



wwPDB X-ray Structure Validation Summary Report ⓘ

Mar 18, 2026 – 06:53 AM UTC

PDB ID : 8E7P / pdb_00008e7p
Title : Staphylococcus aureus ClpP in complex with compound 3421
Authors : Lee, R.E.; Griffith, E.C.
Deposited on : 2022-08-24
Resolution : 1.68 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

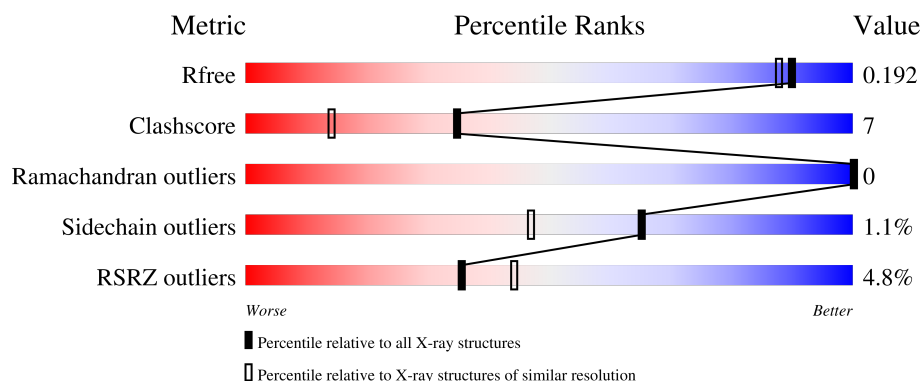
1 Overall quality at a glance

The following experimental techniques were used to determine the structure:

X-RAY DIFFRACTION

The reported resolution of this entry is 1.68 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	1054 (1.68-1.68)
Clashscore	190562	1078 (1.68-1.68)
Ramachandran outliers	187476	1068 (1.68-1.68)
Sidechain outliers	187428	1067 (1.68-1.68)
RSRZ outliers	180081	1055 (1.68-1.68)

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	203	4% 79% 9% 11%
1	B	203	5% 79% 9% 11%
1	C	203	3% 82% 8% 9%
1	D	203	4% 82% 9% 8%
1	E	203	5% 84% 6% 10%

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Mol	Chain	Length	Quality of chain
1	F	203	
1	G	203	
1	I	203	
1	K	203	
1	L	203	
1	M	203	
1	N	203	
1	S	203	
1	T	203	

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

Mol	Type	Chain	Res	Chirality	Geometry	Clashes	Electron density
2	MPD	C	302	-	-	X	-
2	MPD	E	301	-	-	X	-
2	MPD	G	302	-	-	X	-
2	MPD	I	301	-	-	X	-
2	MPD	S	302	-	-	X	-

2 Entry composition

There are 4 unique types of molecules in this entry. The entry contains 22701 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.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	180	Total	C	N	O	S	0	5	0
			1424	894	245	278	7			
1	B	180	Total	C	N	O	S	0	5	0
			1428	899	245	277	7			
1	C	184	Total	C	N	O	S	0	5	0
			1451	915	246	283	7			
1	D	186	Total	C	N	O	S	0	3	0
			1450	912	253	279	6			
1	E	183	Total	C	N	O	S	0	4	0
			1435	905	244	279	7			
1	F	178	Total	C	N	O	S	0	7	0
			1425	896	247	275	7			
1	G	181	Total	C	N	O	S	0	8	0
			1455	915	251	282	7			
1	I	181	Total	C	N	O	S	0	4	0
			1423	897	246	274	6			
1	K	180	Total	C	N	O	S	0	4	0
			1417	893	241	276	7			
1	L	183	Total	C	N	O	S	0	6	0
			1454	915	250	282	7			
1	M	184	Total	C	N	O	S	0	6	0
			1453	914	249	283	7			
1	N	179	Total	C	N	O	S	0	4	0
			1414	890	243	275	6			
1	S	179	Total	C	N	O	S	0	4	0
			1408	885	242	275	6			
1	T	179	Total	C	N	O	S	0	5	0
			1417	892	244	274	7			

There are 112 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	196	LEU	-	expression tag	UNP Q2G036

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Chain	Residue	Modelled	Actual	Comment	Reference
A	197	GLU	-	expression tag	UNP Q2G036
A	198	HIS	-	expression tag	UNP Q2G036
A	199	HIS	-	expression tag	UNP Q2G036
A	200	HIS	-	expression tag	UNP Q2G036
A	201	HIS	-	expression tag	UNP Q2G036
A	202	HIS	-	expression tag	UNP Q2G036
A	203	HIS	-	expression tag	UNP Q2G036
B	196	LEU	-	expression tag	UNP Q2G036
B	197	GLU	-	expression tag	UNP Q2G036
B	198	HIS	-	expression tag	UNP Q2G036
B	199	HIS	-	expression tag	UNP Q2G036
B	200	HIS	-	expression tag	UNP Q2G036
B	201	HIS	-	expression tag	UNP Q2G036
B	202	HIS	-	expression tag	UNP Q2G036
B	203	HIS	-	expression tag	UNP Q2G036
C	196	LEU	-	expression tag	UNP Q2G036
C	197	GLU	-	expression tag	UNP Q2G036
C	198	HIS	-	expression tag	UNP Q2G036
C	199	HIS	-	expression tag	UNP Q2G036
C	200	HIS	-	expression tag	UNP Q2G036
C	201	HIS	-	expression tag	UNP Q2G036
C	202	HIS	-	expression tag	UNP Q2G036
C	203	HIS	-	expression tag	UNP Q2G036
D	196	LEU	-	expression tag	UNP Q2G036
D	197	GLU	-	expression tag	UNP Q2G036
D	198	HIS	-	expression tag	UNP Q2G036
D	199	HIS	-	expression tag	UNP Q2G036
D	200	HIS	-	expression tag	UNP Q2G036
D	201	HIS	-	expression tag	UNP Q2G036
D	202	HIS	-	expression tag	UNP Q2G036
D	203	HIS	-	expression tag	UNP Q2G036
E	196	LEU	-	expression tag	UNP Q2G036
E	197	GLU	-	expression tag	UNP Q2G036
E	198	HIS	-	expression tag	UNP Q2G036
E	199	HIS	-	expression tag	UNP Q2G036
E	200	HIS	-	expression tag	UNP Q2G036
E	201	HIS	-	expression tag	UNP Q2G036
E	202	HIS	-	expression tag	UNP Q2G036
E	203	HIS	-	expression tag	UNP Q2G036
F	196	LEU	-	expression tag	UNP Q2G036
F	197	GLU	-	expression tag	UNP Q2G036
F	198	HIS	-	expression tag	UNP Q2G036

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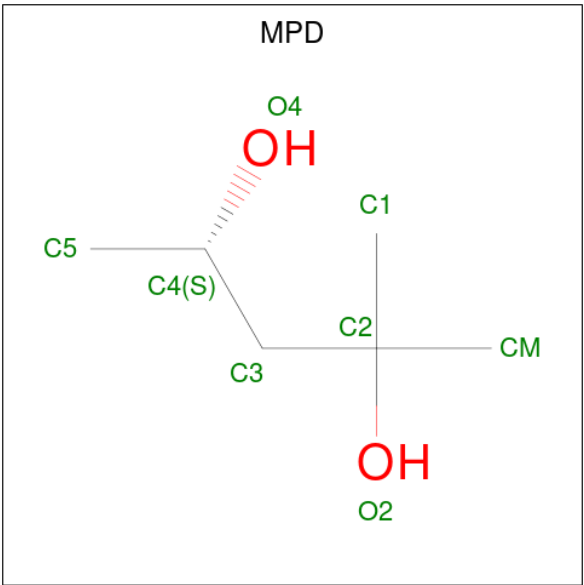
Chain	Residue	Modelled	Actual	Comment	Reference
F	199	HIS	-	expression tag	UNP Q2G036
F	200	HIS	-	expression tag	UNP Q2G036
F	201	HIS	-	expression tag	UNP Q2G036
F	202	HIS	-	expression tag	UNP Q2G036
F	203	HIS	-	expression tag	UNP Q2G036
G	196	LEU	-	expression tag	UNP Q2G036
G	197	GLU	-	expression tag	UNP Q2G036
G	198	HIS	-	expression tag	UNP Q2G036
G	199	HIS	-	expression tag	UNP Q2G036
G	200	HIS	-	expression tag	UNP Q2G036
G	201	HIS	-	expression tag	UNP Q2G036
G	202	HIS	-	expression tag	UNP Q2G036
G	203	HIS	-	expression tag	UNP Q2G036
I	196	LEU	-	expression tag	UNP Q2G036
I	197	GLU	-	expression tag	UNP Q2G036
I	198	HIS	-	expression tag	UNP Q2G036
I	199	HIS	-	expression tag	UNP Q2G036
I	200	HIS	-	expression tag	UNP Q2G036
I	201	HIS	-	expression tag	UNP Q2G036
I	202	HIS	-	expression tag	UNP Q2G036
I	203	HIS	-	expression tag	UNP Q2G036
K	196	LEU	-	expression tag	UNP Q2G036
K	197	GLU	-	expression tag	UNP Q2G036
K	198	HIS	-	expression tag	UNP Q2G036
K	199	HIS	-	expression tag	UNP Q2G036
K	200	HIS	-	expression tag	UNP Q2G036
K	201	HIS	-	expression tag	UNP Q2G036
K	202	HIS	-	expression tag	UNP Q2G036
K	203	HIS	-	expression tag	UNP Q2G036
L	196	LEU	-	expression tag	UNP Q2G036
L	197	GLU	-	expression tag	UNP Q2G036
L	198	HIS	-	expression tag	UNP Q2G036
L	199	HIS	-	expression tag	UNP Q2G036
L	200	HIS	-	expression tag	UNP Q2G036
L	201	HIS	-	expression tag	UNP Q2G036
L	202	HIS	-	expression tag	UNP Q2G036
L	203	HIS	-	expression tag	UNP Q2G036
M	196	LEU	-	expression tag	UNP Q2G036
M	197	GLU	-	expression tag	UNP Q2G036
M	198	HIS	-	expression tag	UNP Q2G036
M	199	HIS	-	expression tag	UNP Q2G036
M	200	HIS	-	expression tag	UNP Q2G036

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Chain	Residue	Modelled	Actual	Comment	Reference
M	201	HIS	-	expression tag	UNP Q2G036
M	202	HIS	-	expression tag	UNP Q2G036
M	203	HIS	-	expression tag	UNP Q2G036
N	196	LEU	-	expression tag	UNP Q2G036
N	197	GLU	-	expression tag	UNP Q2G036
N	198	HIS	-	expression tag	UNP Q2G036
N	199	HIS	-	expression tag	UNP Q2G036
N	200	HIS	-	expression tag	UNP Q2G036
N	201	HIS	-	expression tag	UNP Q2G036
N	202	HIS	-	expression tag	UNP Q2G036
N	203	HIS	-	expression tag	UNP Q2G036
S	196	LEU	-	expression tag	UNP Q2G036
S	197	GLU	-	expression tag	UNP Q2G036
S	198	HIS	-	expression tag	UNP Q2G036
S	199	HIS	-	expression tag	UNP Q2G036
S	200	HIS	-	expression tag	UNP Q2G036
S	201	HIS	-	expression tag	UNP Q2G036
S	202	HIS	-	expression tag	UNP Q2G036
S	203	HIS	-	expression tag	UNP Q2G036
T	196	LEU	-	expression tag	UNP Q2G036
T	197	GLU	-	expression tag	UNP Q2G036
T	198	HIS	-	expression tag	UNP Q2G036
T	199	HIS	-	expression tag	UNP Q2G036
T	200	HIS	-	expression tag	UNP Q2G036
T	201	HIS	-	expression tag	UNP Q2G036
T	202	HIS	-	expression tag	UNP Q2G036
T	203	HIS	-	expression tag	UNP Q2G036

- Molecule 2 is (4S)-2-METHYL-2,4-PENTANEDIOL (CCD ID: MPD) (formula: C₆H₁₄O₂).



Mol	Chain	Residues	Atoms			ZeroOcc	AltConf
2	A	1	Total	C	O	0	0
			8	6	2		
2	B	1	Total	C	O	0	0
			8	6	2		
2	C	1	Total	C	O	0	0
			8	6	2		
2	D	1	Total	C	O	0	0
			8	6	2		
2	D	1	Total	C	O	0	0
			8	6	2		
2	E	1	Total	C	O	0	0
			8	6	2		
2	F	1	Total	C	O	0	0
			8	6	2		
2	G	1	Total	C	O	0	0
			8	6	2		
2	I	1	Total	C	O	0	0
			8	6	2		
2	K	1	Total	C	O	0	0
			8	6	2		
2	L	1	Total	C	O	0	0
			8	6	2		
2	M	1	Total	C	O	0	0
			8	6	2		
2	N	1	Total	C	O	0	0
			8	6	2		
2	S	1	Total	C	O	0	0
			8	6	2		

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Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
2	T	1	Total C O 8 6 2	0	0

-

Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	A	1	Total 41	C 33	N 4	O 4	0	0
3	B	1	Total 41	C 33	N 4	O 4	0	0
3	C	1	Total 41	C 33	N 4	O 4	0	0
3	D	1	Total 41	C 33	N 4	O 4	0	0
3	F	1	Total 41	C 33	N 4	O 4	0	0
3	G	1	Total 41	C 33	N 4	O 4	0	0
3	I	1	Total 41	C 33	N 4	O 4	0	0
3	K	1	Total 41	C 33	N 4	O 4	0	0
3	L	1	Total 41	C 33	N 4	O 4	0	0



WORLD WIDE
PDB
PROTEIN DATA BANK

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Mol	Chain	Residues	Atoms				ZeroOcc	AltConf
3	M	1	Total	C	N	O	0	0
			41	33	4	4		
3	N	1	Total	C	N	O	0	0
			41	33	4	4		
3	S	1	Total	C	N	O	0	0
			41	33	4	4		
3	S	1	Total	C	N	O	0	0
			41	33	4	4		

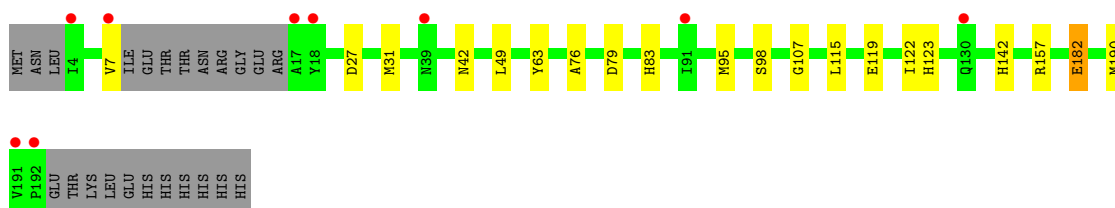
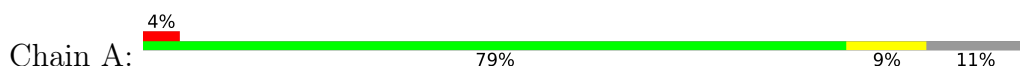
- Molecule 4 is water.

