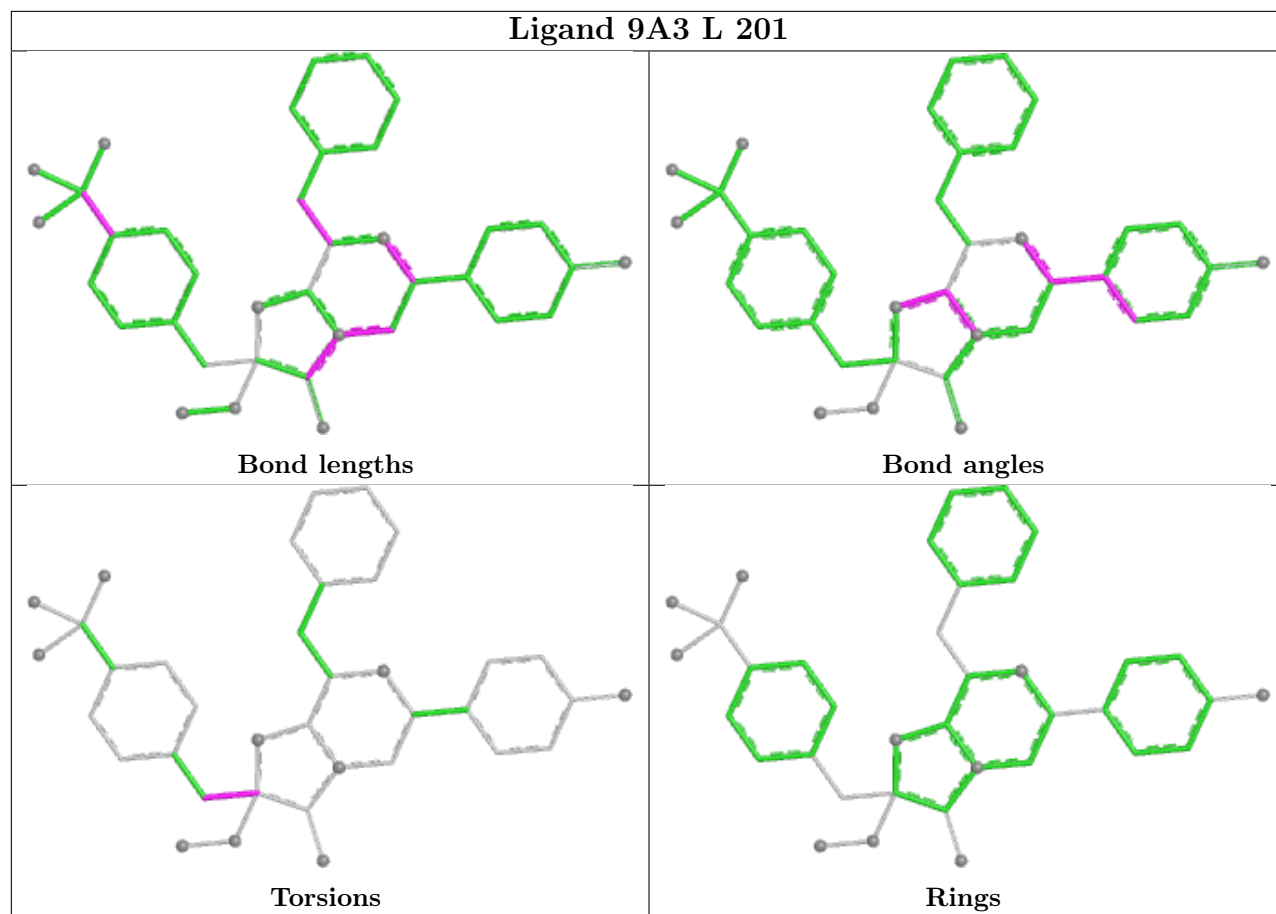
Mol	Chain	Res	Type	Atoms
2	B	201	9A3	N03-C12-C13-C14
2	H	201	9A3	N03-C12-C13-C14
2	M	201	9A3	N03-C12-C13-C14
2	N	201	9A3	N03-C12-C13-C14
2	P	201	9A3	N03-C12-C13-C14

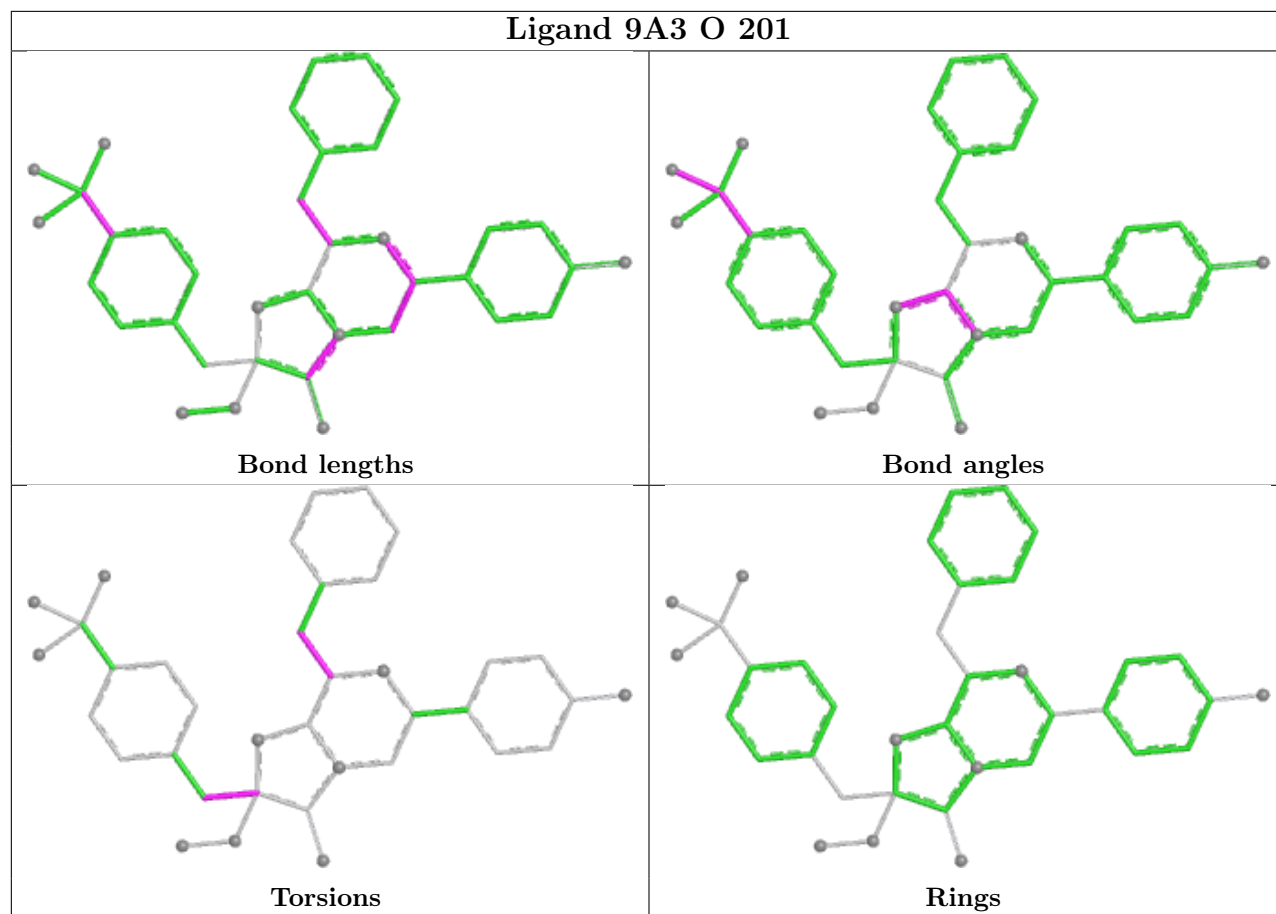
There are no ring outliers.

15 monomers are involved in 15 short contacts:

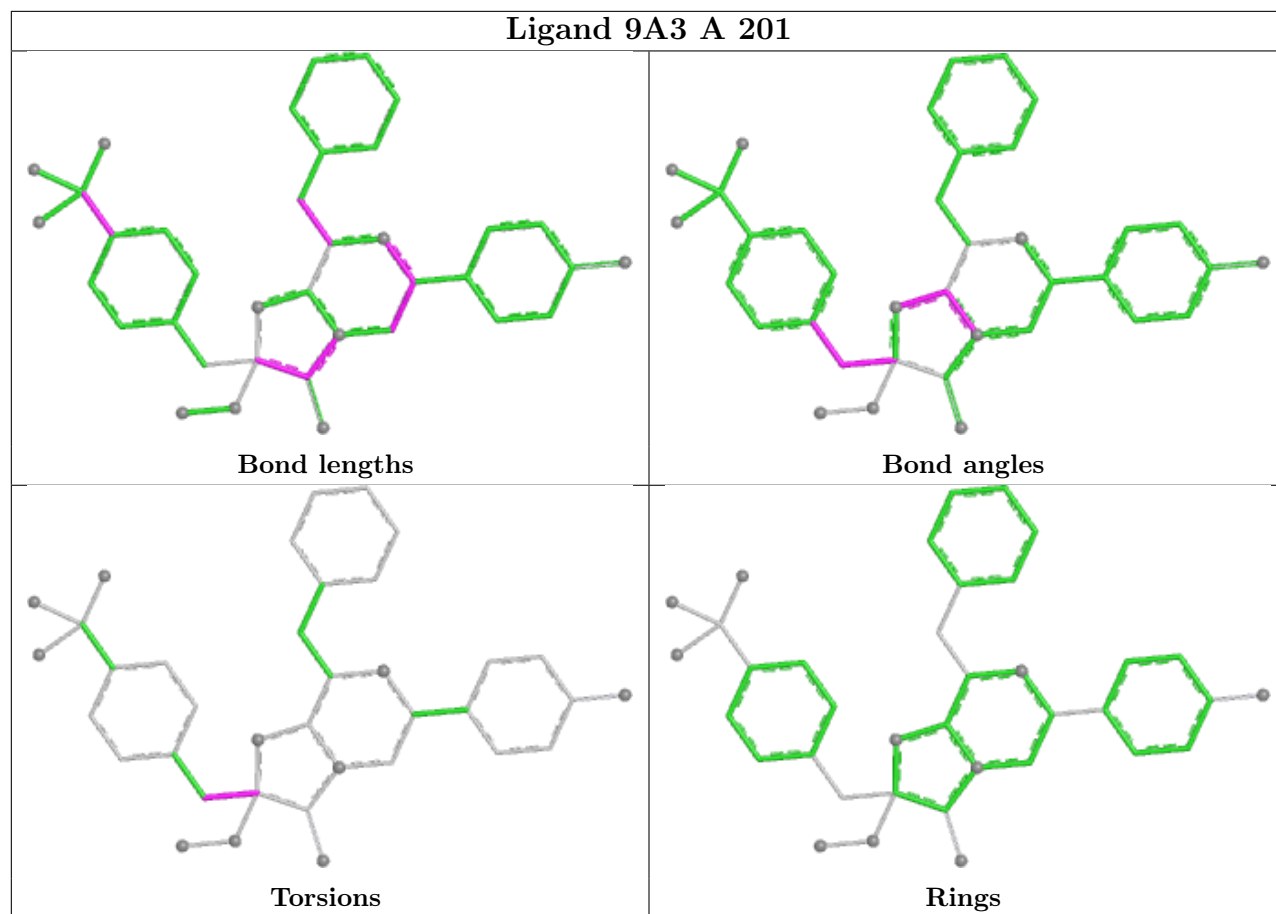
Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	L	201	9A3	1	0
2	A	201	9A3	1	0
2	B	201	9A3	1	0
2	I	201	9A3	1	0
2	D	201	9A3	1	0
2	C	201	9A3	1	0
2	E	201	9A3	1	0
2	G	201	9A3	1	0
2	J	201	9A3	1	0
2	M	201	9A3	1	0
2	K	201	9A3	1	0
2	N	201	9A3	1	0
2	P	201	9A3	1	0
2	H	201	9A3	1	0
2	F	201	9A3	1	0

