wwPDB X-ray Structure Validation Summary Report (i)

Jul 13, 2026 – 10:43 AM EDT

PDB ID	:	9PNC / pdb_00009pnc
Title	:	Crystal structure of human mitochondrial ClpP protease C144R mutant in complex with imipridone compound, TR-65
Authors	:	Mabanglo, M.F.; Houry, W.A.
Deposited on	:	2025-07-19
Resolution	:	2.70 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 (i) 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 (i)) were used in the production of this report:

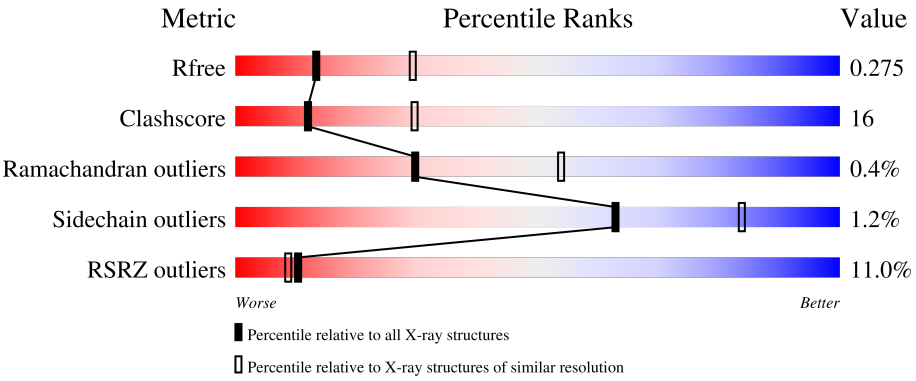
MolProbity	:	4-5-2 with Phenix2.0
Mogul	:	2022.3.0, CSD as543be (2022)
Xtriage (Phenix)	:	2.0
EDS	:	3.0
Buster-report	:	wwPDB partial adaption of 1.1.7 (2018)
Percentile statistics	:	20250101.v01 (using entries in the PDB archive January 1st 2025)
CCP4	:	9.0.015 (Gargrove)
Density-Fitness	:	1.0.12
Ideal geometry (proteins)	:	Engh & Huber (2001)
Ideal geometry (DNA, RNA)	:	Parkinson et al. (1996)
Validation Pipeline (wwPDB-VP)	:	2.50

1 Overall quality at a glance (i)

The following experimental techniques were used to determine the structure:
X-RAY DIFFRACTION

The reported resolution of this entry is 2.70 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	3538 (2.70-2.70)
Clashscore	190562	3843 (2.70-2.70)
Ramachandran outliers	187476	3778 (2.70-2.70)
Sidechain outliers	187428	3778 (2.70-2.70)
RSRZ outliers	180081	3538 (2.70-2.70)

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 <=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	221	2% 57% 19% 24%
1	B	221	5% 55% 20% 24%
1	C	221	8% 56% 19% 24%
1	D	221	6% 52% 23% 24%
1	E	221	6% 59% 17% 24%

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Mol	Chain	Length	Quality of chain
1	F	221	2% 58% 17% 25%
1	G	221	3% 62% 13% 24%
1	H	221	4% 56% 19% 25%
1	I	221	7% 48% 26% 25%
1	J	221	20% 48% 25% 24%
1	K	221	20% 45% 32% 23%
1	L	221	14% 42% 32% 26%
1	M	221	12% 51% 24% 25%
1	N	221	6% 54% 22% 24%

2 Entry composition (i)

There are 3 unique types of molecules in this entry. The entry contains 18941 atoms, of which 0 are hydrogens and 0 are deuteriums.

In the tables below, the ZeroOcc column contains the number of atoms modelled with zero occupancy, the AltConf column contains the number of residues with at least one atom in alternate conformation and the Trace column contains the number of residues modelled with at most 2 atoms.