Mol	Chain	Residues	Atoms		ZeroOcc	AltConf
4	A	120	Total	O	0	0
			120	120		
4	B	127	Total	O	0	0
			127	127		
4	C	147	Total	O	0	0
			147	147		
4	D	163	Total	O	0	0
			163	163		
4	E	174	Total	O	0	0
			174	174		
4	F	145	Total	O	0	0
			145	145		
4	G	116	Total	O	0	0
			116	116		
4	I	113	Total	O	0	0
			113	113		
4	K	146	Total	O	0	0
			146	146		
4	L	167	Total	O	0	0
			167	167		
4	M	173	Total	O	0	0
			173	173		
4	N	144	Total	O	0	0
			144	144		
4	S	130	Total	O	0	0
			130	130		
4	T	129	Total	O	0	0
			129	129		

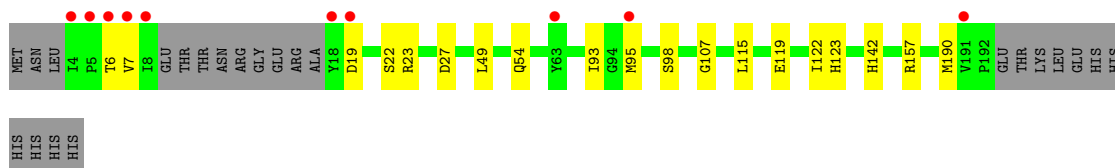
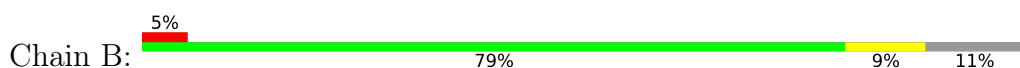
3 Residue-property plots [i](#)

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.

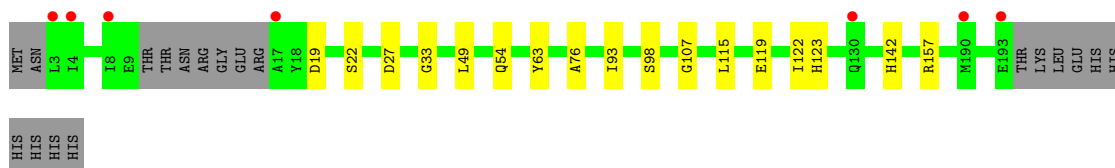
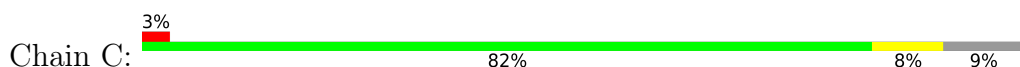
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



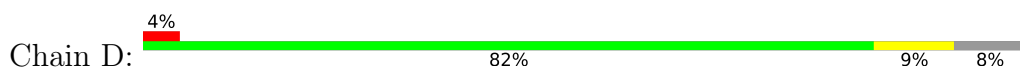
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



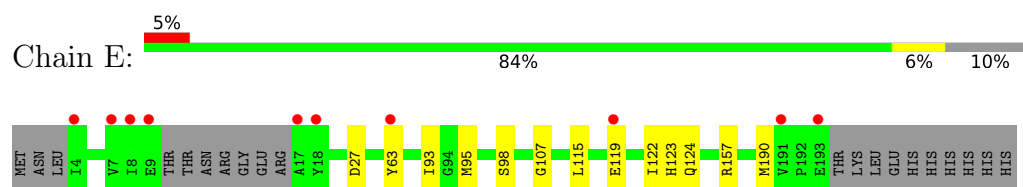
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



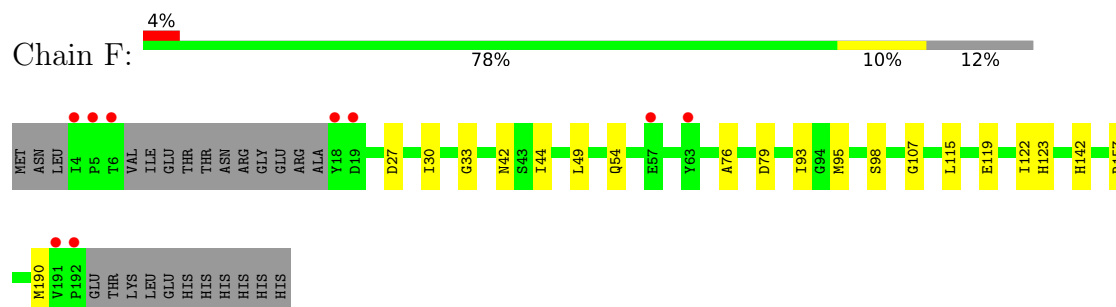
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



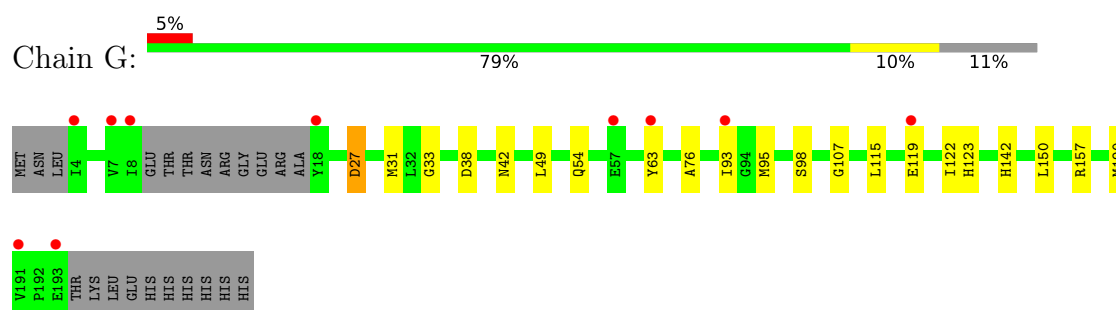
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



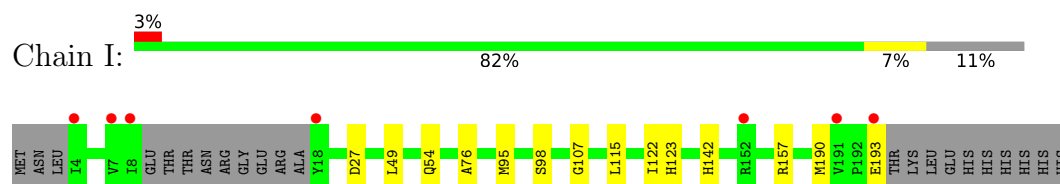
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



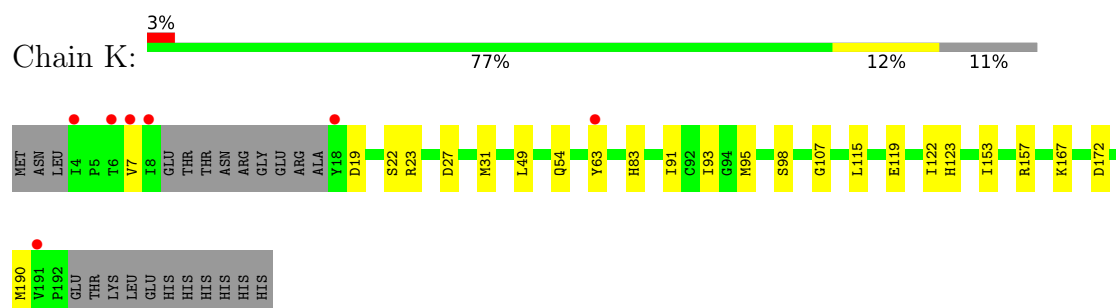
- Molecule 1: ATP-dependent Clp protease proteolytic subunit



- Molecule 1: ATP-dependent Clp protease proteolytic subunit

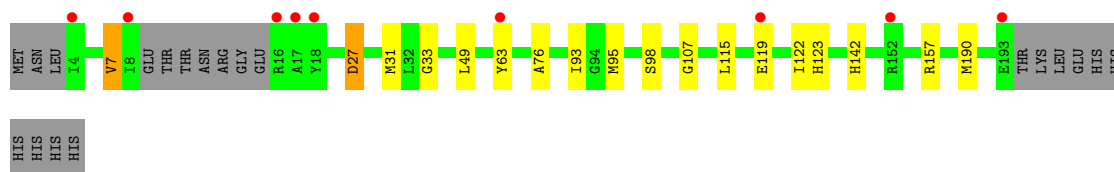


- Molecule 1: ATP-dependent Clp protease proteolytic subunit



- Molecule 1: ATP-dependent Clp protease proteolytic subunit

Chain L: 



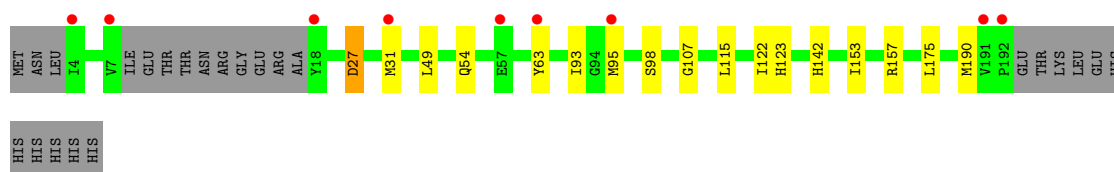
- Molecule 1: ATP-dependent Clp protease proteolytic subunit

Chain M: 



- Molecule 1: ATP-dependent Clp protease proteolytic subunit

Chain N: 



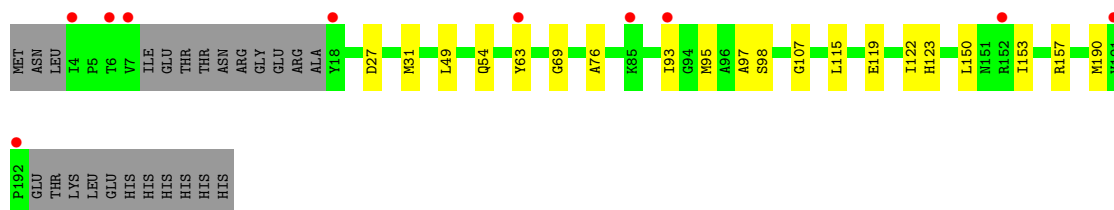
- Molecule 1: ATP-dependent Clp protease proteolytic subunit

Chain S: 



- Molecule 1: ATP-dependent Clp protease proteolytic subunit

Chain T: 



4 Data and refinement statistics

Property	Value	Source
Space group	P 1 21 1	Depositor
Cell constants a, b, c, α , β , γ	94.07Å 126.14Å 145.47Å 90.00° 93.88° 90.00°	Depositor
Resolution (Å)	49.90 – 1.68 49.90 – 1.68	Depositor EDS
% Data completeness (in resolution range)	99.7 (49.90-1.68) 99.7 (49.90-1.68)	Depositor EDS
R_{merge}	0.08	Depositor
R_{sym}	(Not available)	Depositor
$\langle I/\sigma(I) \rangle$ ¹	1.99 (at 1.68Å)	Xtriage
Refinement program	REFMAC 5.8.0267	Depositor
R, R_{free}	0.166 , 0.182 0.177 , 0.192	Depositor DCC
R_{free} test set	18992 reflections (4.98%)	wwPDB-VP
Wilson B-factor (Å ²)	22.5	Xtriage
Anisotropy	0.019	Xtriage
Bulk solvent k_{sol} (e/Å ³), B_{sol} (Å ²)	0.36 , 38.5	EDS
L-test for twinning ²	$\langle L \rangle = 0.49$, $\langle L^2 \rangle = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o, F_c correlation	0.96	EDS
Total number of atoms	22701	wwPDB-VP
Average B, all atoms (Å ²)	26.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 3.03% 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: MPD, UTC

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	1.02	0/1442	1.16	1/1947 (0.1%)
1	B	1.01	0/1446	1.13	1/1951 (0.1%)
1	C	1.03	0/1469	1.17	1/1984 (0.1%)
1	D	1.06	1/1468 (0.1%)	1.19	2/1981 (0.1%)
1	E	1.08	0/1453	1.17	1/1963 (0.1%)
1	F	1.02	0/1442	1.14	1/1945 (0.1%)
1	G	1.00	0/1473	1.12	1/1988 (0.1%)
1	I	0.99	0/1441	1.14	2/1946 (0.1%)
1	K	1.02	0/1435	1.16	2/1937 (0.1%)
1	L	1.01	0/1472	1.16	1/1987 (0.1%)
1	M	1.05	1/1471 (0.1%)	1.17	1/1986 (0.1%)
1	N	1.05	0/1432	1.16	1/1933 (0.1%)
1	S	0.99	0/1426	1.12	1/1926 (0.1%)
1	T	1.00	1/1435 (0.1%)	1.14	1/1936 (0.1%)
All	All	1.02	3/20305 (0.0%)	1.15	17/27410 (0.1%)

All (3) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	M	148	GLU	CD-OE1	6.84	1.38	1.25
1	D	4	ILE	N-CA	5.19	1.50	1.46
1	T	69	GLY	C-O	5.12	1.27	1.23

The worst 5 of 17 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
1	M	57	GLU	CB-CG-CD	7.55	125.44	112.60
1	A	182	GLU	CB-CG-CD	6.80	124.16	112.60
1	I	193	GLU	CA-C-O	-6.37	109.97	120.80
1	G	54	GLN	CB-CG-CD	-6.36	101.79	112.60
1	K	54	GLN	CB-CG-CD	-6.13	102.18	112.60

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	1424	0	1421	30	0
1	B	1428	0	1434	23	0
1	C	1451	0	1454	34	0
1	D	1450	0	1456	22	0
1	E	1435	0	1441	19	0
1	F	1425	0	1439	33	0
1	G	1455	0	1455	41	0
1	I	1423	0	1433	19	0
1	K	1417	0	1422	26	0
1	L	1454	0	1457	32	0
1	M	1453	0	1448	30	0
1	N	1414	0	1422	23	0
1	S	1408	0	1404	19	0
1	T	1417	0	1421	25	0
2	A	8	0	14	5	0
2	B	8	0	14	4	0
2	C	8	0	14	6	0
2	D	16	0	28	5	0
2	E	8	0	14	7	0
2	F	8	0	14	4	0
2	G	8	0	14	6	0
2	I	8	0	14	6	0
2	K	8	0	14	4	0
2	L	8	0	14	5	0
2	M	8	0	14	4	0
2	N	8	0	14	5	0
2	S	8	0	14	6	0
2	T	8	0	14	5	0
3	A	41	0	0	6	0
3	B	41	0	0	6	0
3	C	41	0	0	6	0
3	D	41	0	0	0	0
3	F	41	0	0	5	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	G	41	0	0	6	0
3	I	41	0	0	4	0
3	K	41	0	0	7	0
3	L	41	0	0	9	0
3	M	41	0	0	6	0
3	N	41	0	0	8	0
3	S	82	0	0	15	0
4	A	120	0	0	0	0
4	B	127	0	0	1	0
4	C	147	0	0	0	0
4	D	163	0	0	0	0
4	E	174	0	0	1	0
4	F	145	0	0	0	0
4	G	116	0	0	1	0
4	I	113	0	0	0	0
4	K	146	0	0	0	0
4	L	167	0	0	0	0
4	M	173	0	0	1	0
4	N	144	0	0	1	0
4	S	130	0	0	0	0
4	T	129	0	0	0	0
All	All	22701	0	20317	307	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 7.