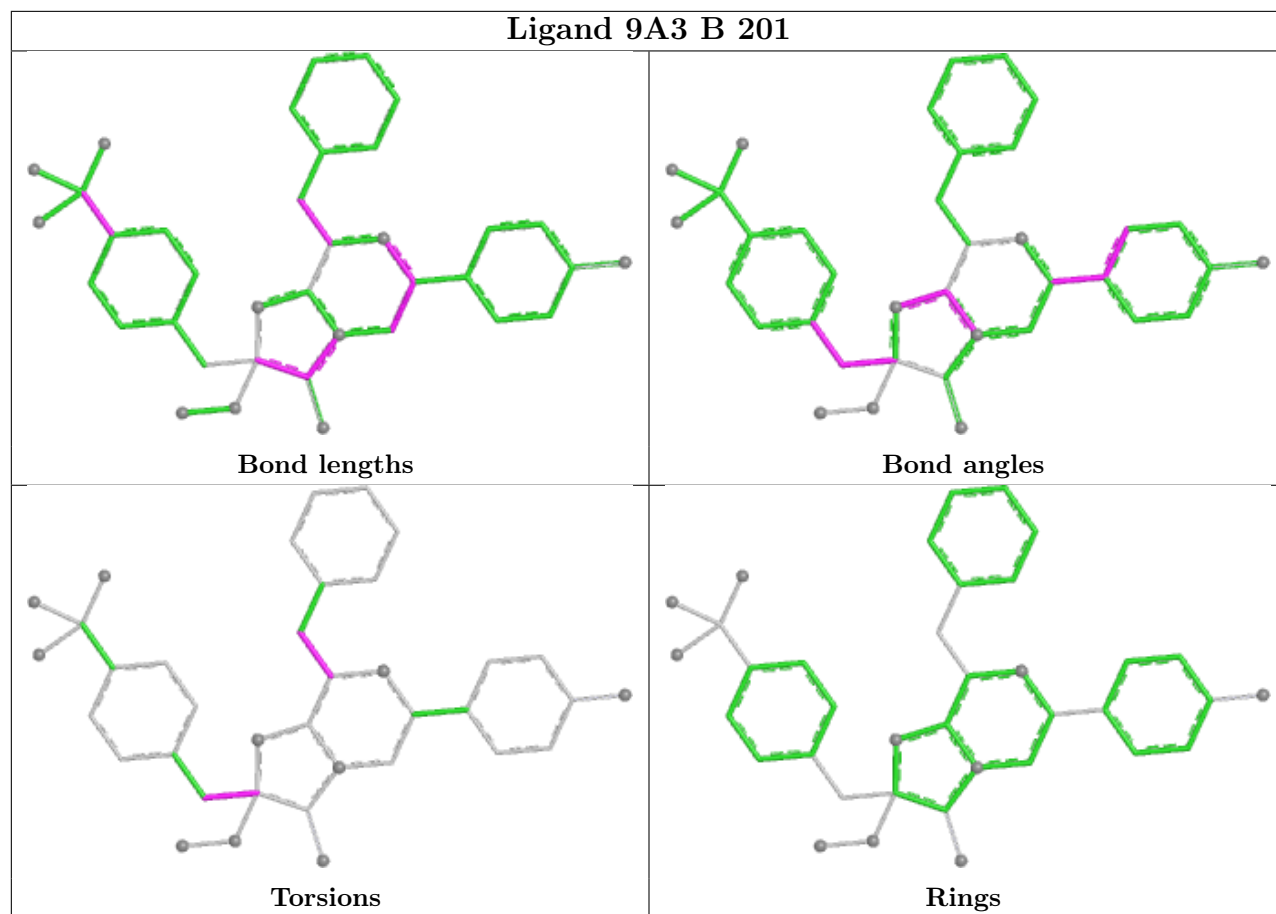
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included. 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.