The worst 5 of 307 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:49[B]:LEU:HD11	3:M:301:UTC:CAV	1.48	1.43
1:A:49:LEU:HD11	3:A:302:UTC:CAV	1.54	1.37
1:L:49[B]:LEU:HD11	3:L:301:UTC:CAV	1.54	1.35
1:G:49[B]:LEU:HD11	3:G:301:UTC:CAV	1.58	1.31
3:S:303:UTC:CAV	1:T:49[B]:LEU:HD11	1.62	1.29

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	181/203 (89%)	179 (99%)	2 (1%)	0	100	100
1	B	181/203 (89%)	179 (99%)	2 (1%)	0	100	100
1	C	185/203 (91%)	182 (98%)	3 (2%)	0	100	100
1	D	185/203 (91%)	182 (98%)	3 (2%)	0	100	100
1	E	183/203 (90%)	181 (99%)	2 (1%)	0	100	100
1	F	181/203 (89%)	178 (98%)	3 (2%)	0	100	100
1	G	185/203 (91%)	182 (98%)	3 (2%)	0	100	100
1	I	181/203 (89%)	179 (99%)	2 (1%)	0	100	100
1	K	180/203 (89%)	178 (99%)	2 (1%)	0	100	100
1	L	185/203 (91%)	183 (99%)	2 (1%)	0	100	100
1	M	186/203 (92%)	183 (98%)	3 (2%)	0	100	100
1	N	179/203 (88%)	176 (98%)	3 (2%)	0	100	100
1	S	179/203 (88%)	176 (98%)	3 (2%)	0	100	100
1	T	180/203 (89%)	178 (99%)	2 (1%)	0	100	100
All	All	2551/2842 (90%)	2516 (99%)	35 (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	152/171 (89%)	149 (98%)	3 (2%)	48	23
1	B	153/171 (90%)	152 (99%)	1 (1%)	76	62
1	C	155/171 (91%)	153 (99%)	2 (1%)	61	39
1	D	153/171 (90%)	150 (98%)	3 (2%)	48	23
1	E	153/171 (90%)	152 (99%)	1 (1%)	76	62
1	F	153/171 (90%)	152 (99%)	1 (1%)	76	62
1	G	155/171 (91%)	153 (99%)	2 (1%)	61	39
1	I	152/171 (89%)	150 (99%)	2 (1%)	61	39
1	K	152/171 (89%)	150 (99%)	2 (1%)	61	39
1	L	155/171 (91%)	153 (99%)	2 (1%)	61	39
1	M	154/171 (90%)	154 (100%)	0	100	100
1	N	152/171 (89%)	149 (98%)	3 (2%)	48	23
1	S	150/171 (88%)	147 (98%)	3 (2%)	48	23
1	T	151/171 (88%)	150 (99%)	1 (1%)	76	62
All	All	2140/2394 (89%)	2114 (99%)	26 (1%)	65	43

5 of 26 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	I	95	MET
1	L	7	VAL
1	S	95	MET
1	K	167	LYS
1	L	27	ASP

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 10 such sidechains are listed below:

Mol	Chain	Res	Type
1	N	142	HIS
1	S	151	ASN
1	T	151	ASN
1	F	151	ASN
1	G	151	ASN

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](#)

28 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	$\# Z > 2$
3	UTC	B	301	-	45,46,46	1.75	11 (24%)	56,65,65	1.43	9 (16%)
3	UTC	S	303	-	45,46,46	1.64	9 (20%)	56,65,65	1.55	12 (21%)
3	UTC	G	301	-	45,46,46	1.67	8 (17%)	56,65,65	1.78	14 (25%)
3	UTC	N	301	-	45,46,46	1.81	9 (20%)	56,65,65	1.44	7 (12%)
2	MPD	E	301	-	7,7,7	0.42	0	9,10,10	1.13	1 (11%)
3	UTC	A	302	-	45,46,46	2.02	11 (24%)	56,65,65	1.72	16 (28%)
2	MPD	L	302	-	7,7,7	0.34	0	9,10,10	1.27	1 (11%)
3	UTC	C	301	-	45,46,46	1.78	9 (20%)	56,65,65	1.63	12 (21%)
2	MPD	S	302	-	7,7,7	0.24	0	9,10,10	0.68	0
2	MPD	I	301	-	7,7,7	0.26	0	9,10,10	1.38	1 (11%)
3	UTC	D	303	-	45,46,46	1.74	8 (17%)	56,65,65	1.58	9 (16%)
3	UTC	I	302	-	45,46,46	1.70	8 (17%)	56,65,65	1.69	9 (16%)
3	UTC	S	301	-	45,46,46	1.56	7 (15%)	56,65,65	1.56	9 (16%)
2	MPD	D	301	-	7,7,7	0.53	0	9,10,10	1.09	1 (11%)
2	MPD	F	302	-	7,7,7	0.39	0	9,10,10	1.47	2 (22%)
2	MPD	M	302	-	7,7,7	0.54	0	9,10,10	1.31	1 (11%)
3	UTC	F	301	-	45,46,46	1.76	12 (26%)	56,65,65	1.62	8 (14%)
2	MPD	B	302	-	7,7,7	0.39	0	9,10,10	1.02	1 (11%)

Mol	Type	Chain	Res	Link	Bond lengths			Bond angles		
					Counts	RMSZ	# Z > 2	Counts	RMSZ	# Z > 2
2	MPD	A	301	-	7,7,7	0.21	0	9,10,10	0.93	1 (11%)
2	MPD	C	302	-	7,7,7	0.51	0	9,10,10	0.81	0
3	UTC	L	301	-	45,46,46	1.79	12 (26%)	56,65,65	1.91	14 (25%)
3	UTC	M	301	-	45,46,46	1.97	15 (33%)	56,65,65	1.71	11 (19%)
3	UTC	K	301	-	45,46,46	1.84	8 (17%)	56,65,65	1.73	9 (16%)
2	MPD	T	301	-	7,7,7	0.29	0	9,10,10	0.94	1 (11%)
2	MPD	D	302	-	7,7,7	0.40	0	9,10,10	0.36	0
2	MPD	G	302	-	7,7,7	0.25	0	9,10,10	0.69	0
2	MPD	K	302	-	7,7,7	0.30	0	9,10,10	0.93	1 (11%)
2	MPD	N	302	-	7,7,7	0.55	0	9,10,10	1.15	1 (11%)

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
3	UTC	B	301	-	-	0/17/50/50	0/6/6/6
3	UTC	S	303	-	-	0/17/50/50	0/6/6/6
3	UTC	G	301	-	-	0/17/50/50	0/6/6/6
3	UTC	N	301	-	-	0/17/50/50	0/6/6/6
2	MPD	E	301	-	-	1/5/5/5	-
3	UTC	A	302	-	-	0/17/50/50	0/6/6/6
2	MPD	L	302	-	-	1/5/5/5	-
3	UTC	C	301	-	-	0/17/50/50	0/6/6/6
2	MPD	S	302	-	-	1/5/5/5	-
2	MPD	I	301	-	-	1/5/5/5	-
3	UTC	D	303	-	-	0/17/50/50	0/6/6/6
3	UTC	I	302	-	-	0/17/50/50	0/6/6/6
3	UTC	S	301	-	-	0/17/50/50	0/6/6/6
2	MPD	D	301	-	-	1/5/5/5	-
2	MPD	F	302	-	-	1/5/5/5	-
2	MPD	M	302	-	-	1/5/5/5	-
3	UTC	F	301	-	-	0/17/50/50	0/6/6/6
2	MPD	B	302	-	-	1/5/5/5	-
2	MPD	A	301	-	-	1/5/5/5	-
2	MPD	C	302	-	-	1/5/5/5	-
3	UTC	L	301	-	-	0/17/50/50	0/6/6/6
3	UTC	M	301	-	-	0/17/50/50	0/6/6/6
3	UTC	K	301	-	-	0/17/50/50	0/6/6/6
2	MPD	T	301	-	-	1/5/5/5	-

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Mol	Type	Chain	Res	Link	Chirals	Torsions	Rings
2	MPD	D	302	-	-	0/5/5/5	-
2	MPD	G	302	-	-	1/5/5/5	-
2	MPD	K	302	-	-	1/5/5/5	-
2	MPD	N	302	-	-	0/5/5/5	-

The worst 5 of 127 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
3	C	301	UTC	CA-C	-5.99	1.40	1.51
3	K	301	UTC	CA-C	-5.95	1.40	1.51
3	A	302	UTC	CA-C	-5.51	1.41	1.51
3	I	302	UTC	CA-C	-5.43	1.41	1.51
3	G	301	UTC	CA-C	-5.32	1.41	1.51

The worst 5 of 151 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(°)	Ideal(°)
3	K	301	UTC	OBA-CBK-N	-6.39	113.99	122.36
3	L	301	UTC	OBA-CBK-N	-5.57	115.06	122.36
3	I	302	UTC	CBL-CBK-N	5.37	125.48	117.98
3	D	303	UTC	OBA-CBK-N	-5.23	115.50	122.36
3	I	302	UTC	OBA-CBK-N	-5.21	115.53	122.36

There are no chirality outliers.

5 of 13 torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	D	301	MPD	O2-C2-C3-C4
2	E	301	MPD	O2-C2-C3-C4
2	F	302	MPD	O2-C2-C3-C4
2	G	302	MPD	O2-C2-C3-C4
2	I	301	MPD	O2-C2-C3-C4

There are no ring outliers.

26 monomers are involved in 150 short contacts:

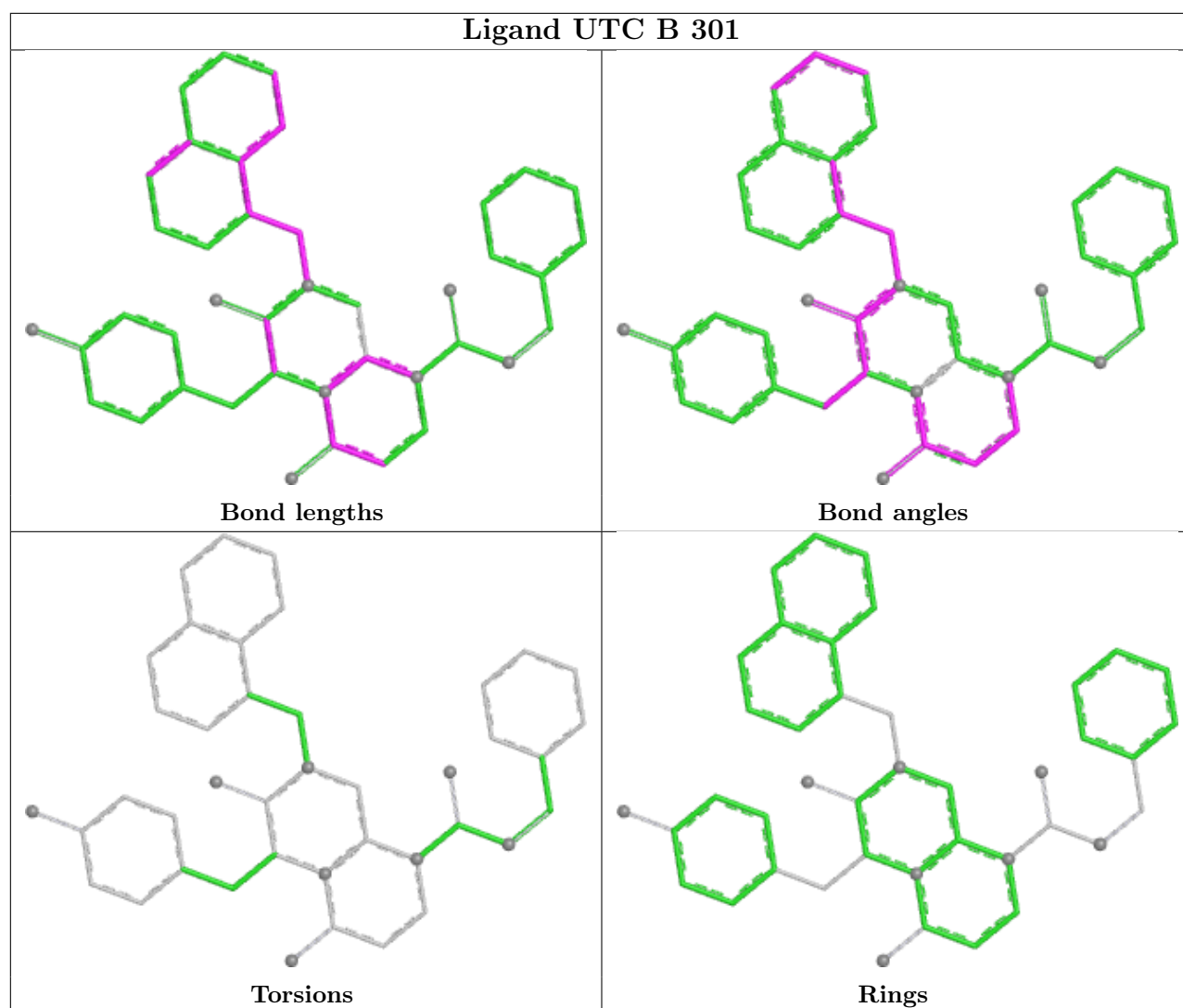
Mol	Chain	Res	Type	Clashes	Symm-Clashes
3	B	301	UTC	6	0
3	S	303	UTC	8	0
3	G	301	UTC	6	0
3	N	301	UTC	8	0

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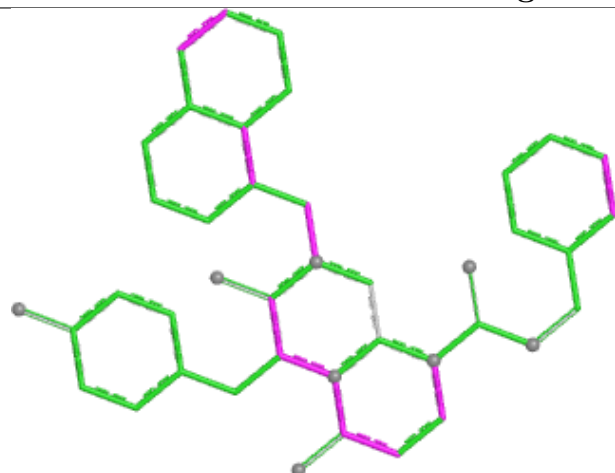
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Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	E	301	MPD	7	0
3	A	302	UTC	6	0
2	L	302	MPD	5	0
3	C	301	UTC	6	0
2	S	302	MPD	6	0
2	I	301	MPD	6	0
3	I	302	UTC	4	0
3	S	301	UTC	7	0
2	D	301	MPD	5	0
2	F	302	MPD	4	0
2	M	302	MPD	4	0
3	F	301	UTC	5	0
2	B	302	MPD	4	0
2	A	301	MPD	5	0
2	C	302	MPD	6	0
3	L	301	UTC	9	0
3	M	301	UTC	6	0
3	K	301	UTC	7	0
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2	G	302	MPD	6	0
2	K	302	MPD	4	0
2	N	302	MPD	5	0

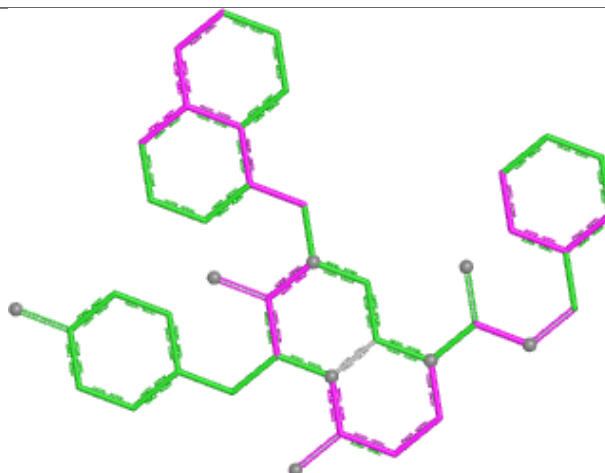
The following is a two-dimensional graphical depiction of Mogul quality analysis of bond lengths, bond angles, torsion angles, and ring geometry for all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the validation Tables will also be included.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