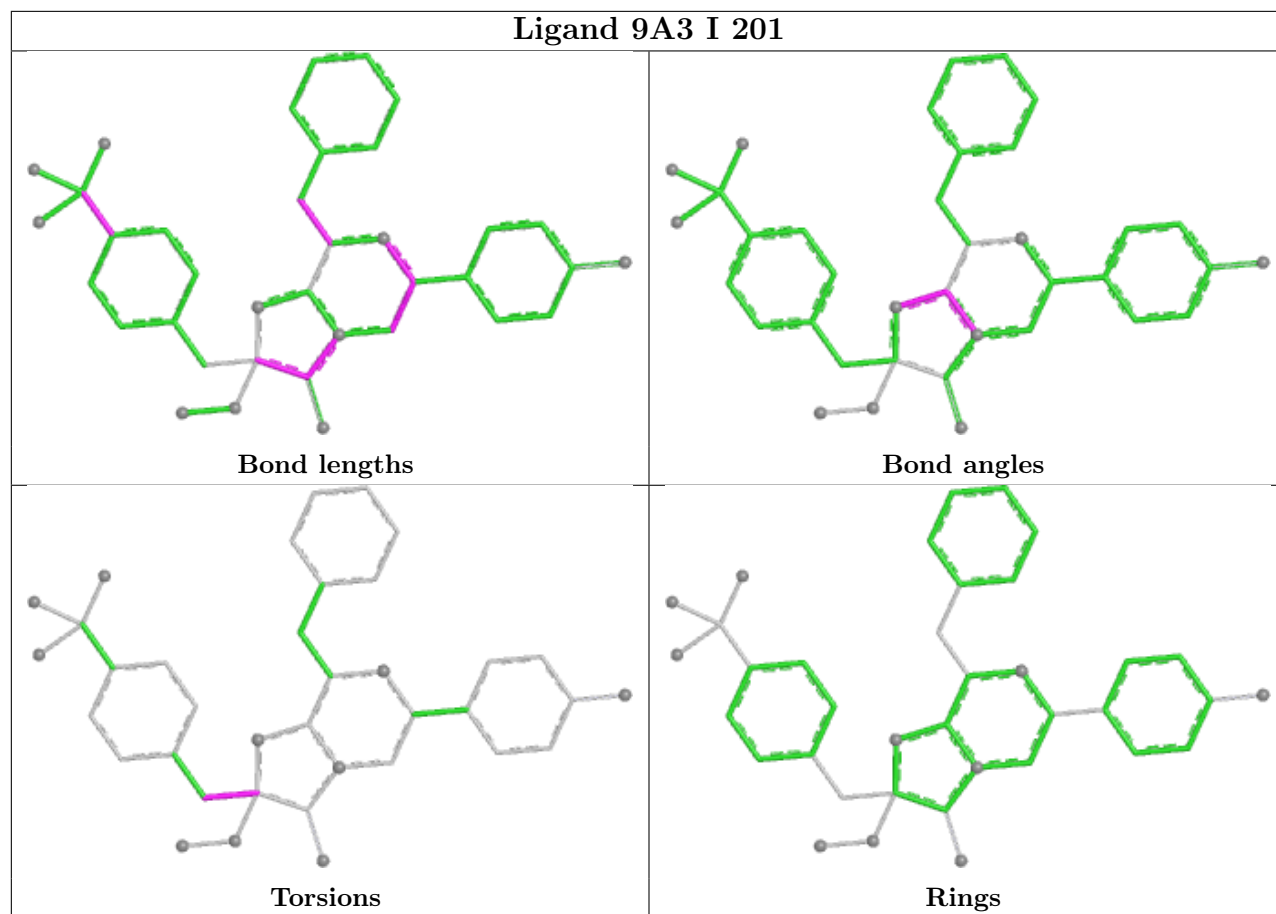




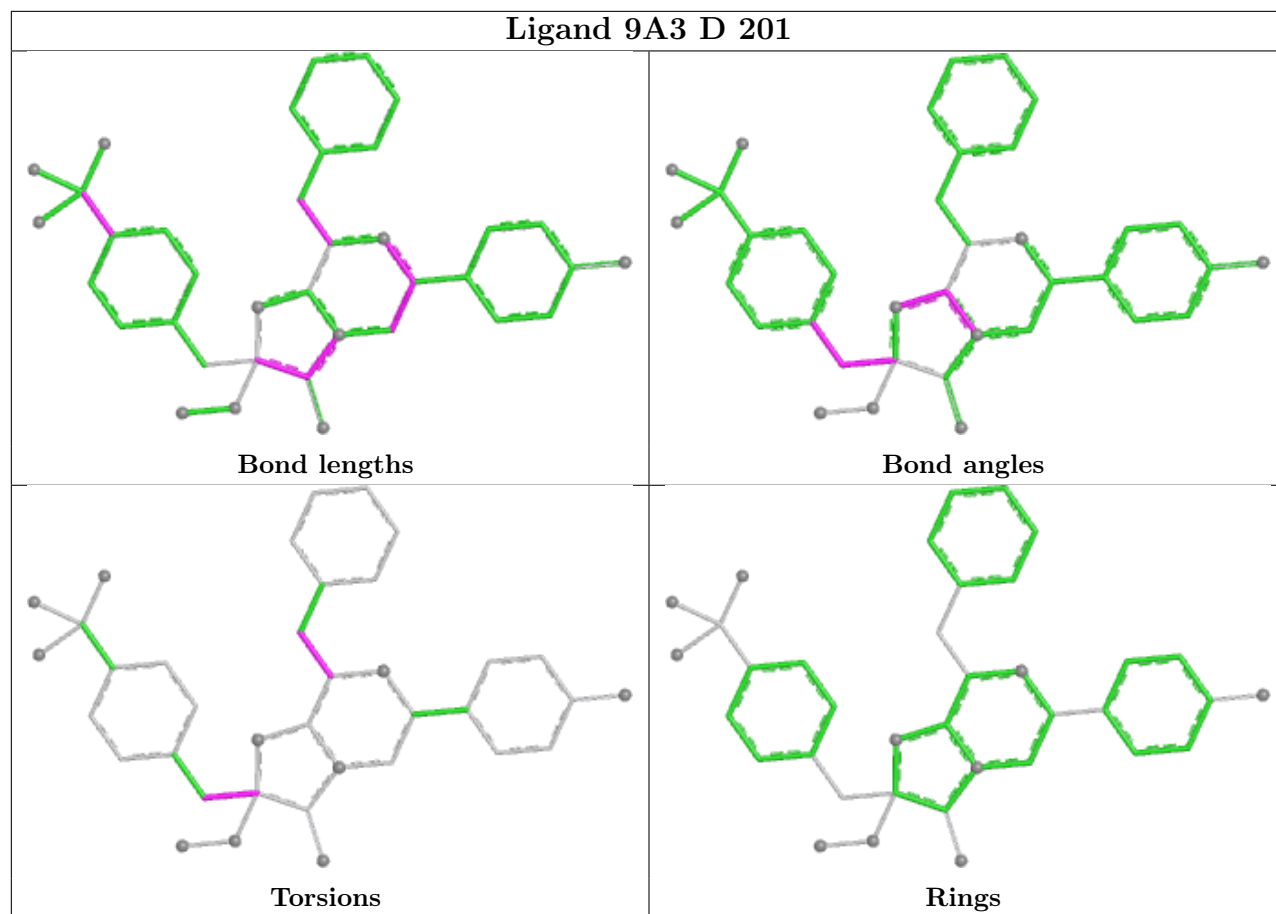
Ligand 9A3 A 201

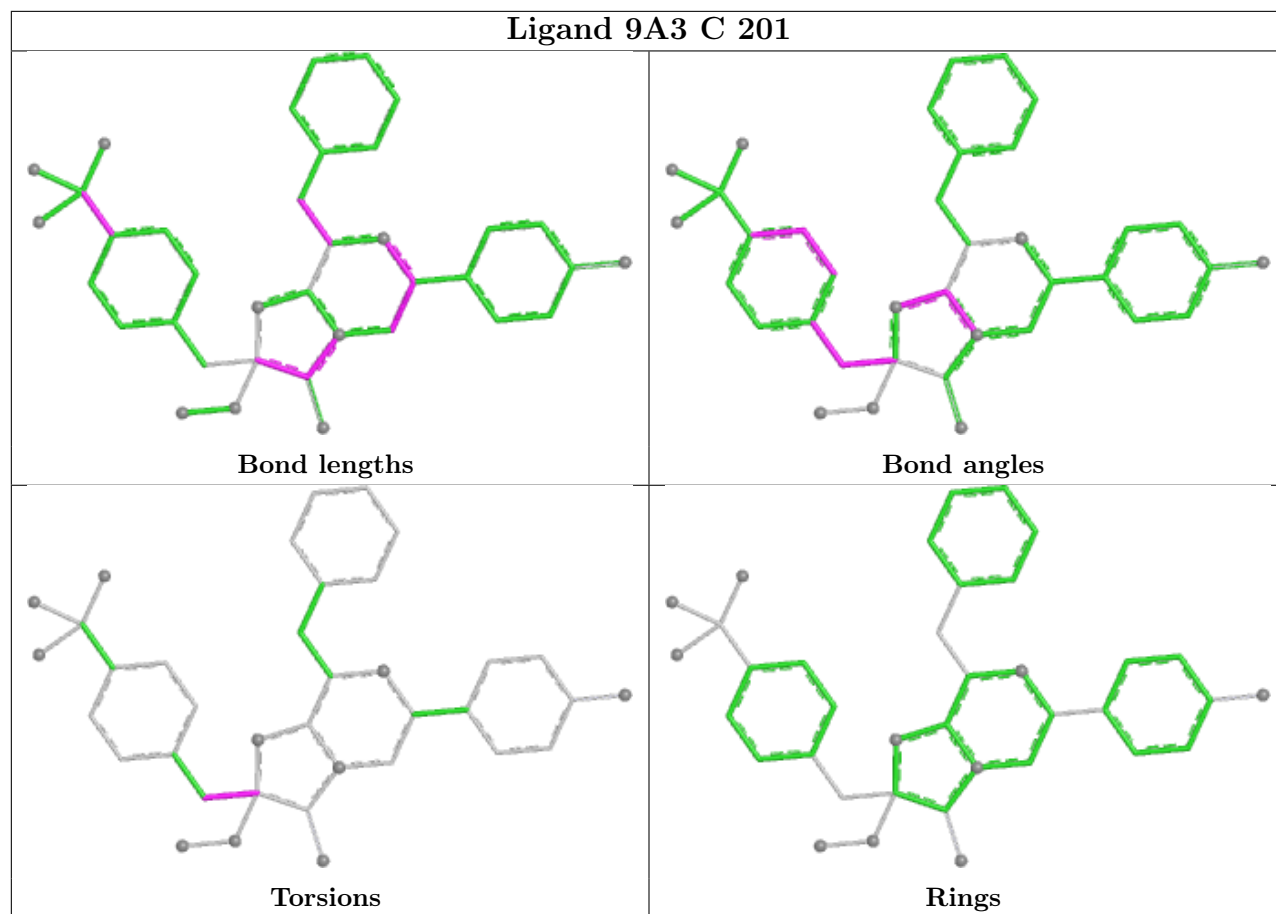


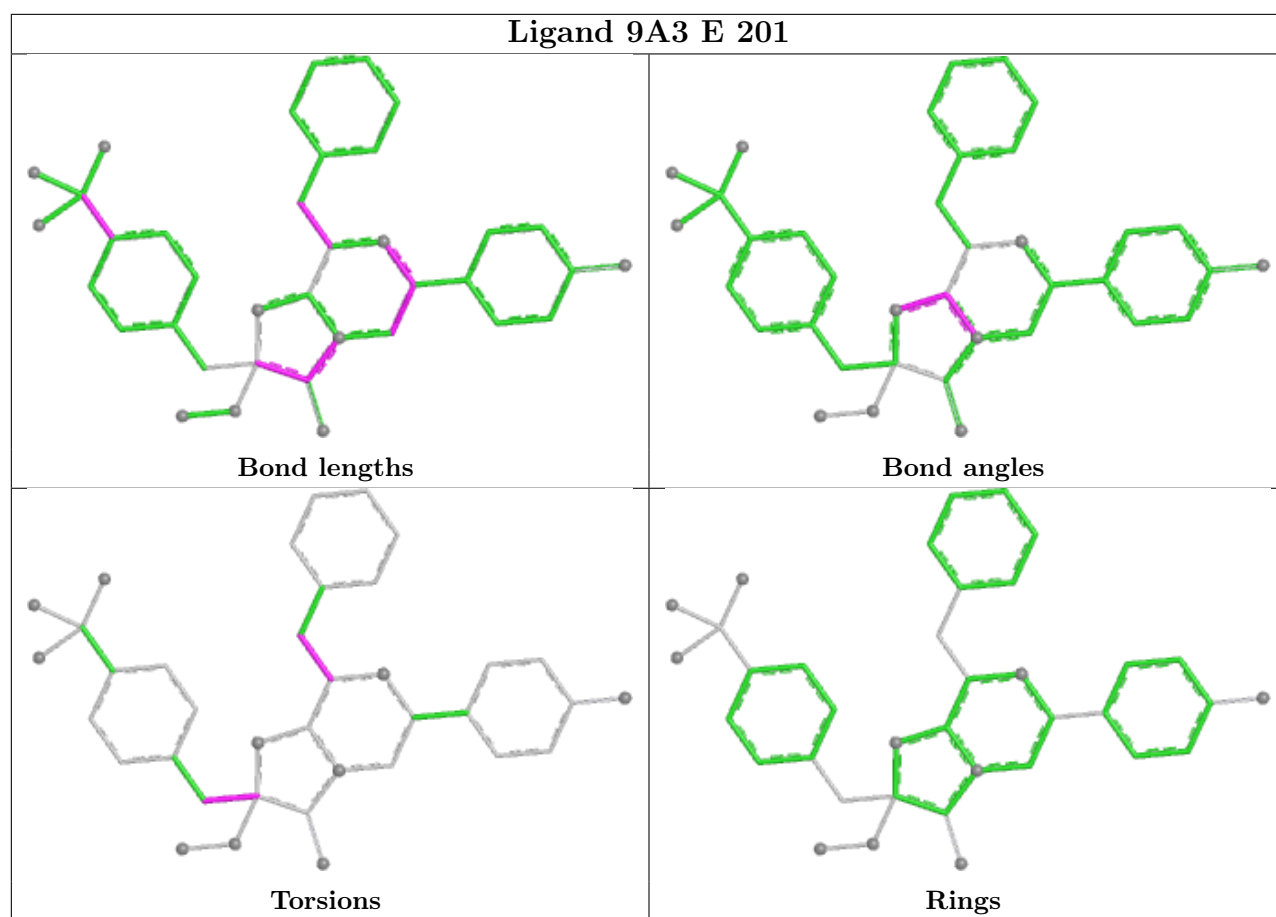


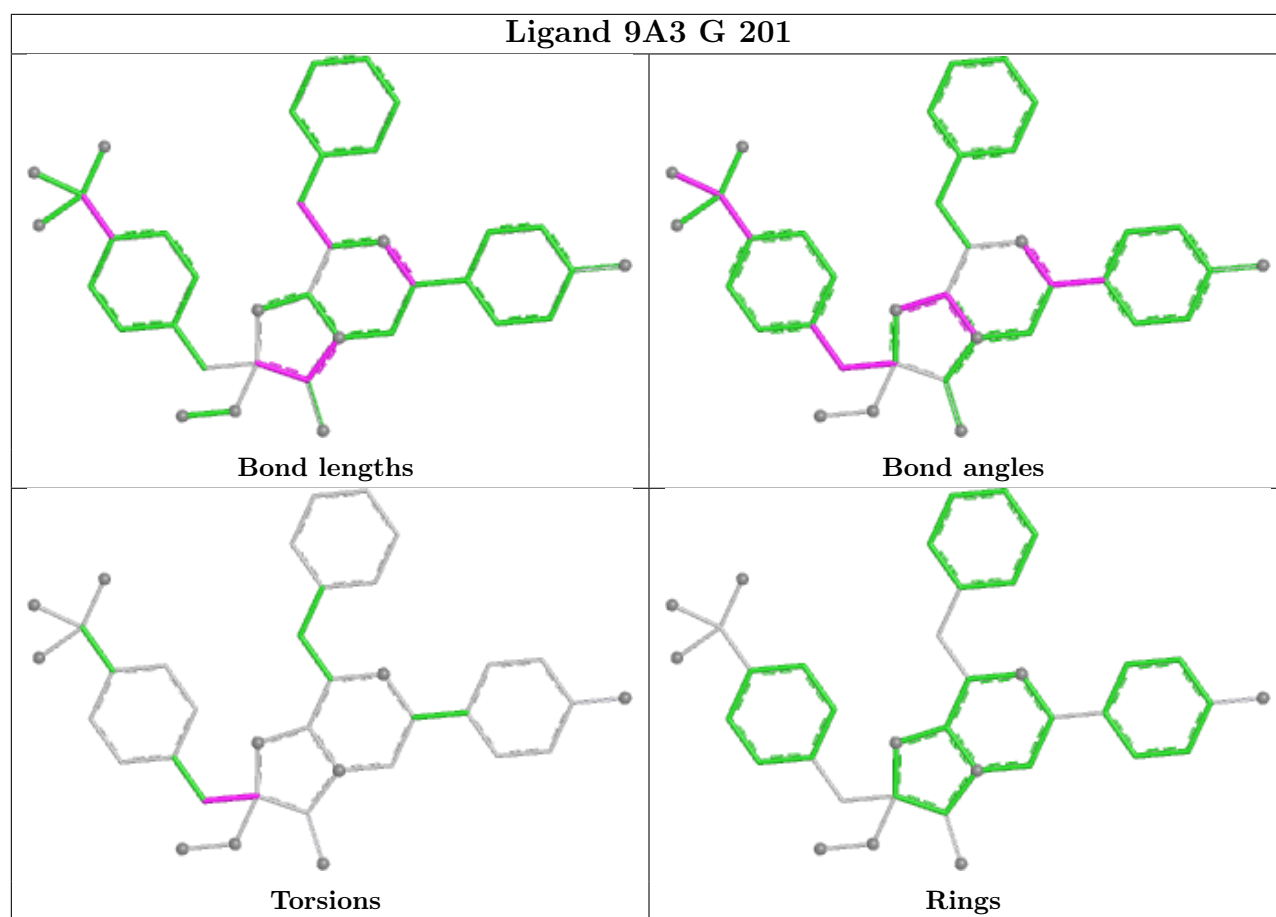