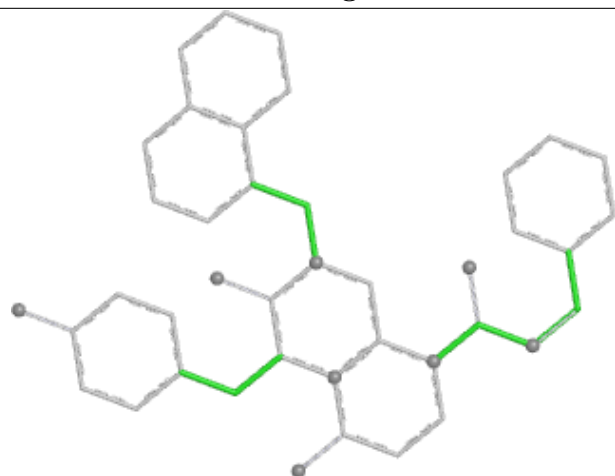
Ligand UTC S 303



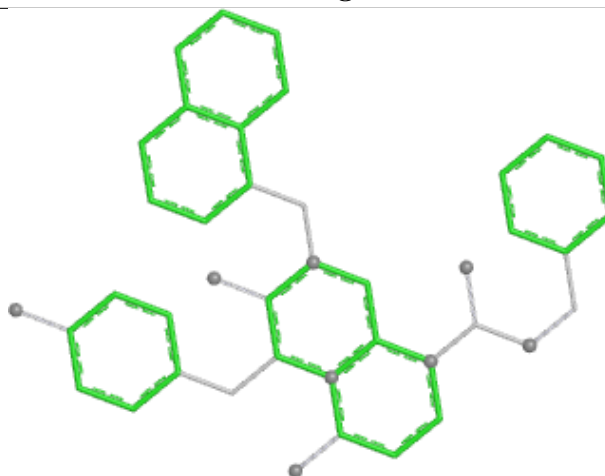
Bond lengths



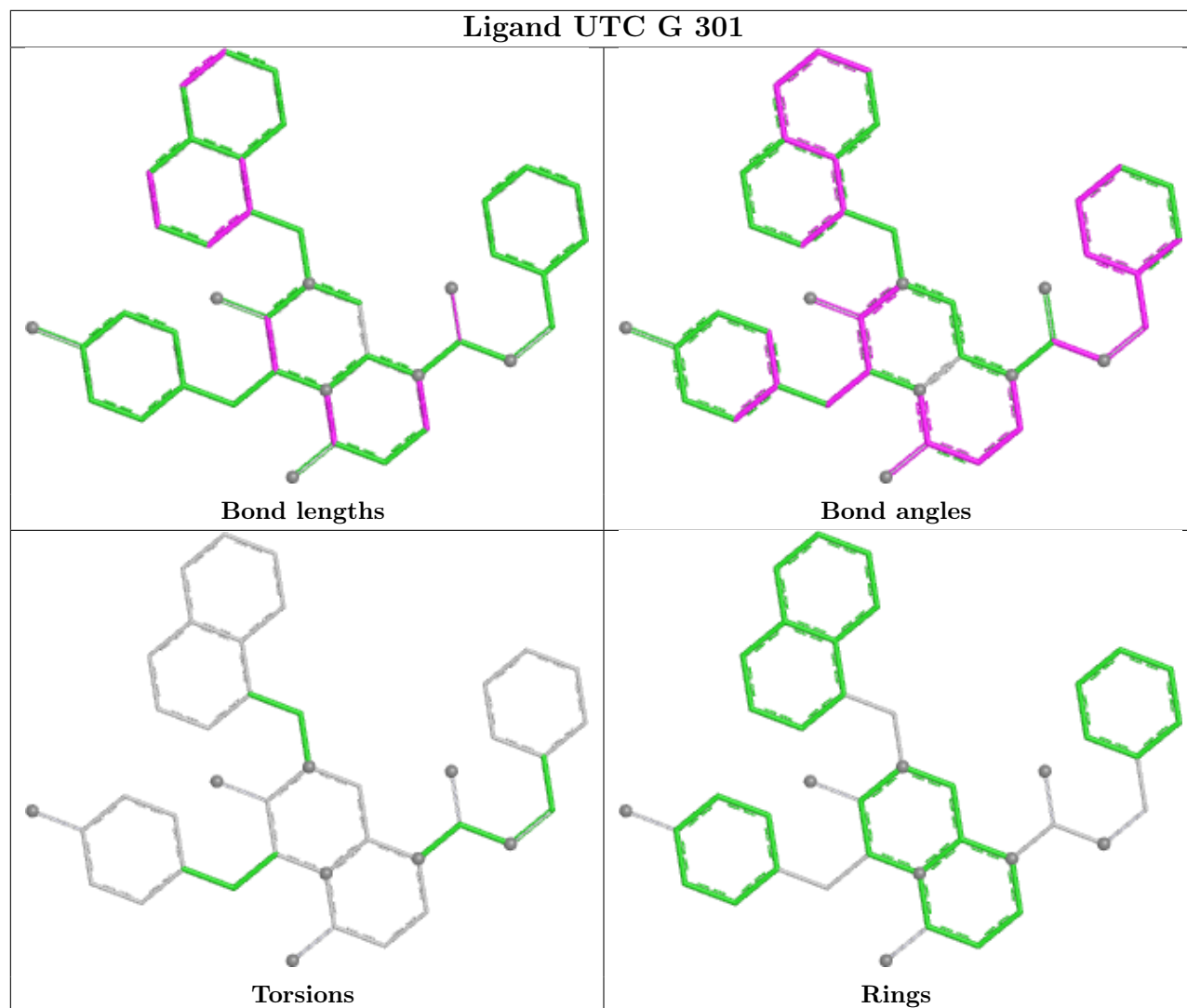
Bond angles

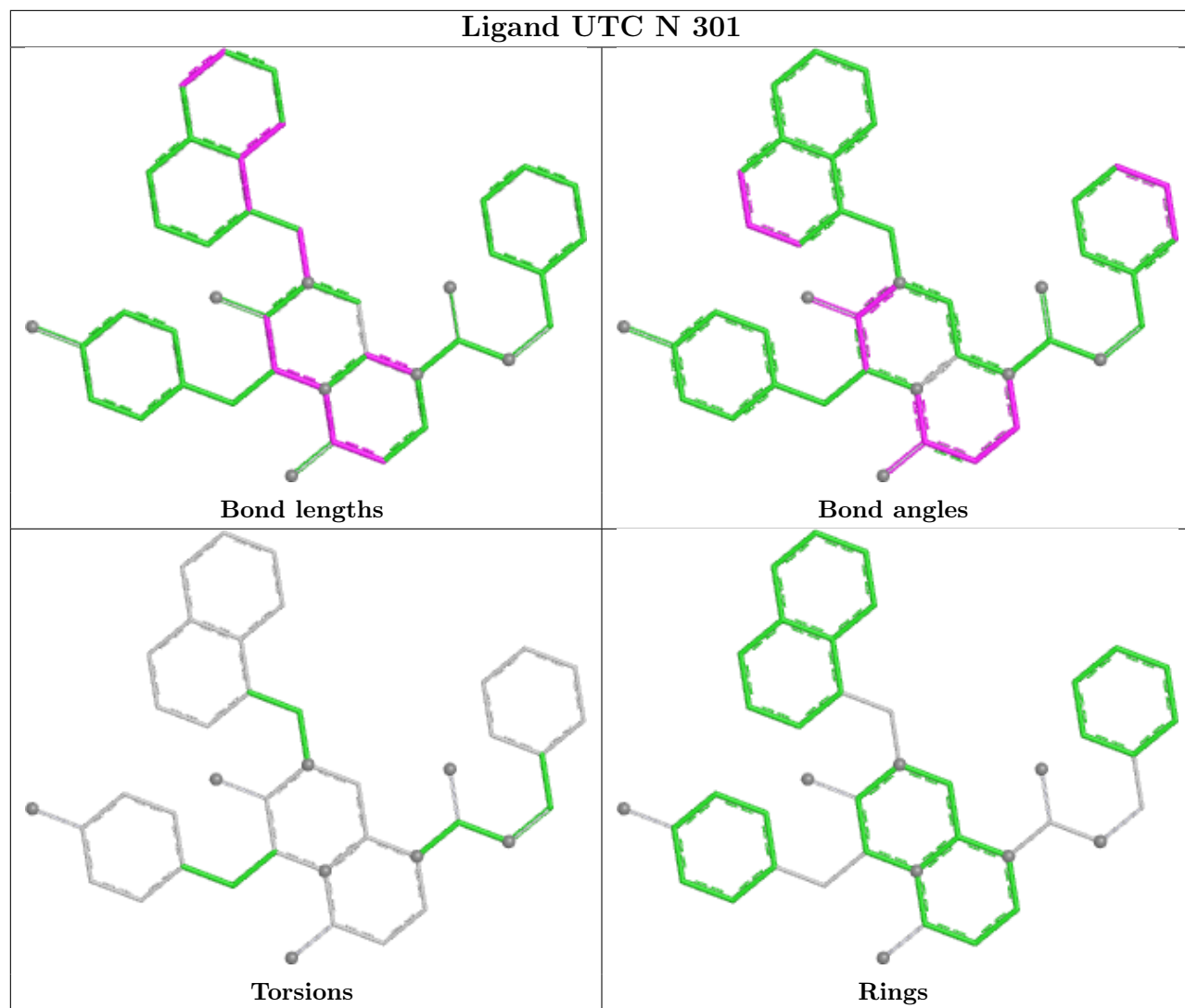


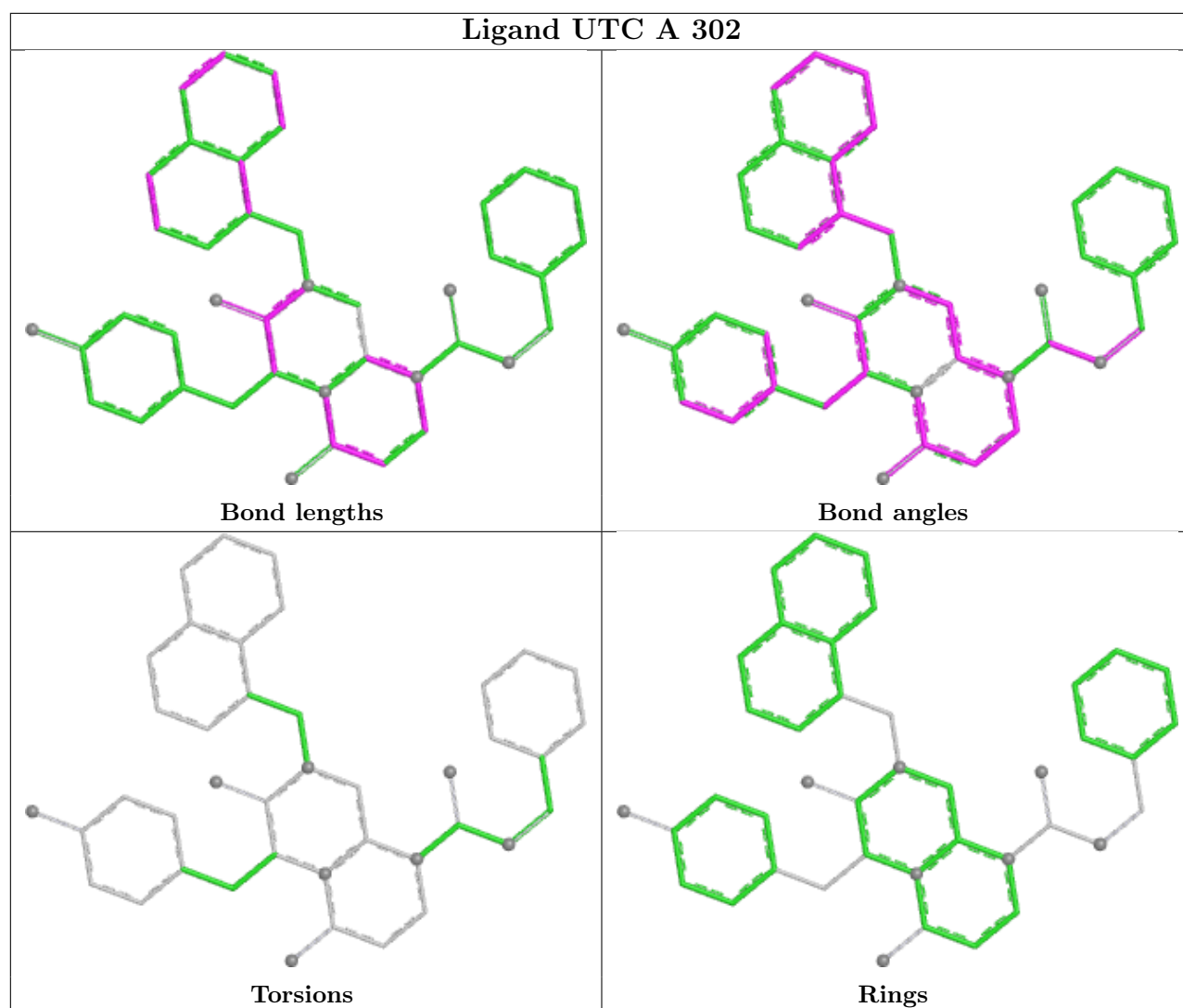
Torsions

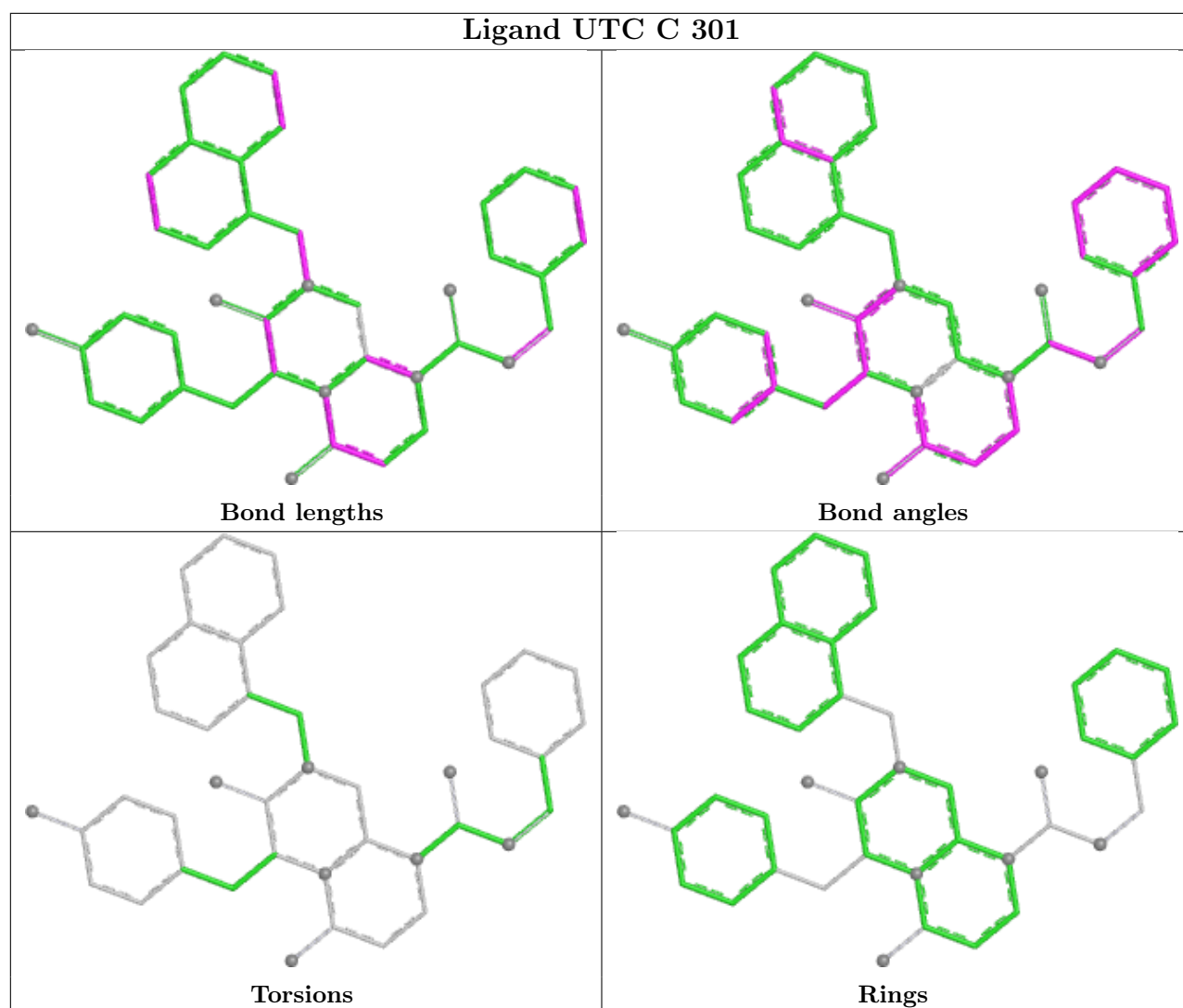


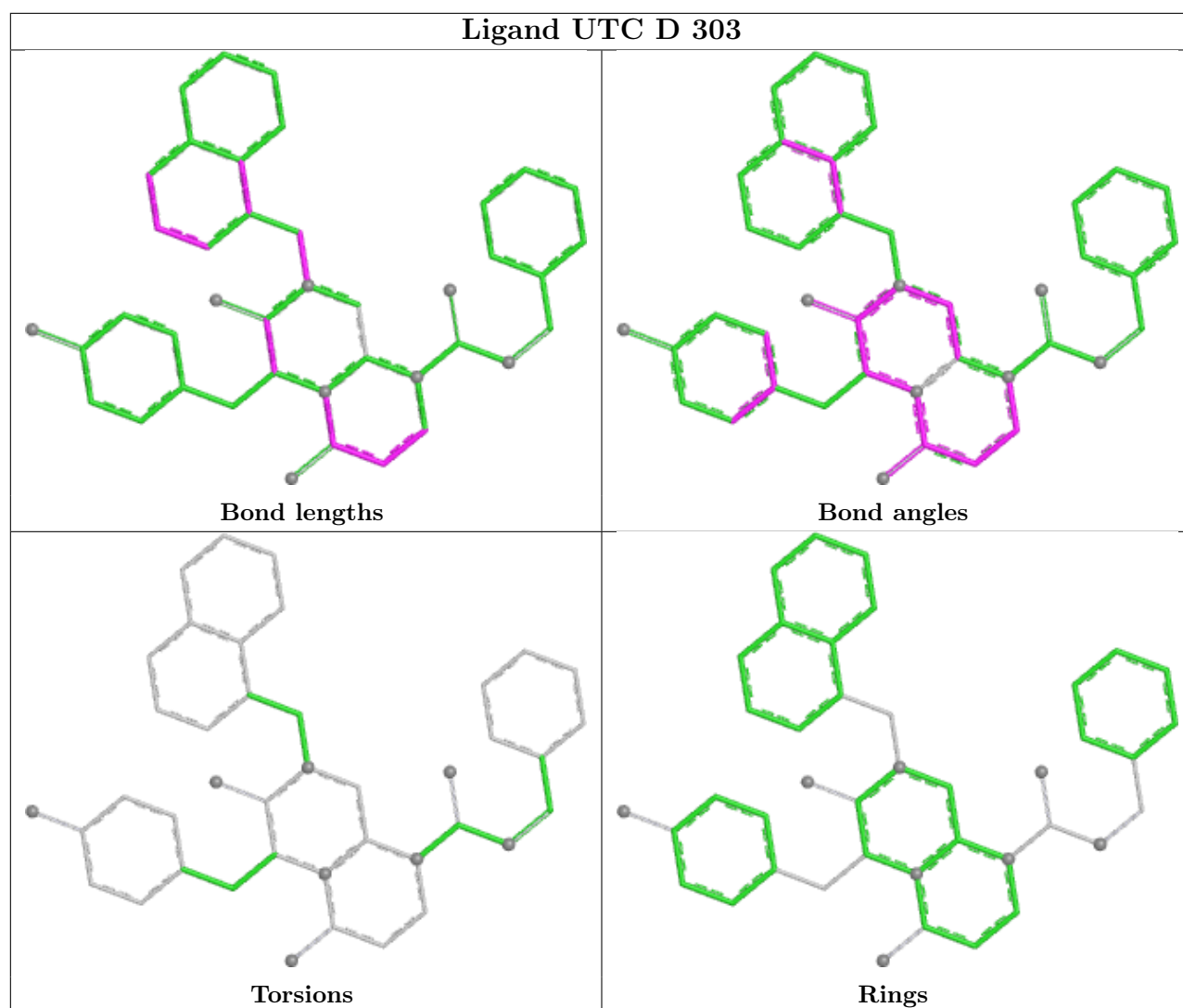
Rings



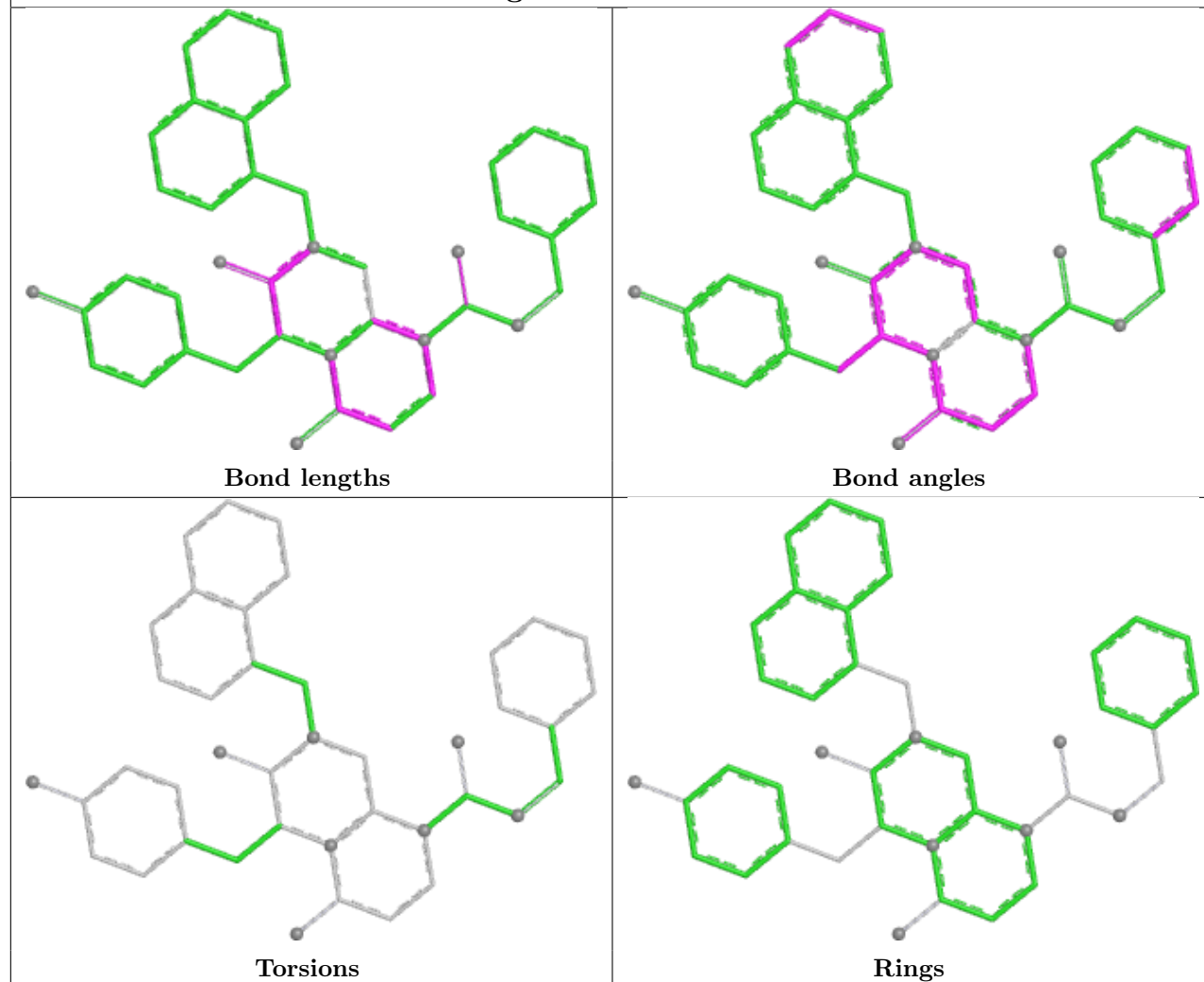




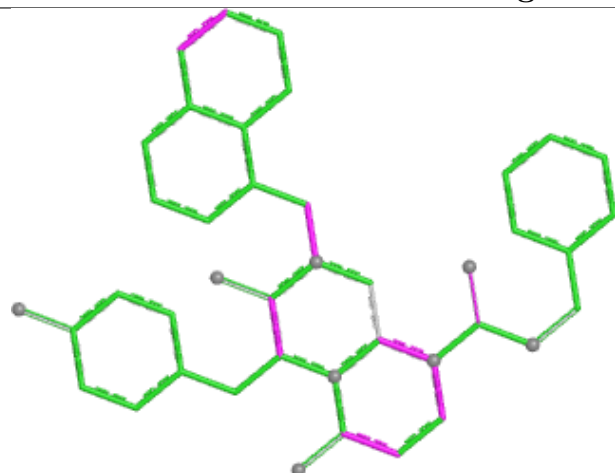




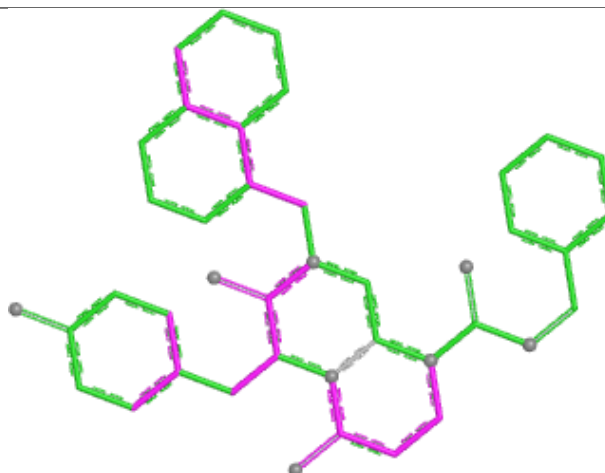
Ligand UTC I 302



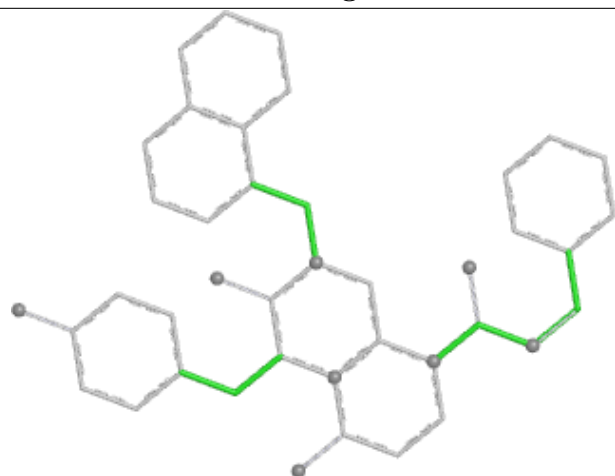
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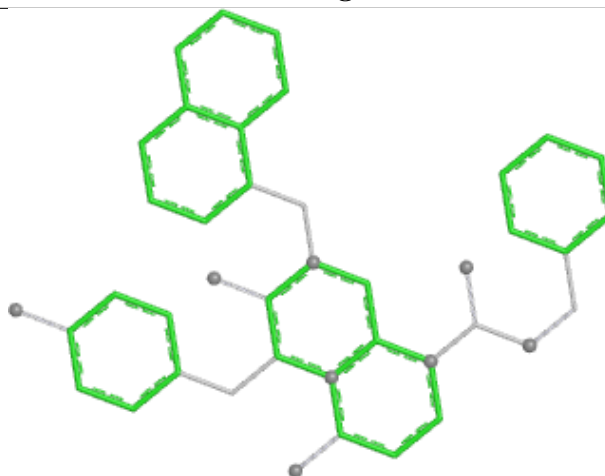
Bond lengths