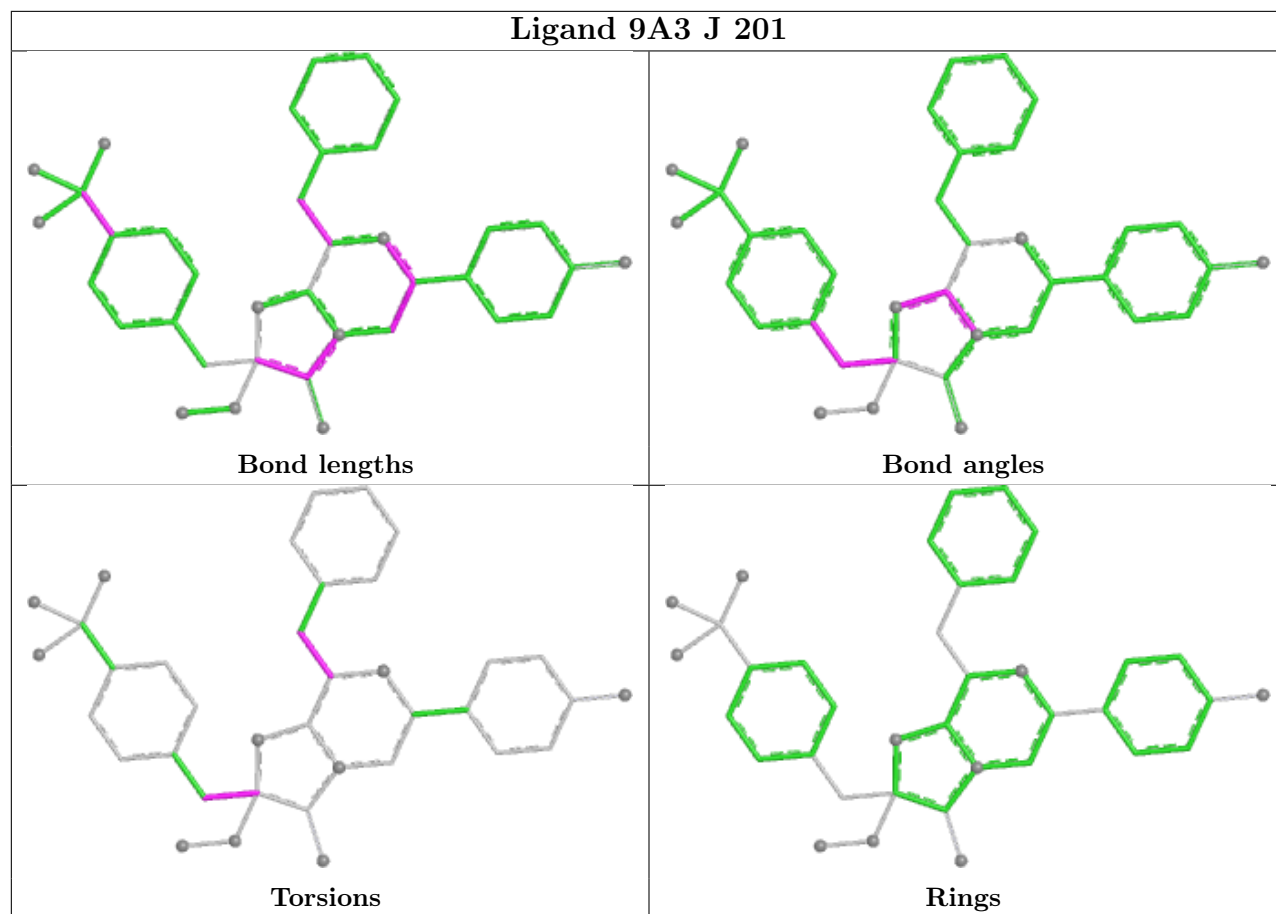
Ligand 9A3 D 201

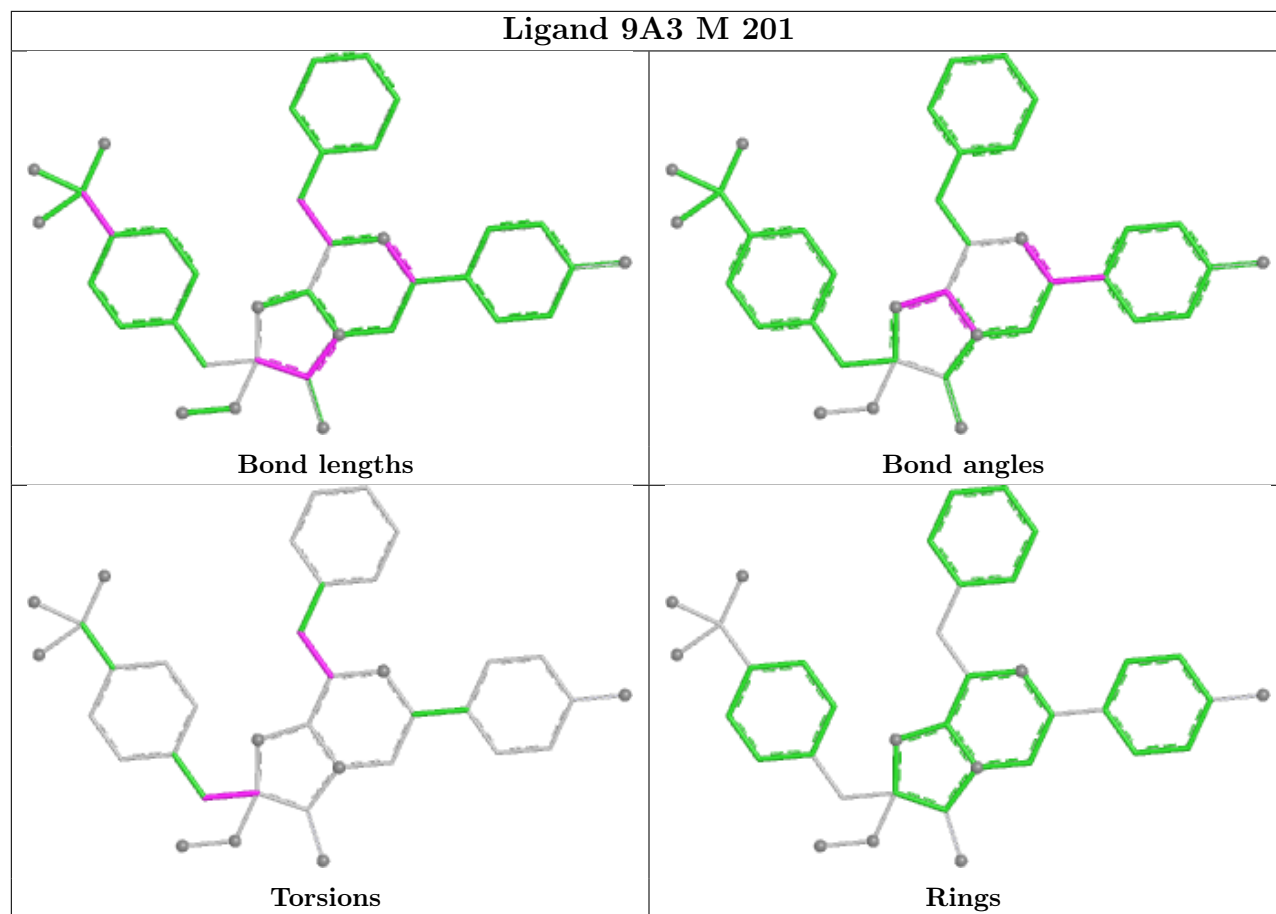




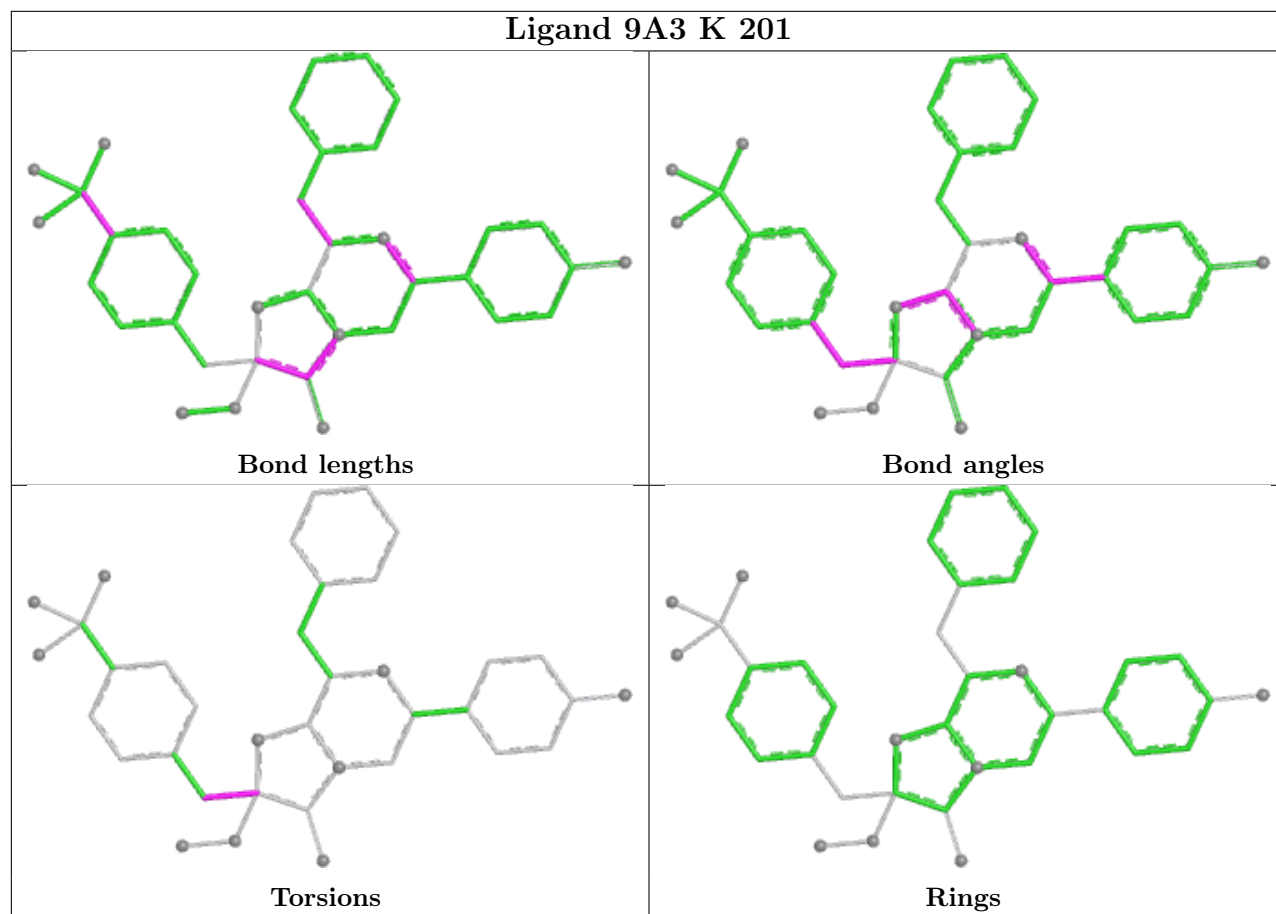




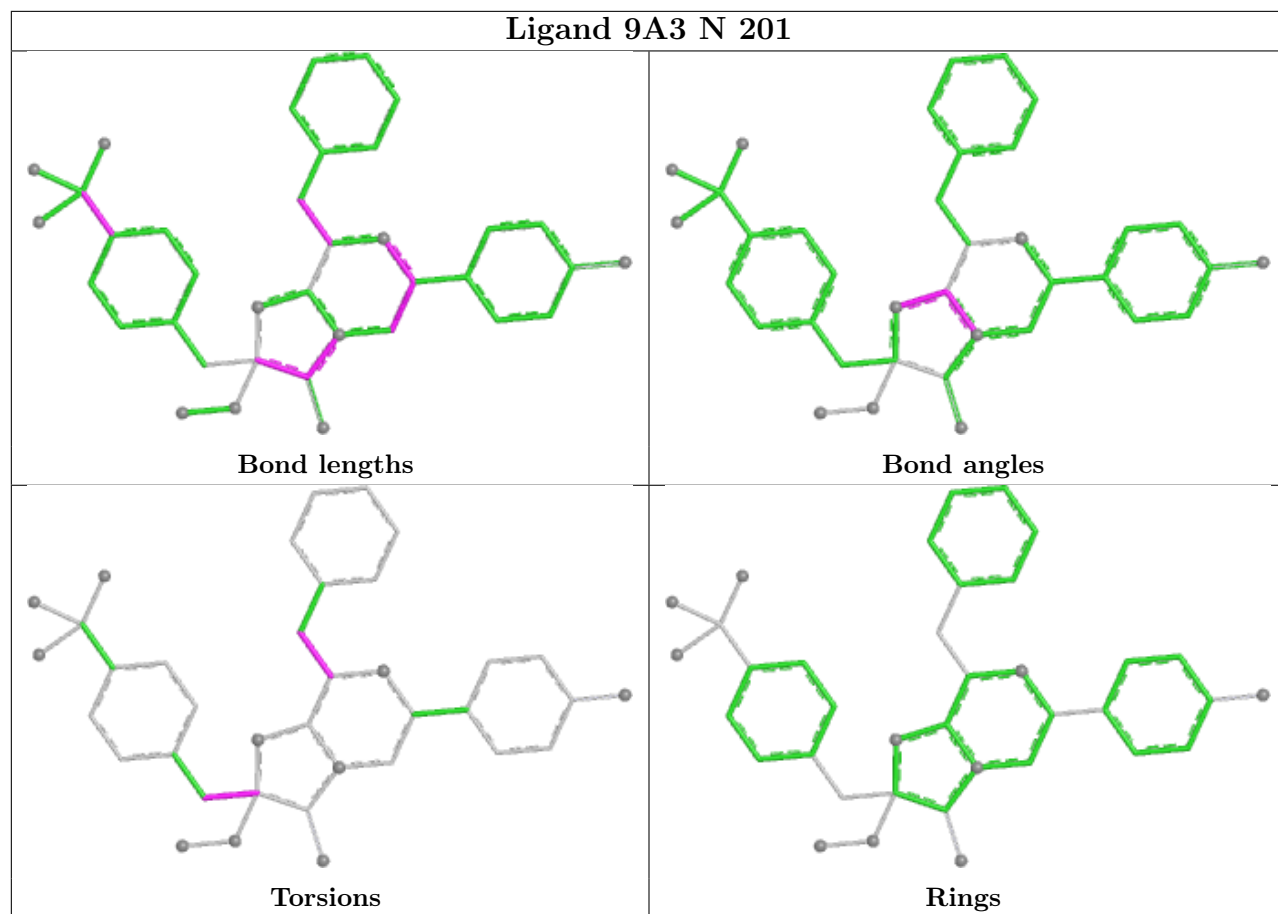


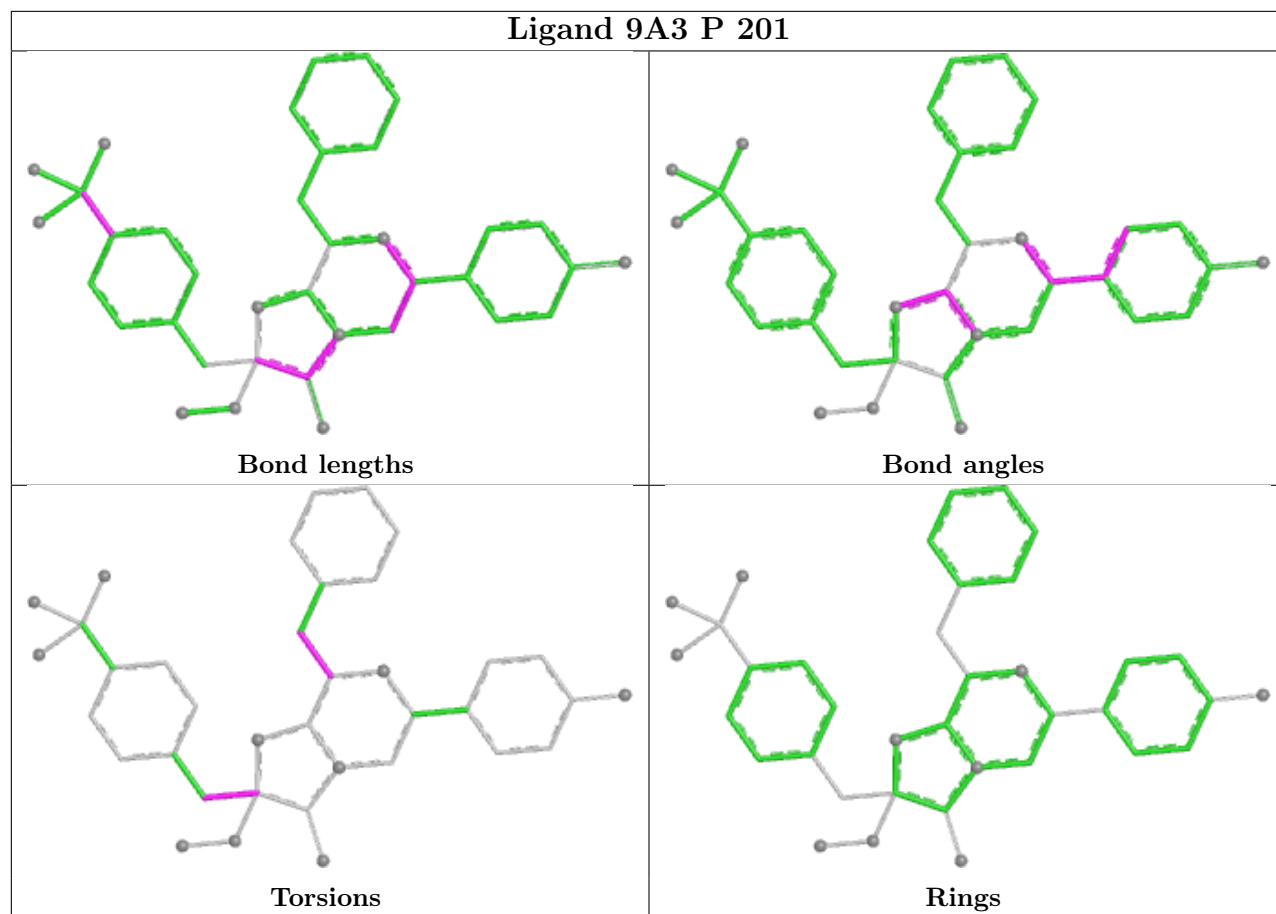


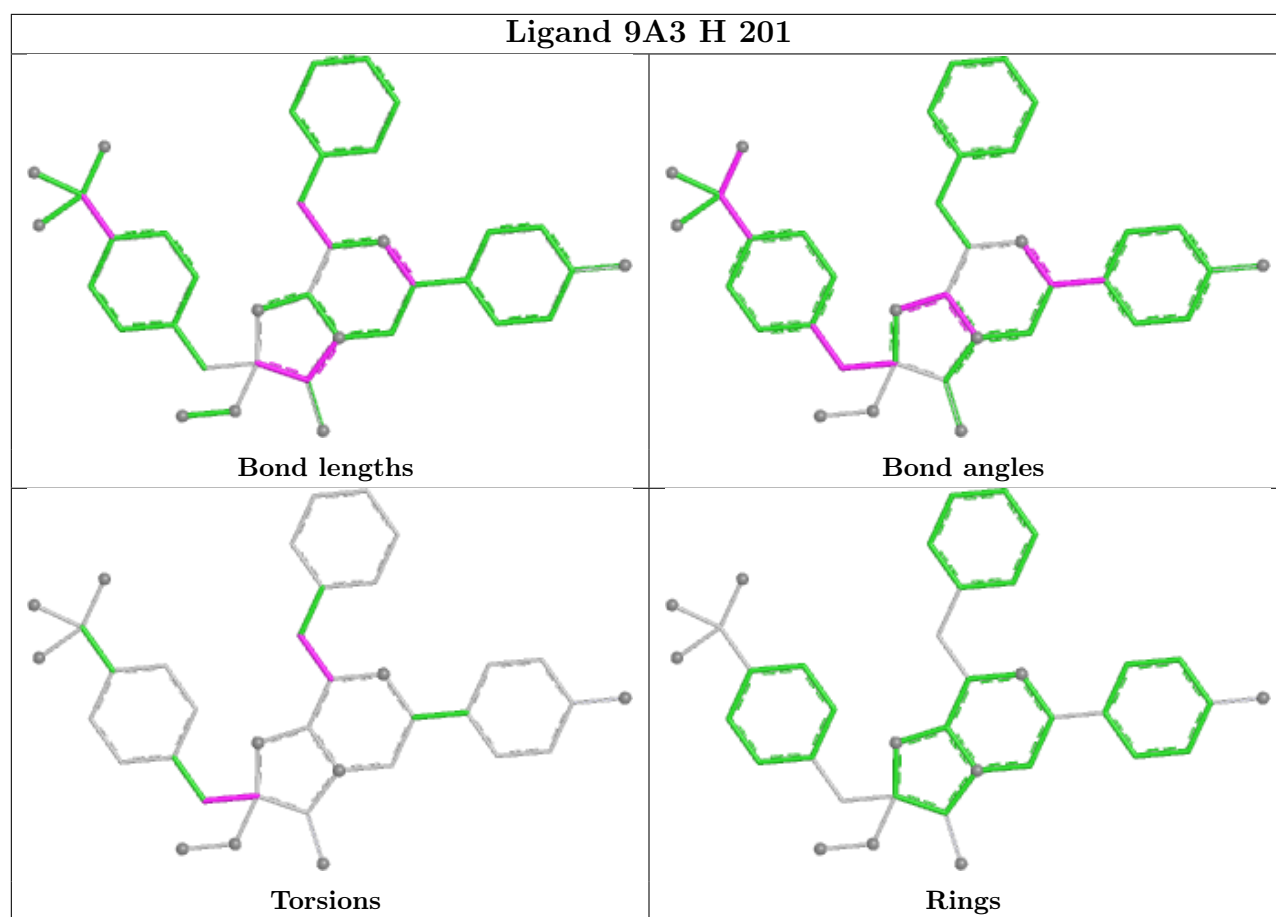