Bond angles

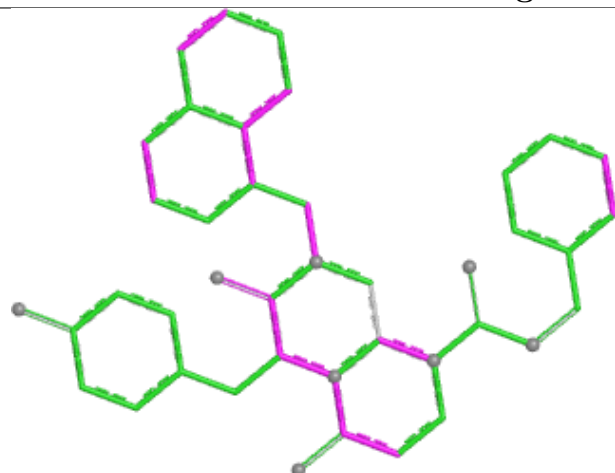


Torsions

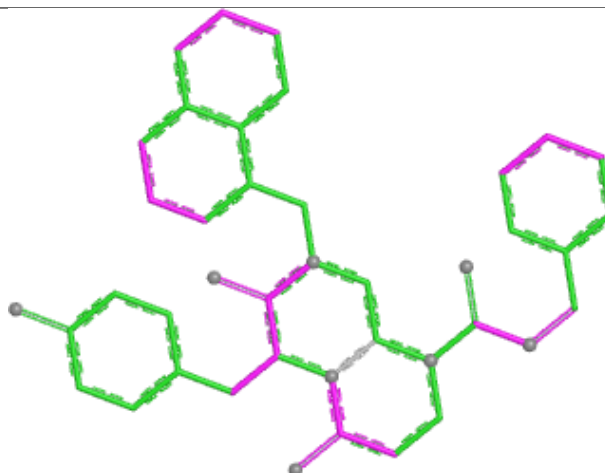


Rings

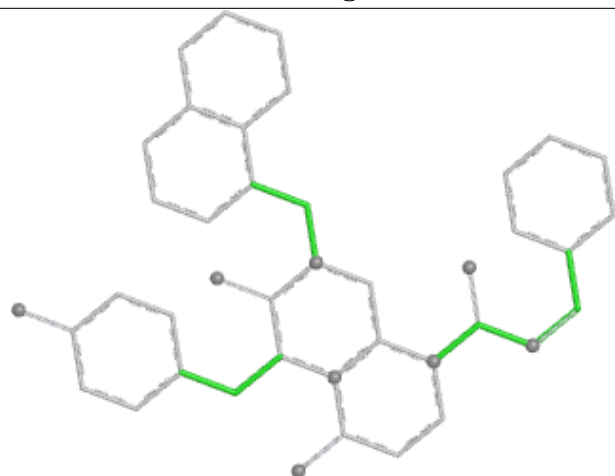
Ligand UTC F 301



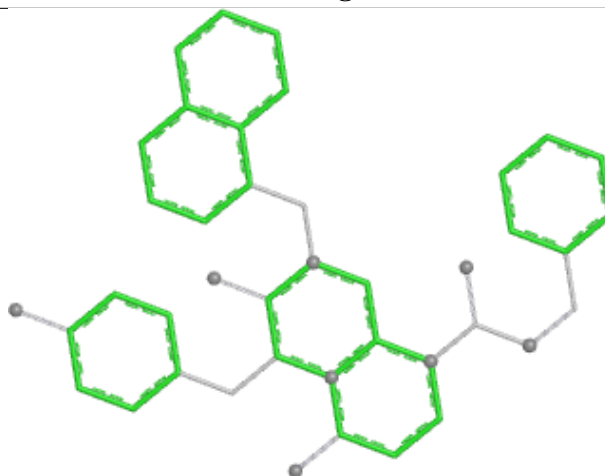
Bond lengths



Bond angles

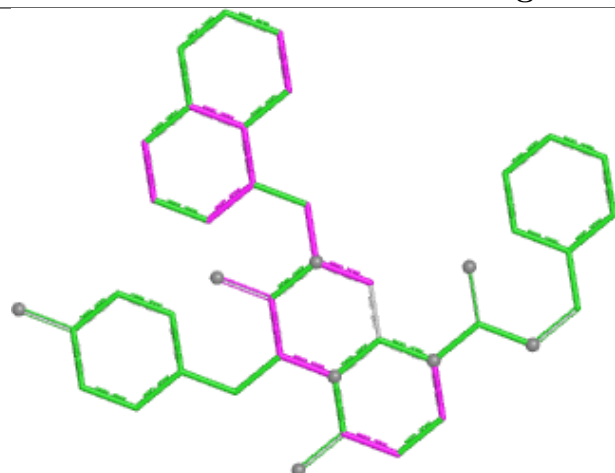


Torsions

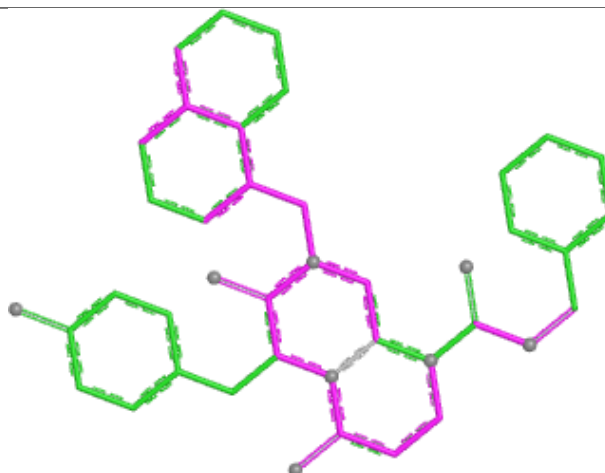


Rings

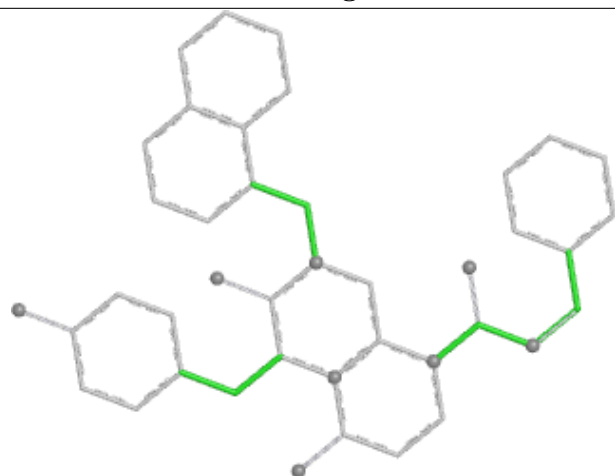
Ligand UTC L 301



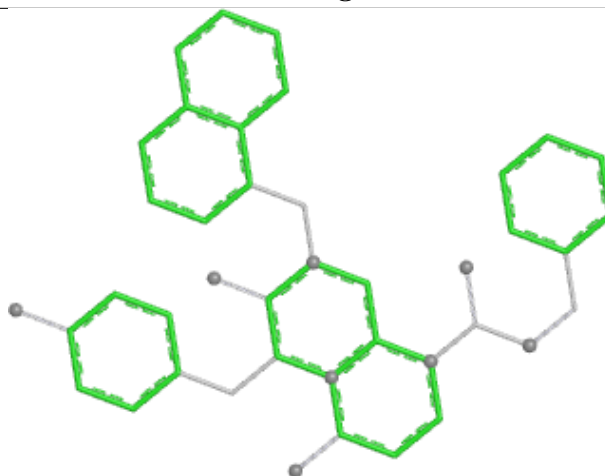
Bond lengths



Bond angles

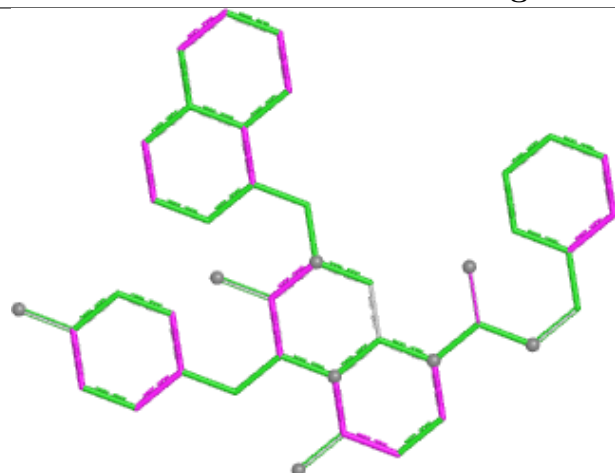


Torsions

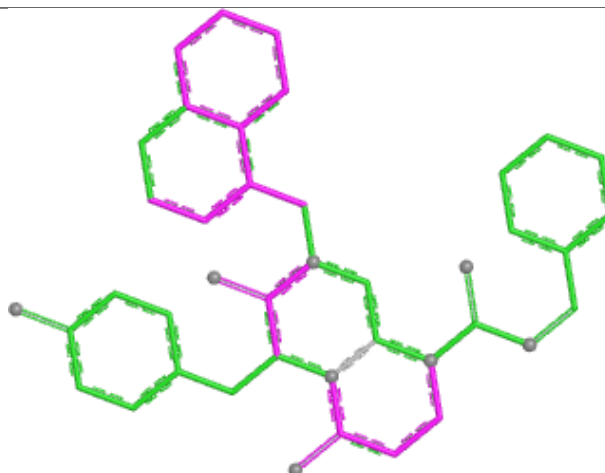


Rings

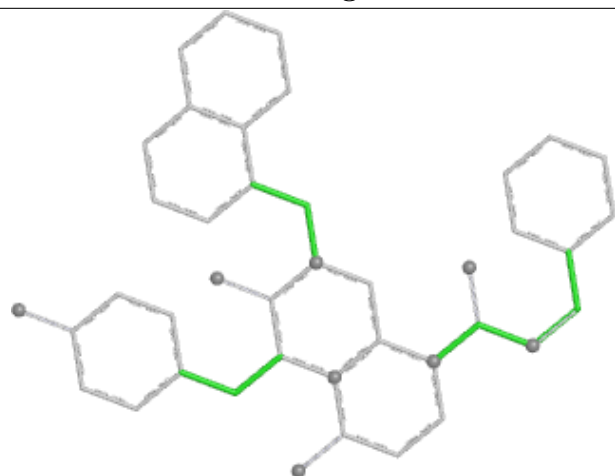
Ligand UTC M 301



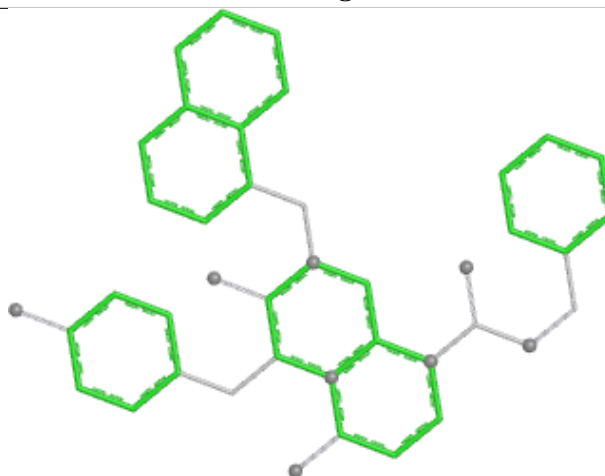
Bond lengths



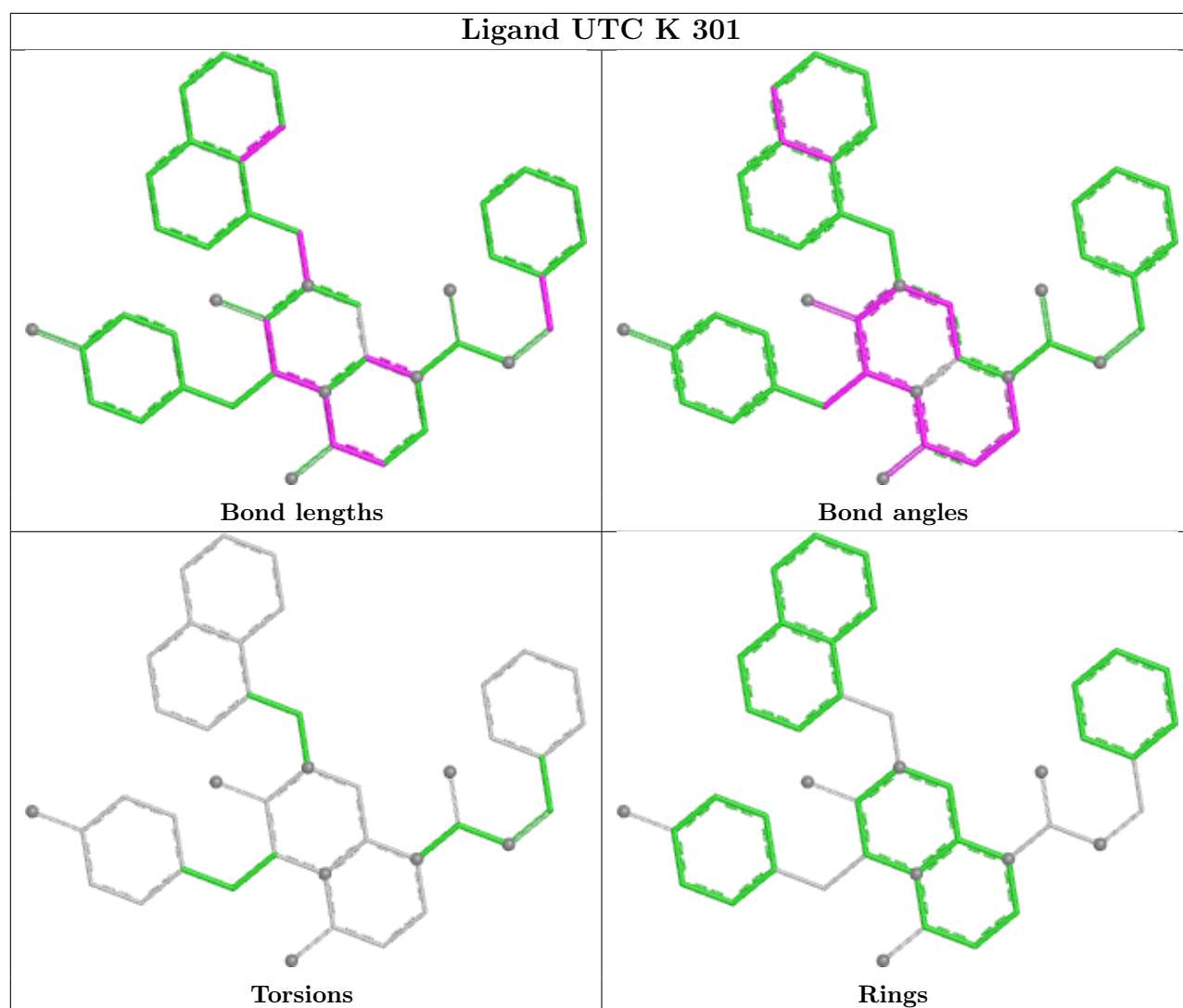
Bond angles



Torsions



Rings



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	180/203 (88%)	0.36	9 (5%) 34 42	13, 26, 44, 65	5 (2%)
1	B	180/203 (88%)	0.41	10 (5%) 30 38	13, 26, 43, 65	5 (2%)
1	C	184/203 (90%)	0.06	7 (3%) 44 52	11, 21, 38, 64	5 (2%)
1	D	186/203 (91%)	-0.05	8 (4%) 40 48	9, 19, 34, 58	3 (1%)
1	E	183/203 (90%)	-0.04	10 (5%) 30 39	10, 19, 38, 59	4 (2%)
1	F	178/203 (87%)	0.08	9 (5%) 33 42	10, 20, 40, 55	7 (3%)
1	G	181/203 (89%)	0.32	10 (5%) 30 39	11, 25, 43, 64	8 (4%)
1	I	181/203 (89%)	0.40	7 (3%) 43 51	13, 26, 44, 61	4 (2%)
1	K	180/203 (88%)	0.06	7 (3%) 43 51	12, 22, 36, 52	4 (2%)
1	L	183/203 (90%)	-0.08	9 (4%) 35 43	9, 19, 35, 50	6 (3%)
1	M	184/203 (90%)	-0.08	9 (4%) 35 43	8, 19, 36, 61	6 (3%)
1	N	179/203 (88%)	0.06	9 (5%) 34 42	10, 21, 39, 50	4 (2%)
1	S	179/203 (88%)	0.34	8 (4%) 38 47	12, 26, 42, 60	4 (2%)
1	T	179/203 (88%)	0.40	10 (5%) 30 38	13, 25, 44, 60	5 (2%)
All	All	2537/2842 (89%)	0.16	122 (4%) 35 44	8, 23, 42, 65	70 (2%)

The worst 5 of 122 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	F	18	TYR	9.9
1	G	8	ILE	6.4
1	G	7	VAL	5.6
1	T	7	VAL	5.4
1	F	6	THR	5.3

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
3	UTC	A	302	41/41	0.79	0.17	35,41,87,100	0
2	MPD	F	302	8/8	0.82	0.18	22,33,36,38	0
3	UTC	M	301	41/41	0.83	0.17	22,32,74,91	0
3	UTC	G	301	41/41	0.84	0.15	25,36,72,81	0
3	UTC	C	301	41/41	0.84	0.14	28,36,67,81	0
3	UTC	I	302	41/41	0.85	0.14	29,38,69,77	0
2	MPD	I	301	8/8	0.85	0.15	27,38,41,43	0
3	UTC	S	303	41/41	0.85	0.15	29,37,75,83	0
3	UTC	L	301	41/41	0.86	0.15	25,33,75,90	0
2	MPD	M	302	8/8	0.87	0.13	19,28,35,35	0
3	UTC	K	301	41/41	0.88	0.14	28,35,72,84	0
2	MPD	B	302	8/8	0.89	0.13	26,34,41,42	0
2	MPD	G	302	8/8	0.89	0.14	26,38,47,50	0
2	MPD	C	302	8/8	0.89	0.13	22,32,36,42	0
3	UTC	S	301	41/41	0.89	0.14	25,35,73,77	0
2	MPD	D	302	8/8	0.89	0.13	34,37,40,45	0
2	MPD	L	302	8/8	0.90	0.11	21,32,36,39	0
2	MPD	D	301	8/8	0.90	0.11	20,28,33,34	0
2	MPD	T	301	8/8	0.90	0.14	26,41,43,46	0
2	MPD	K	302	8/8	0.90	0.12	22,32,38,41	0
2	MPD	E	301	8/8	0.91	0.13	24,31,36,40	0
3	UTC	F	301	41/41	0.91	0.12	18,25,49,59	41
3	UTC	B	301	41/41	0.91	0.12	29,35,70,80	0
2	MPD	A	301	8/8	0.92	0.11	28,36,42,49	0
2	MPD	S	302	8/8	0.92	0.11	26,35,42,46	0
2	MPD	N	302	8/8	0.93	0.10	22,32,36,37	0
3	UTC	N	301	41/41	0.93	0.10	22,30,65,71	0

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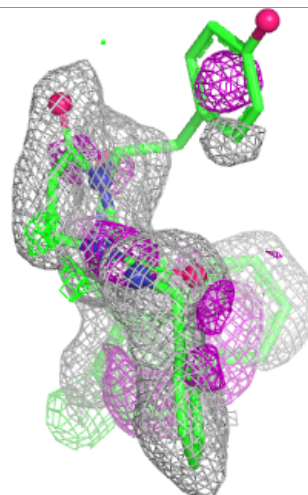
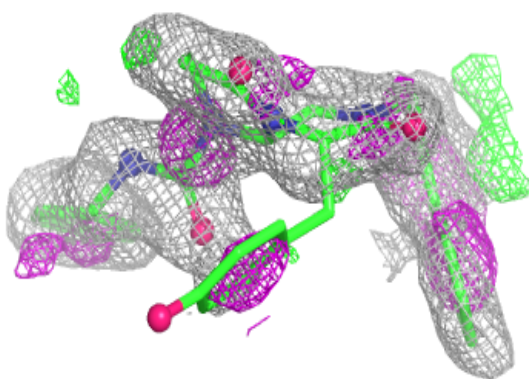
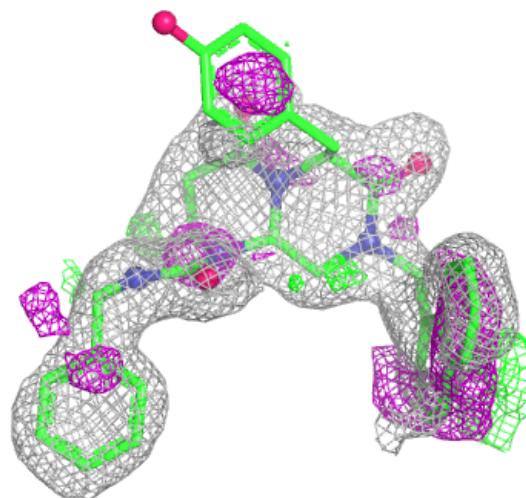
Continued from previous page...

Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors($\text{\AA}^2$)	Q<0.9
3	UTC	D	303	41/41	0.95	0.09	21,25,55,70	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.

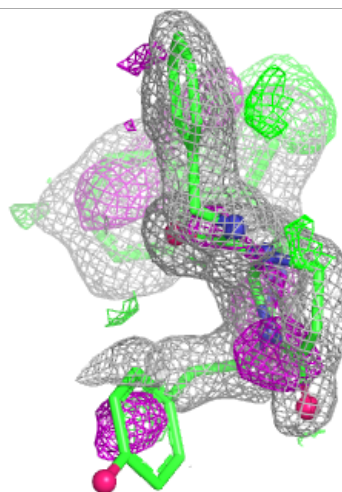
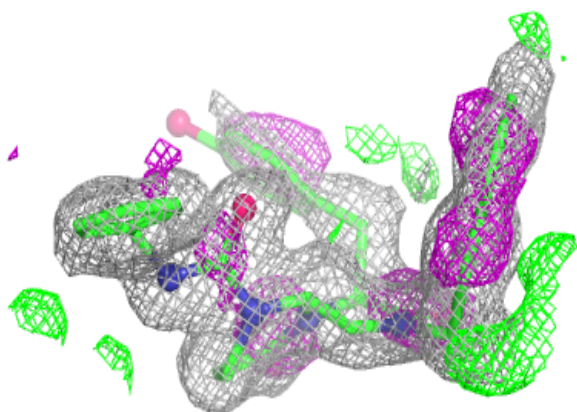
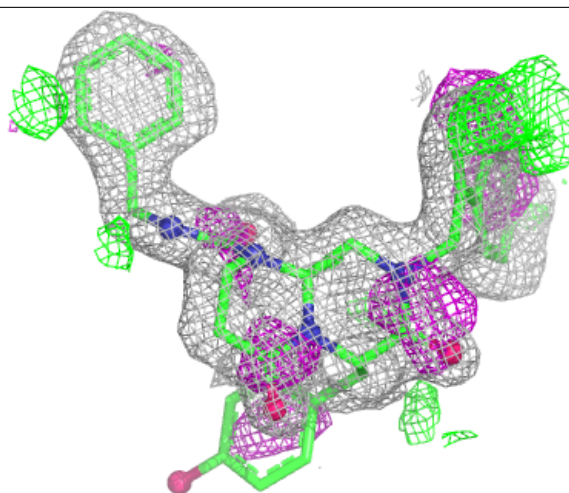
Electron density around UTC A 302:

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



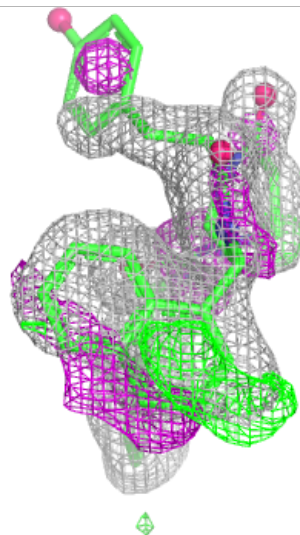
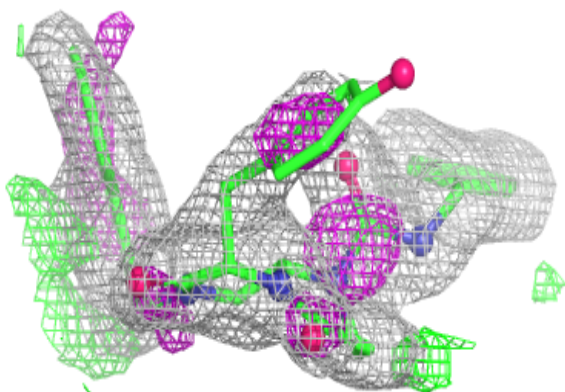
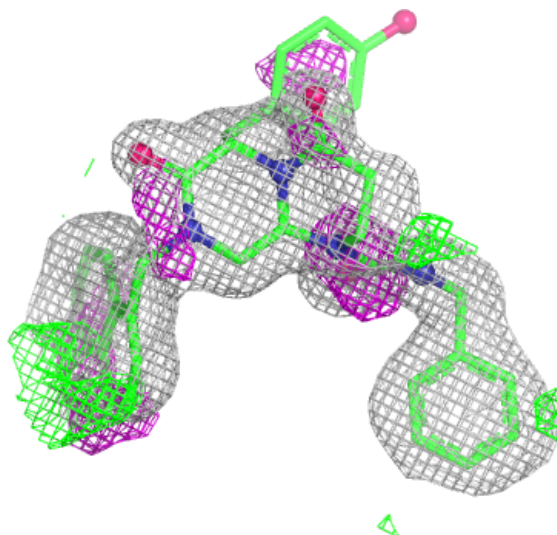
Electron density around UTC M 301:

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and green (positive)



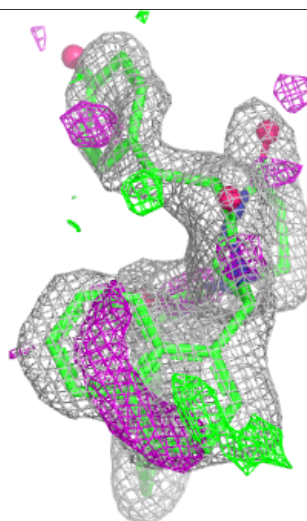
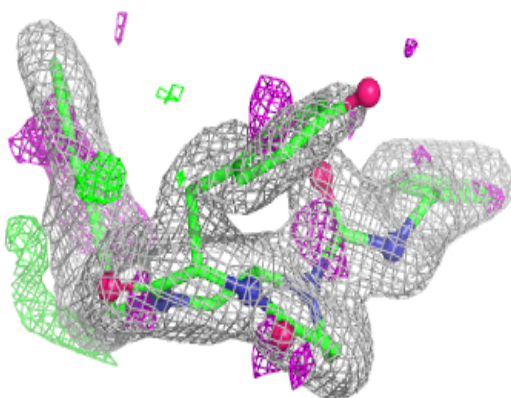
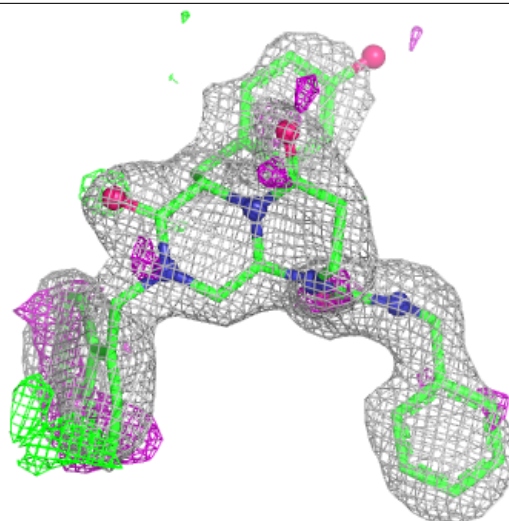
Electron density around UTC G 301:

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and green (positive)



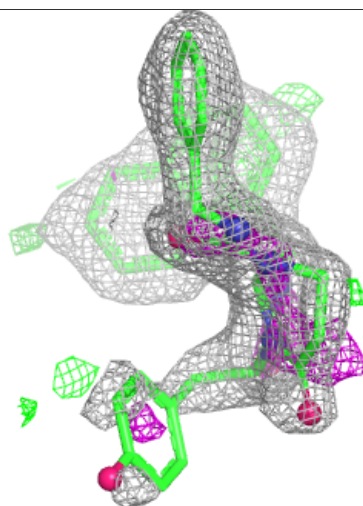
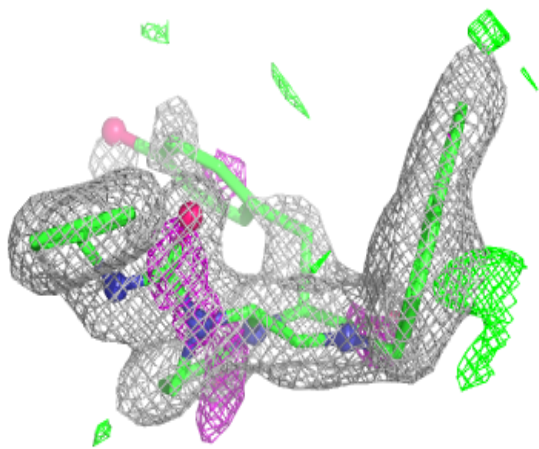
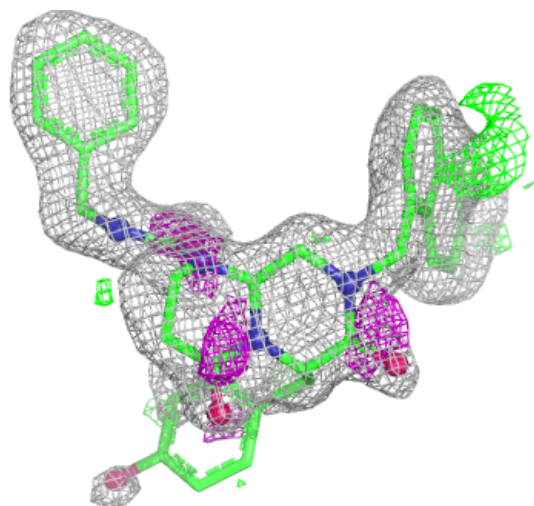
Electron density around UTC C 301:

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and green (positive)



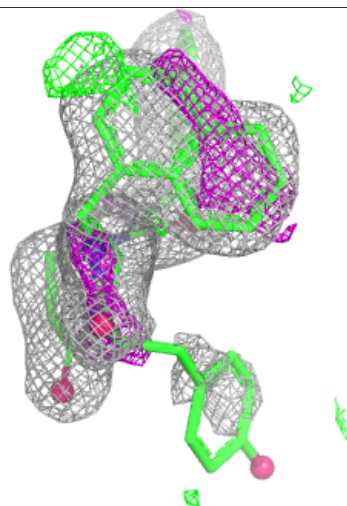
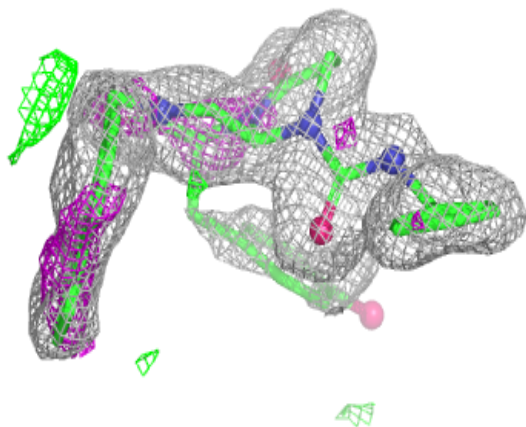
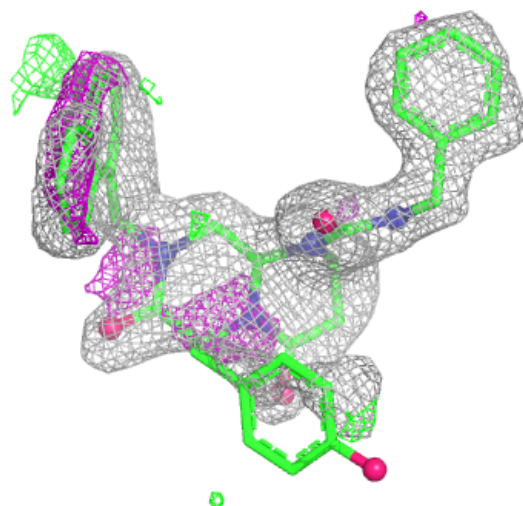
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and green (positive)