Ligand 9A3 K 201

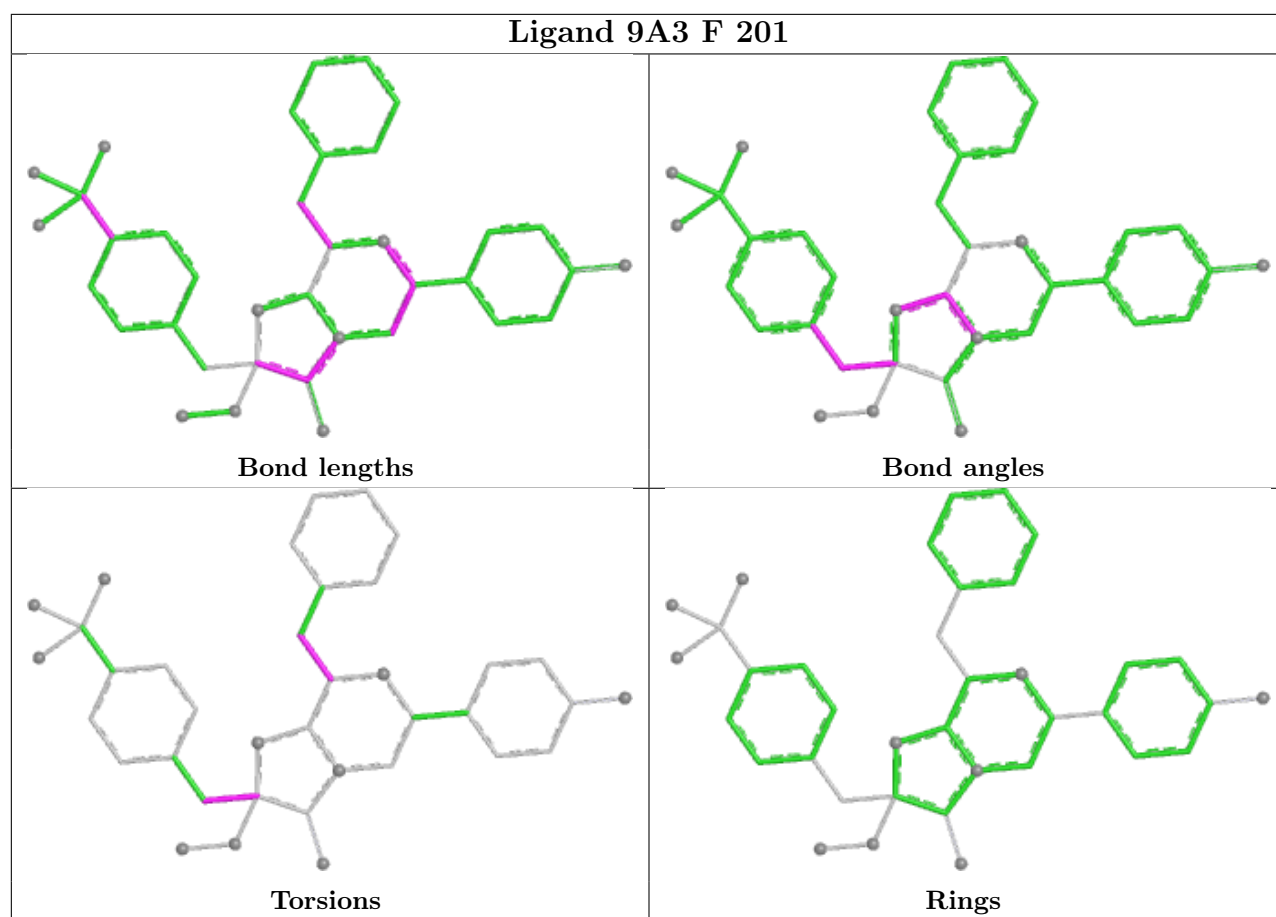


Ligand 9A3 N 201









5.7 Other polymers [i](#)

There are no such residues in this entry.

5.8 Polymer linkage issues [i](#)

There are no chain breaks in this entry.