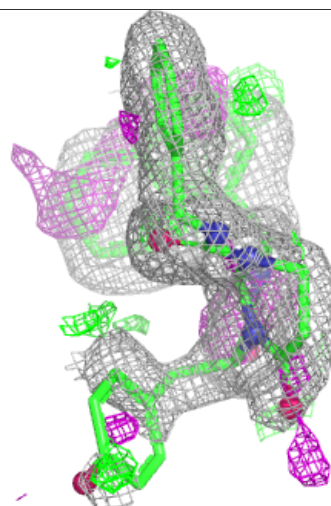
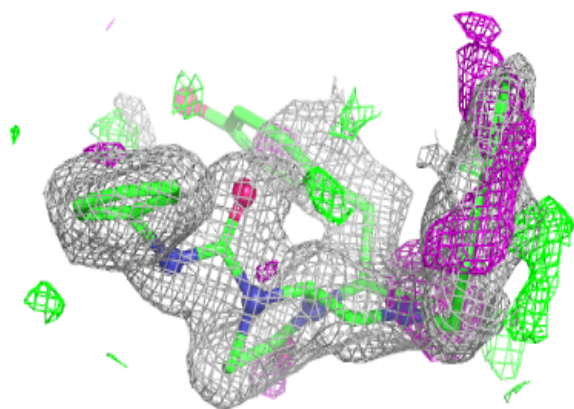
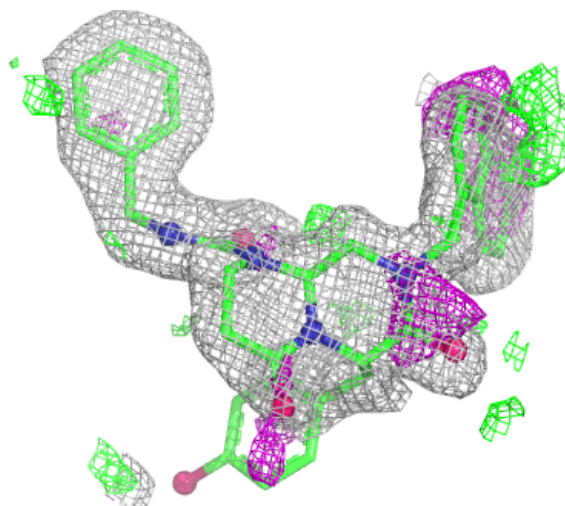
Electron density around UTC S 303:

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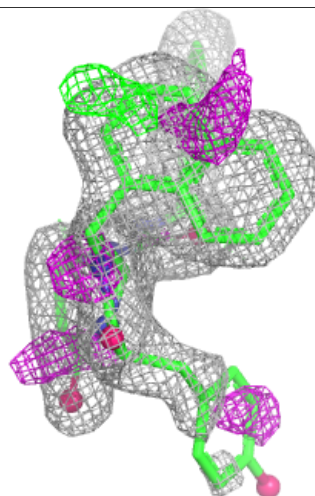
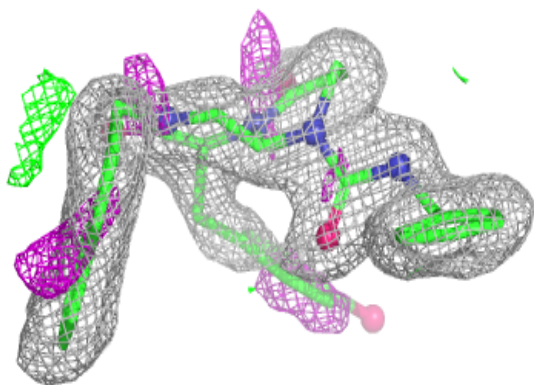
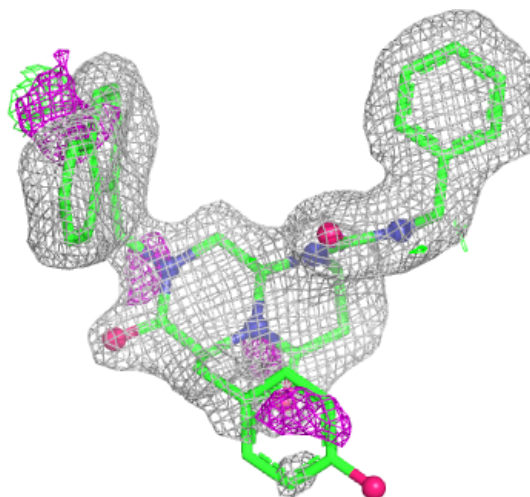
Electron density around UTC L 301:

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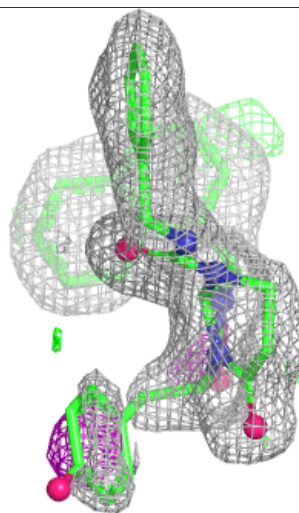
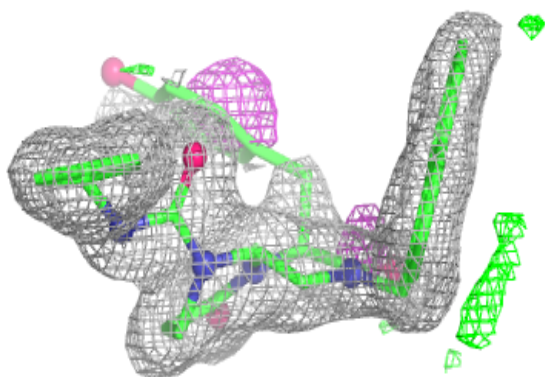
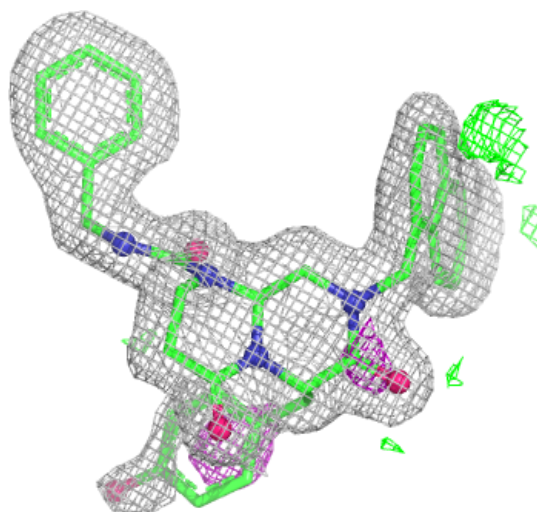
Electron density around UTC K 301:

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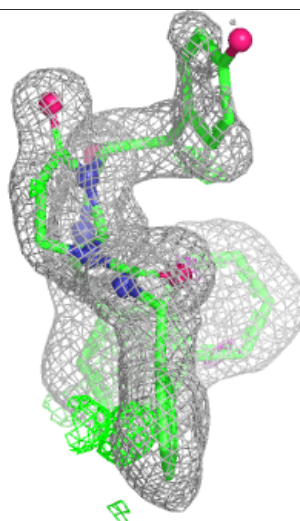
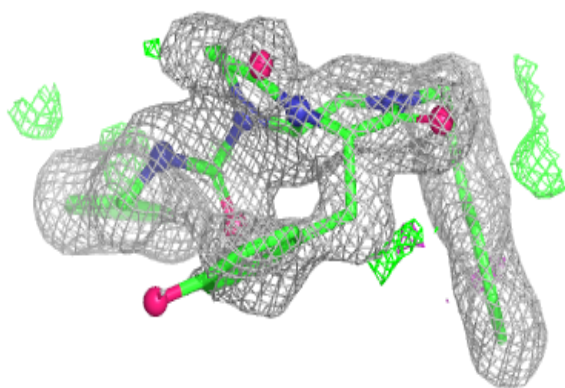
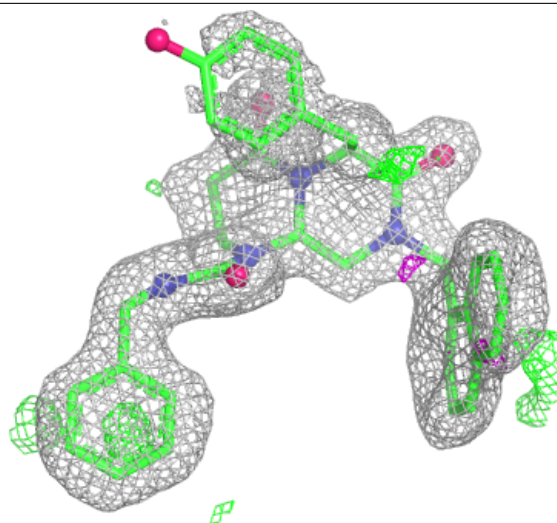
Electron density around UTC S 301:

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and green (positive)



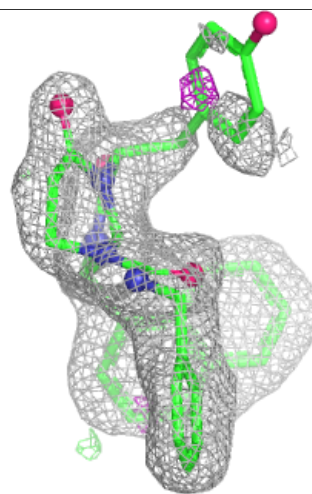
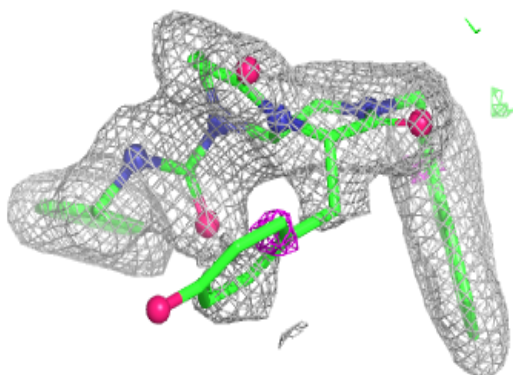
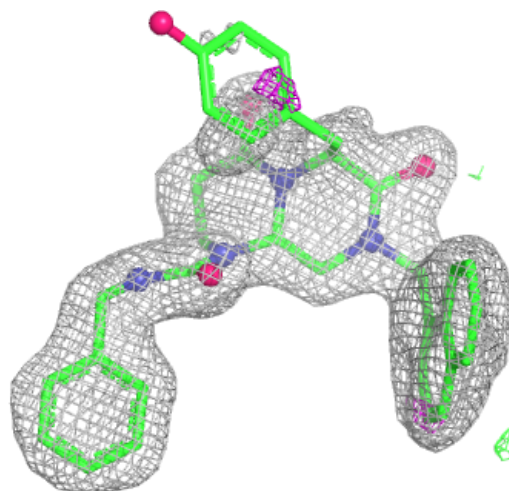
Electron density around UTC F 301:

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and green (positive)



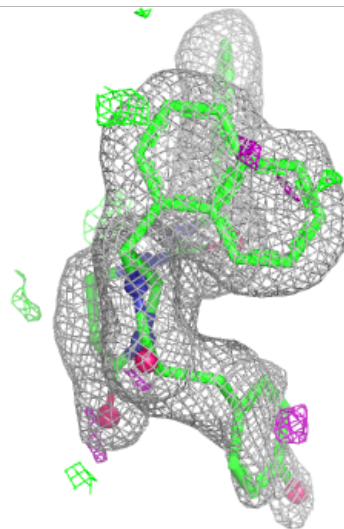
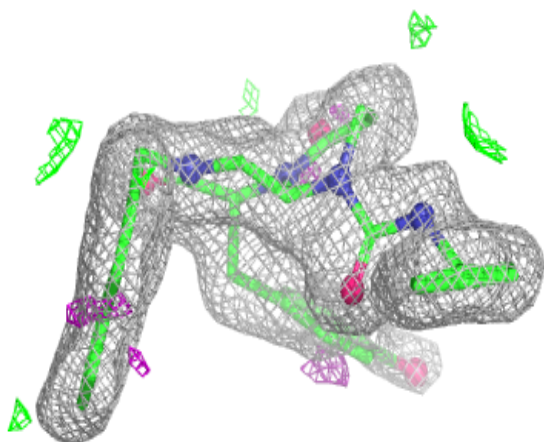
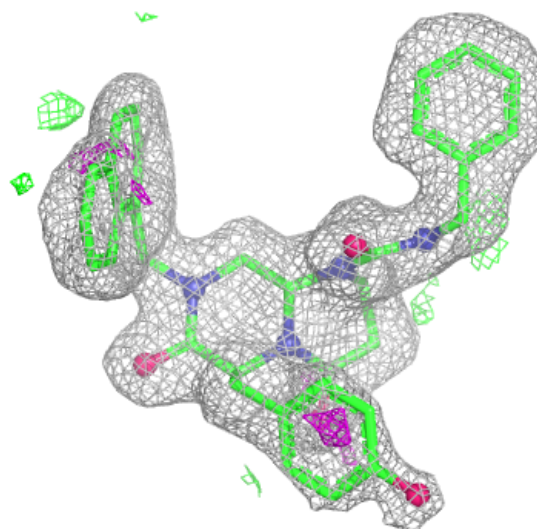
Electron density around UTC B 301:

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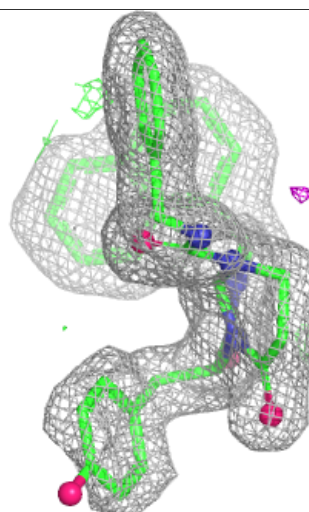
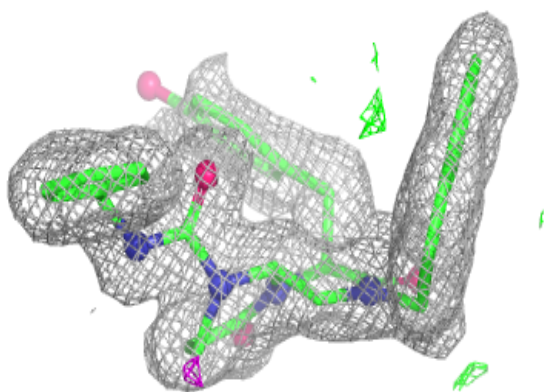
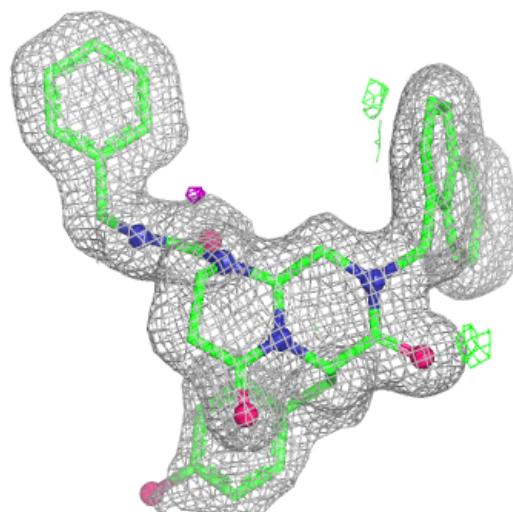
Electron density around UTC N 301:

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and green (positive)



Electron density around UTC D 303:

$2mF_o-DF_c$ (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.