6 Fit of model and data [i](#)

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

In the following table, the column labelled ‘#RSRZ > 2’ contains the number (and percentage) of RSRZ outliers, followed by percent RSRZ outliers for the chain as percentile scores relative to all X-ray entries and entries of similar resolution. The OWAB column contains the minimum, median, 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	191/198 (96%)	0.10	7 (3%) 45 50	24, 34, 62, 71	0
1	B	192/198 (96%)	0.09	5 (2%) 57 61	25, 36, 52, 71	0
1	C	191/198 (96%)	0.20	3 (1%) 70 74	29, 39, 58, 70	0
1	D	191/198 (96%)	0.47	7 (3%) 45 50	31, 45, 68, 79	0
1	E	191/198 (96%)	0.16	6 (3%) 51 55	25, 36, 65, 77	0
1	F	192/198 (96%)	0.64	16 (8%) 17 20	27, 45, 74, 91	0
1	G	190/198 (95%)	0.28	9 (4%) 36 41	27, 39, 63, 82	0
1	H	191/198 (96%)	0.46	11 (5%) 29 33	30, 43, 68, 84	0
1	I	191/198 (96%)	-0.00	5 (2%) 57 61	22, 33, 59, 69	0
1	J	191/198 (96%)	0.33	7 (3%) 45 50	28, 41, 64, 76	0
1	K	191/198 (96%)	0.08	5 (2%) 57 61	26, 35, 59, 70	0
1	L	188/198 (94%)	0.11	9 (4%) 35 41	23, 35, 51, 70	0
1	M	191/198 (96%)	0.11	8 (4%) 40 46	24, 34, 58, 71	0
1	N	191/198 (96%)	1.00	25 (13%) 7 9	37, 52, 78, 93	0
1	O	191/198 (96%)	0.92	24 (12%) 8 9	35, 50, 77, 89	0
1	P	188/198 (94%)	0.29	7 (3%) 45 50	25, 40, 57, 69	0
All	All	3051/3168 (96%)	0.33	154 (5%) 34 39	22, 40, 66, 93	0

The worst 5 of 154 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	O	13	ILE	4.7
1	F	156	GLU	4.6
1	G	121	ASN	4.4
1	N	121	ASN	4.4
1	L	122	GLY	4.4

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](#)

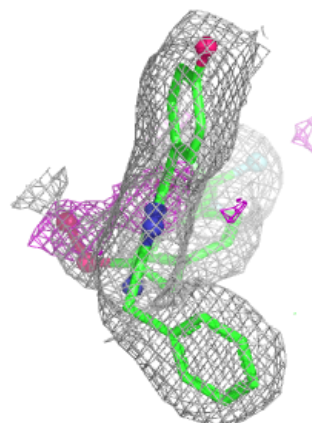
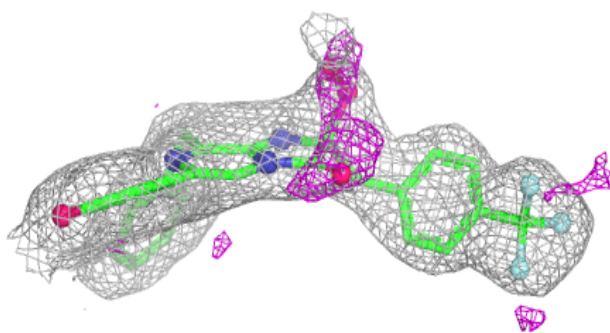
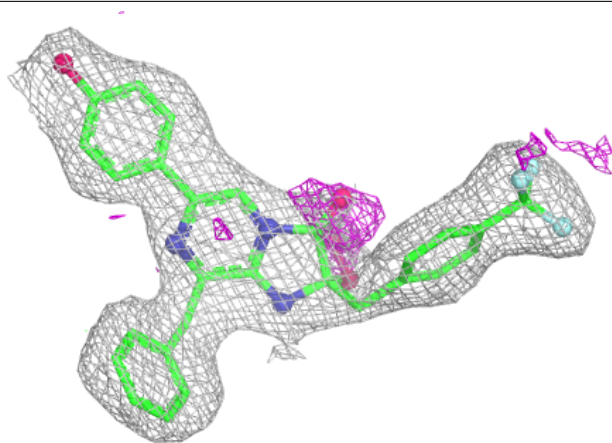
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95th percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9' lists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

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
2	9A3	F	201	37/37	0.92	0.09	27,39,49,53	0
2	9A3	H	201	37/37	0.92	0.09	29,38,47,49	0
2	9A3	N	201	37/37	0.92	0.10	34,44,51,56	0
2	9A3	D	201	37/37	0.93	0.08	29,40,47,52	0
2	9A3	B	201	37/37	0.93	0.08	26,32,42,46	0
2	9A3	A	201	37/37	0.94	0.07	23,32,42,47	0
2	9A3	J	201	37/37	0.94	0.08	27,37,50,51	0
2	9A3	L	201	37/37	0.94	0.08	25,32,42,47	0
2	9A3	C	201	37/37	0.94	0.07	28,34,42,49	0
2	9A3	O	201	37/37	0.94	0.08	34,45,52,57	0
2	9A3	P	201	37/37	0.94	0.07	25,36,43,50	0
2	9A3	K	201	37/37	0.95	0.07	26,33,38,46	0
2	9A3	E	201	37/37	0.95	0.07	24,34,42,46	0
2	9A3	M	201	37/37	0.95	0.07	22,30,42,44	0
2	9A3	I	201	37/37	0.96	0.06	21,28,42,47	0
2	9A3	G	201	37/37	0.96	0.06	26,35,42,47	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.

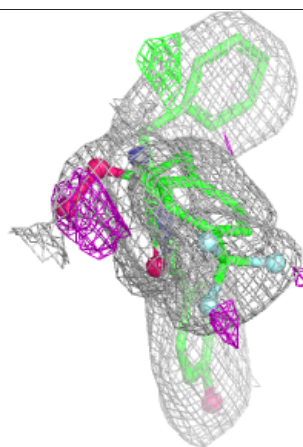
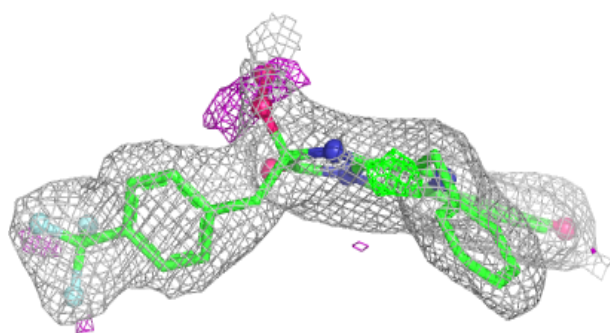
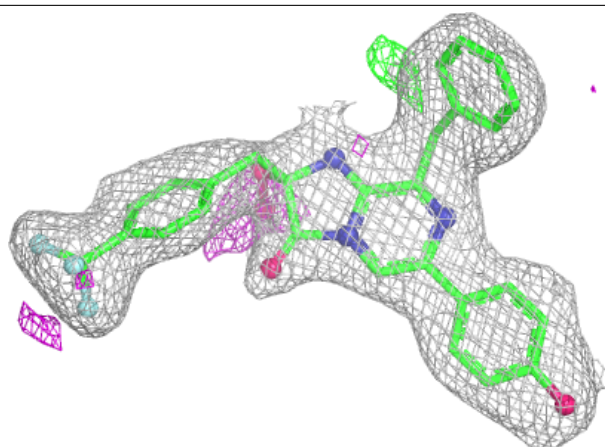
Electron density around 9A3 F 201:

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



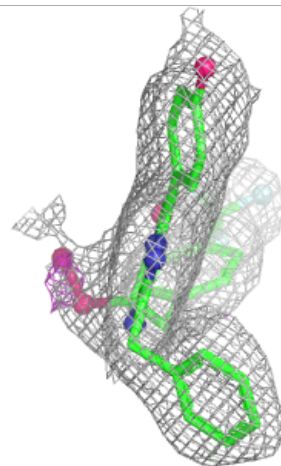
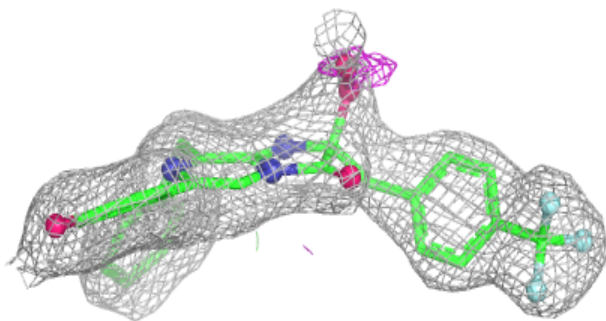
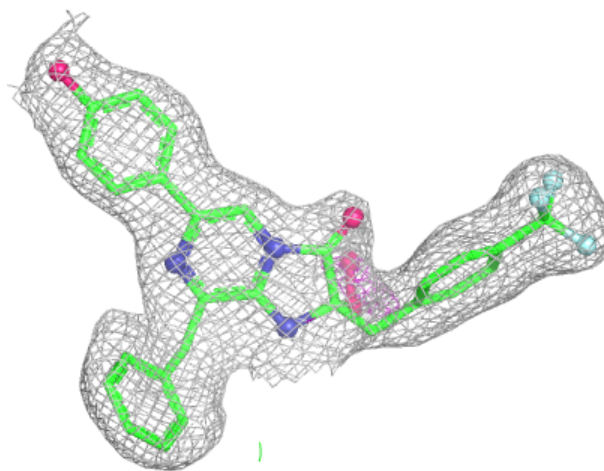
Electron density around 9A3 H 201:

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



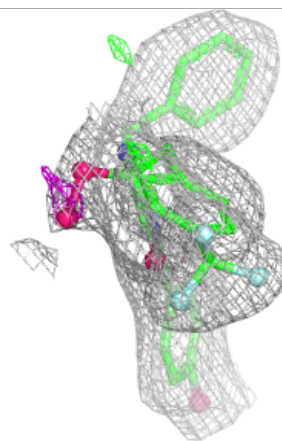
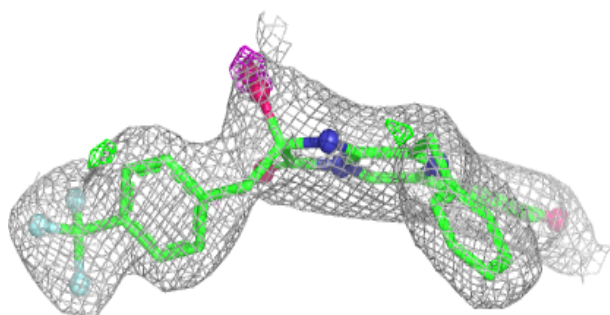
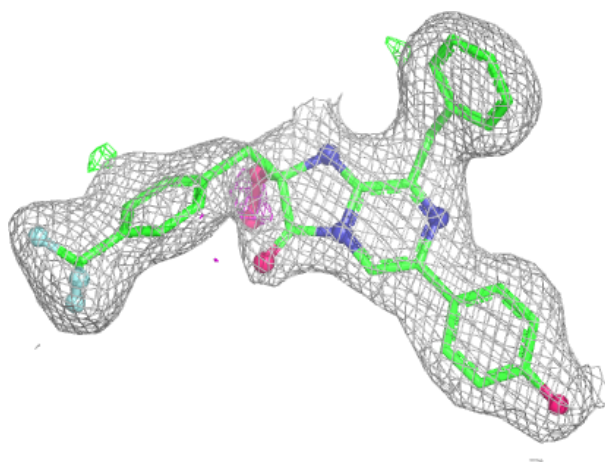
Electron density around 9A3 N 201:

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



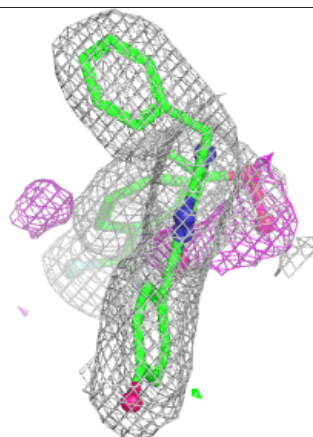
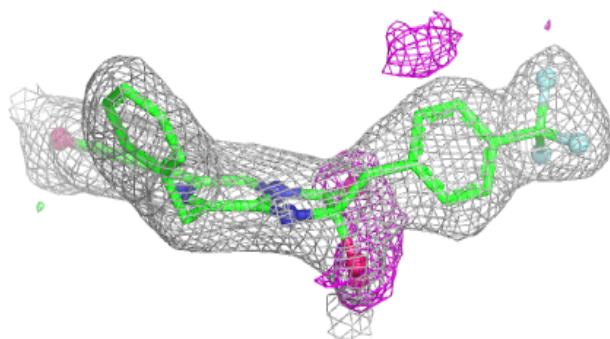
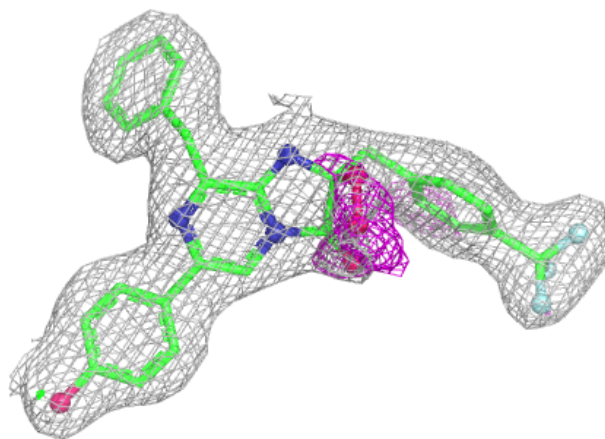
Electron density around 9A3 D 201:

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



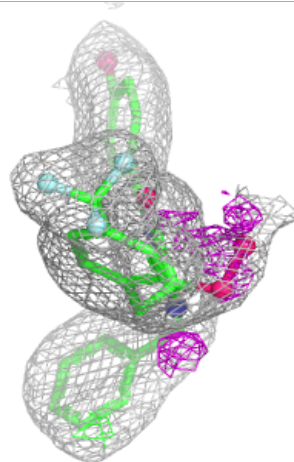
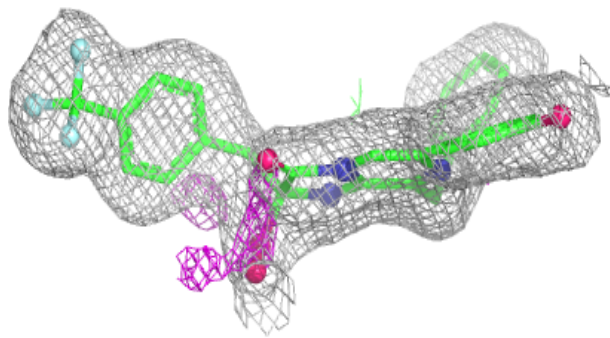
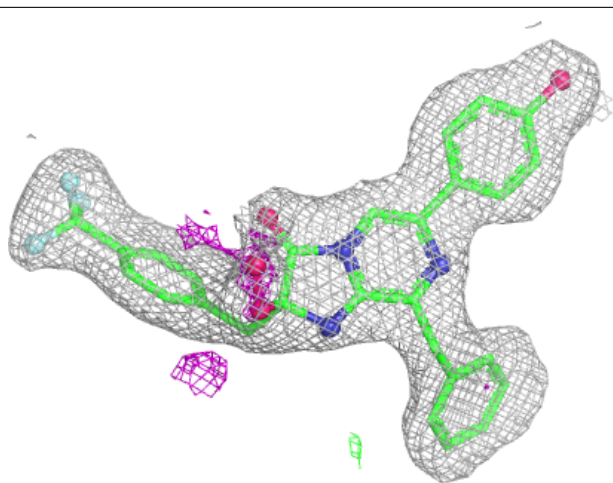
Electron density around 9A3 B 201:

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



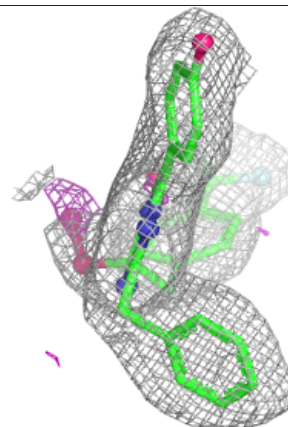
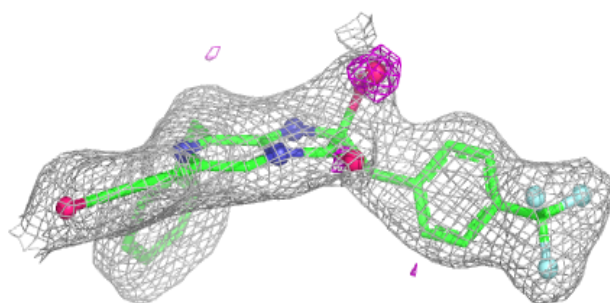
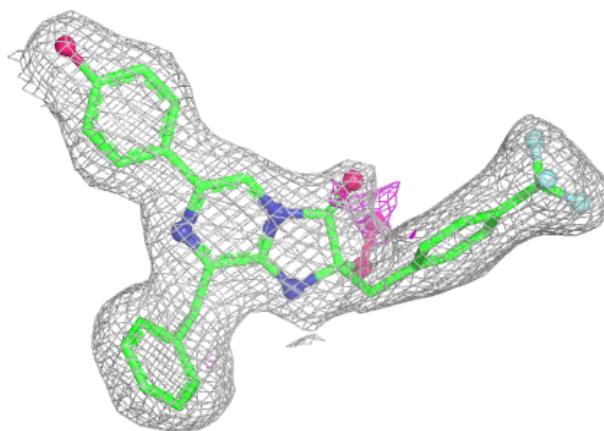
Electron density around 9A3 A 201:

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



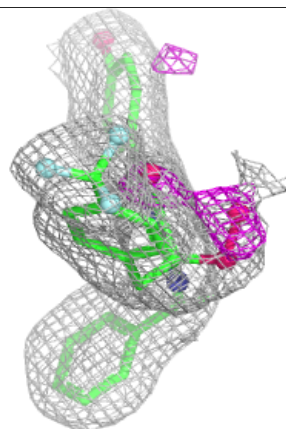
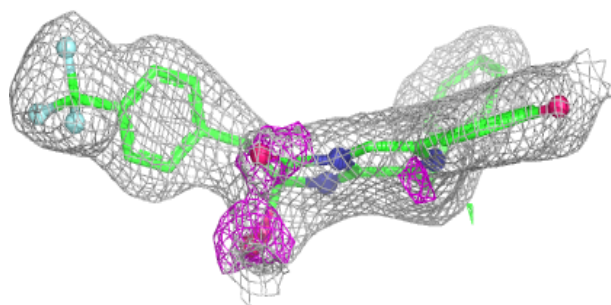
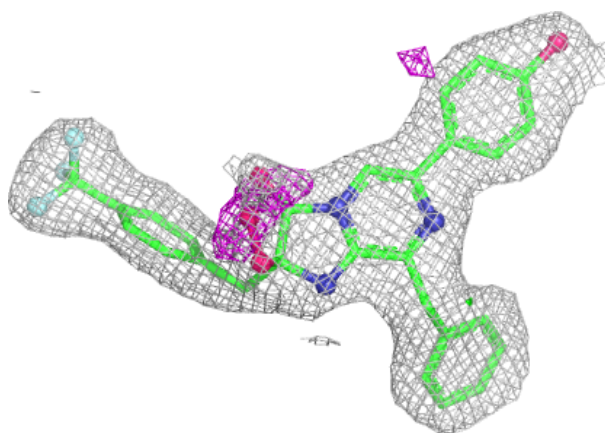
Electron density around 9A3 J 201:

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



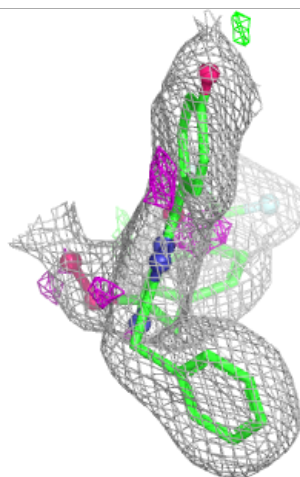
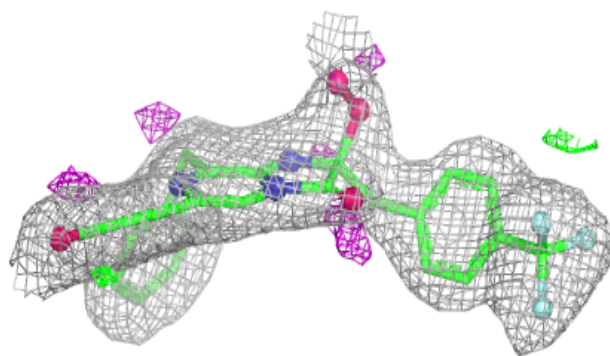
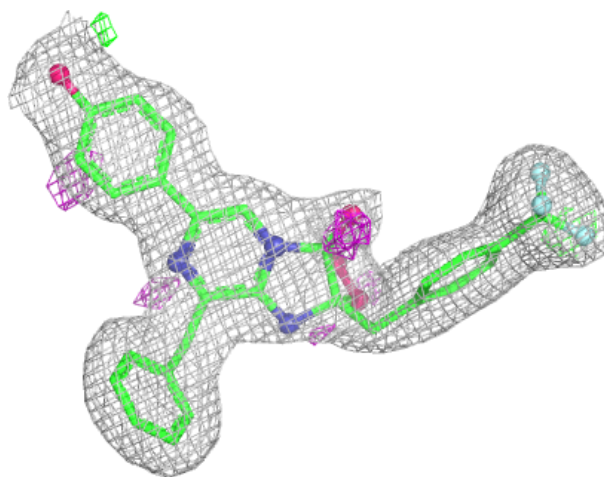
Electron density around 9A3 L 201:

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and green (positive)



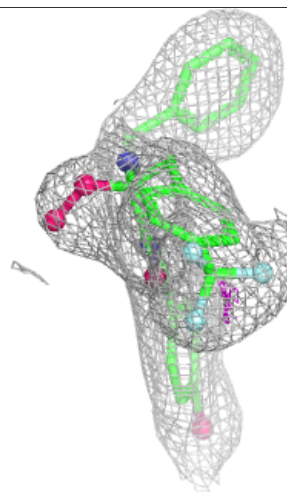
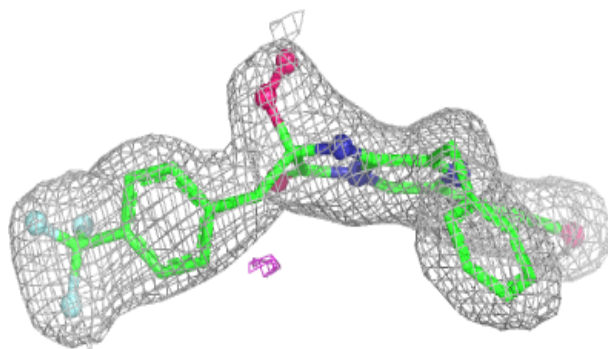
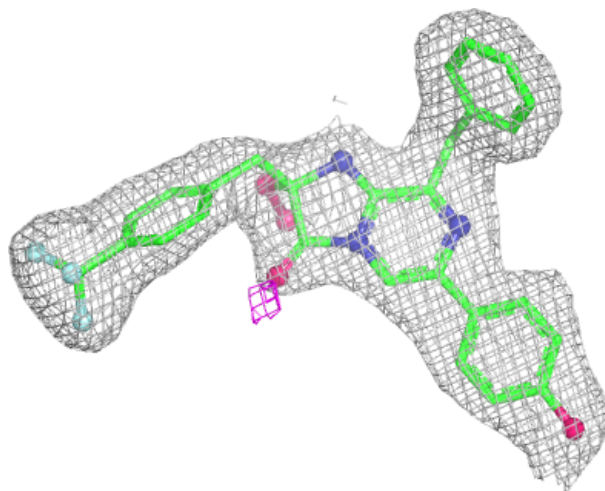
Electron density around 9A3 C 201:

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



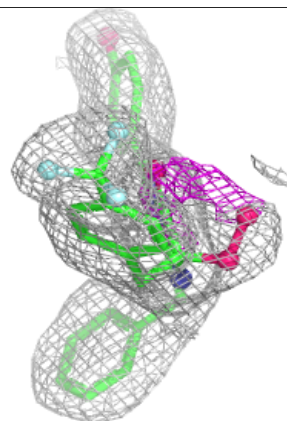
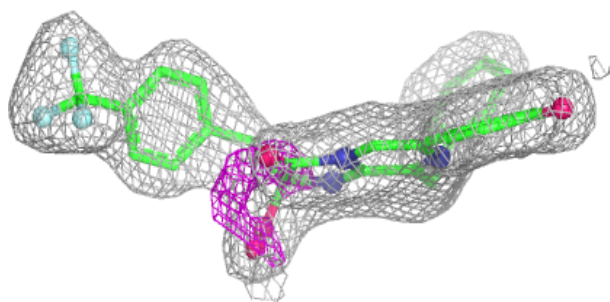
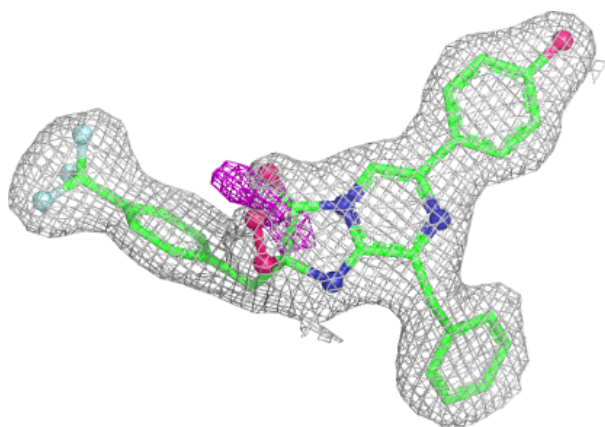
Electron density around 9A3 O 201:

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



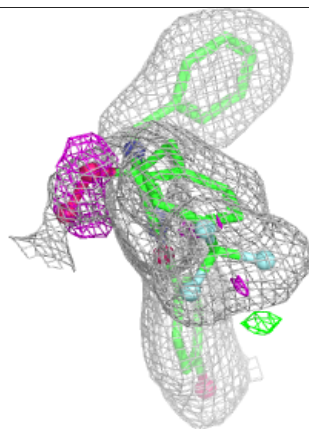
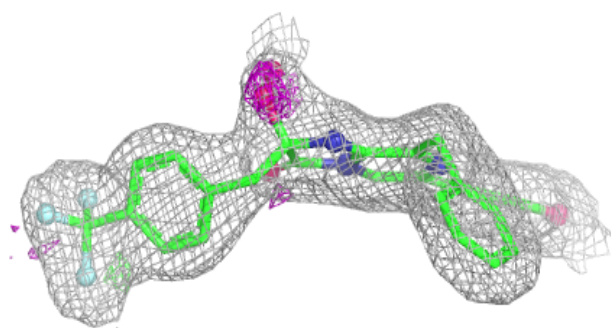
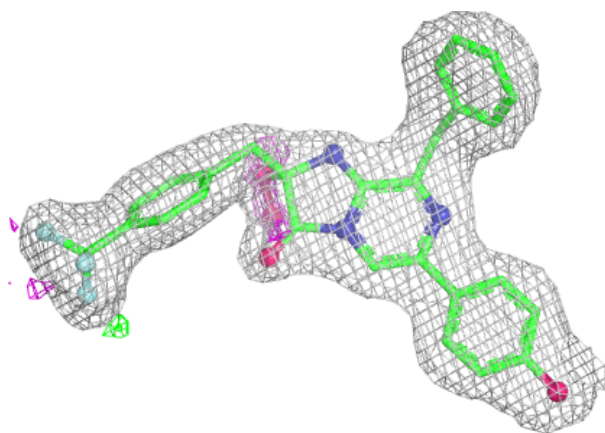
Electron density around 9A3 P 201:

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



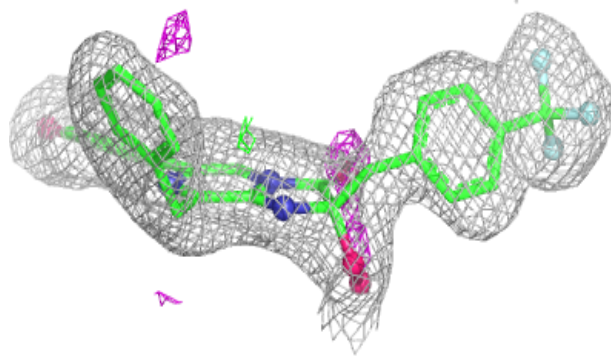
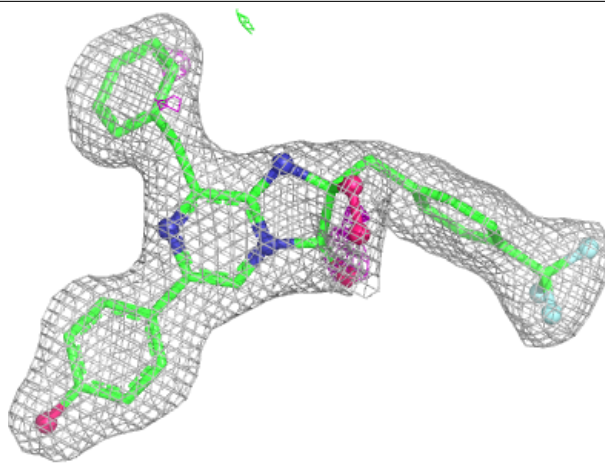
Electron density around 9A3 K 201:

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and green (positive)



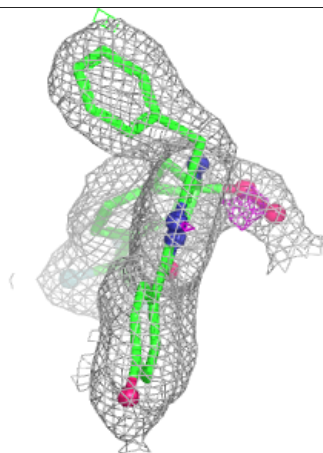
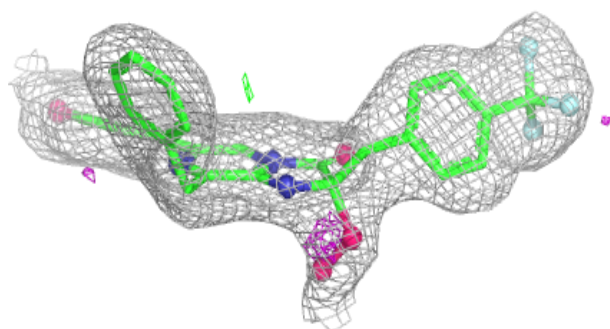
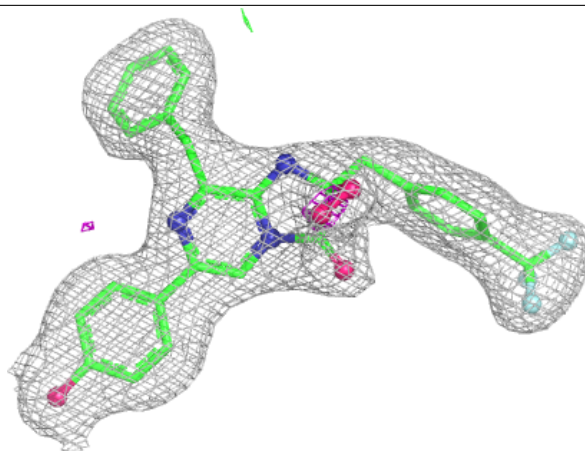
Electron density around 9A3 E 201:

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



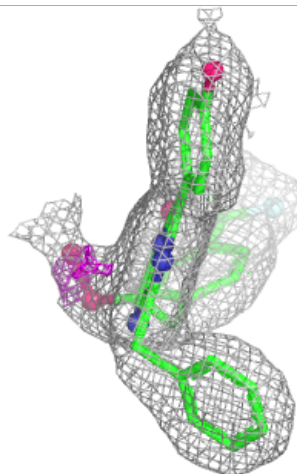
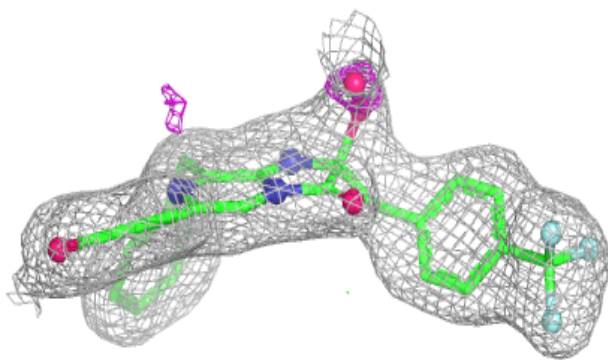
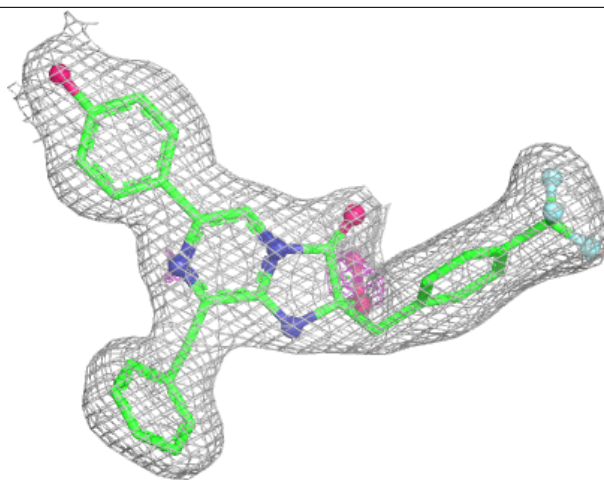
Electron density around 9A3 M 201:

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



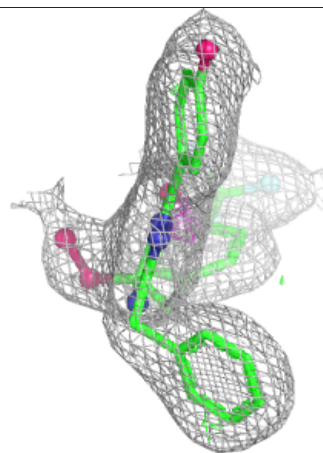
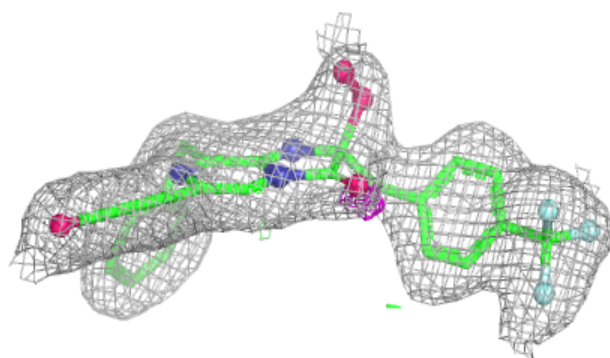
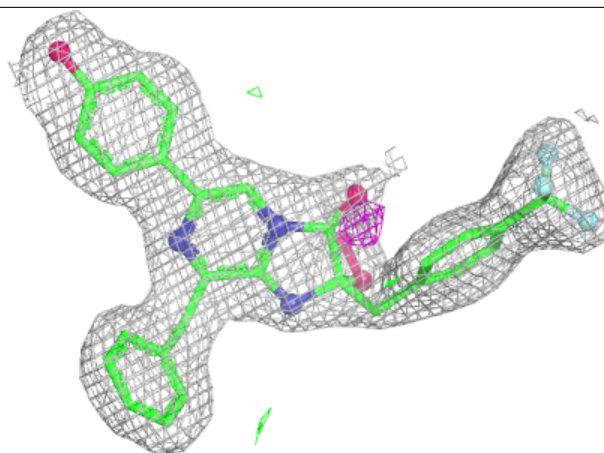
Electron density around 9A3 I 201:

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



Electron density around 9A3 G 201:

$2mF_o-DF_c$ (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.