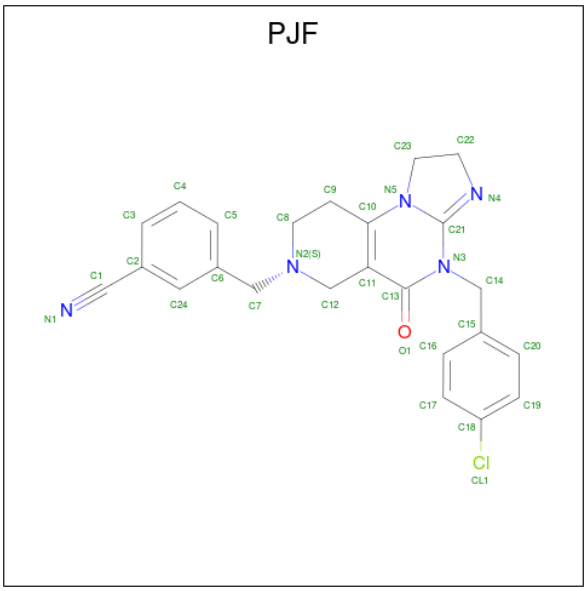
- Molecule 1 is a protein called ATP-dependent Clp protease proteolytic subunit, mitochondrial.

Mol	Chain	Residues	Atoms					ZeroOcc	AltConf	Trace
1	A	168	Total	C	N	O	S	0	0	0
			1312	835	226	239	12			
1	B	167	Total	C	N	O	S	0	0	0
			1304	831	225	236	12			
1	C	167	Total	C	N	O	S	0	0	0
			1305	830	225	238	12			
1	D	168	Total	C	N	O	S	0	0	0
			1312	835	226	239	12			
1	E	169	Total	C	N	O	S	0	0	0
			1321	840	228	241	12			
1	F	166	Total	C	N	O	S	0	0	0
			1296	825	224	235	12			
1	G	168	Total	C	N	O	S	0	0	0
			1313	834	227	240	12			
1	H	166	Total	C	N	O	S	0	0	0
			1296	825	224	235	12			
1	I	165	Total	C	N	O	S	0	0	0
			1289	820	223	234	12			
1	J	167	Total	C	N	O	S	0	0	0
			1306	831	225	238	12			
1	K	170	Total	C	N	O	S	0	0	0
			1324	842	228	242	12			
1	L	164	Total	C	N	O	S	0	0	0
			1282	815	222	233	12			
1	M	166	Total	C	N	O	S	0	0	0
			1296	827	224	233	12			
1	N	168	Total	C	N	O	S	0	0	0
			1309	833	226	238	12			

There are 28 discrepancies between the modelled and reference sequences:

Chain	Residue	Modelled	Actual	Comment	Reference
A	57	SER	-	expression tag	UNP Q16740
A	144	ARG	CYS	engineered mutation	UNP Q16740
B	57	SER	-	expression tag	UNP Q16740
B	144	ARG	CYS	engineered mutation	UNP Q16740
C	57	SER	-	expression tag	UNP Q16740
C	144	ARG	CYS	engineered mutation	UNP Q16740
D	57	SER	-	expression tag	UNP Q16740
D	144	ARG	CYS	engineered mutation	UNP Q16740
E	57	SER	-	expression tag	UNP Q16740
E	144	ARG	CYS	engineered mutation	UNP Q16740
F	57	SER	-	expression tag	UNP Q16740
F	144	ARG	CYS	engineered mutation	UNP Q16740
G	57	SER	-	expression tag	UNP Q16740
G	144	ARG	CYS	engineered mutation	UNP Q16740
H	57	SER	-	expression tag	UNP Q16740
H	144	ARG	CYS	engineered mutation	UNP Q16740
I	57	SER	-	expression tag	UNP Q16740
I	144	ARG	CYS	engineered mutation	UNP Q16740
J	57	SER	-	expression tag	UNP Q16740
J	144	ARG	CYS	engineered mutation	UNP Q16740
K	57	SER	-	expression tag	UNP Q16740
K	144	ARG	CYS	engineered mutation	UNP Q16740
L	57	SER	-	expression tag	UNP Q16740
L	144	ARG	CYS	engineered mutation	UNP Q16740
M	57	SER	-	expression tag	UNP Q16740
M	144	ARG	CYS	engineered mutation	UNP Q16740
N	57	SER	-	expression tag	UNP Q16740
N	144	ARG	CYS	engineered mutation	UNP Q16740

- Molecule 2 is 3-{[(10R)-4-[(4-chlorophenyl)methyl]-5-oxo-1,2,4,5,8,9-hexahydroimidazo[1,2-a]pyrido[3,4-e]pyrimidin-7(6H)-yl]methyl}benzonitrile (CCD ID: PJF) (formula: $C_{24}H_{22}ClN_5O$) (labeled as "Ligand of Interest" by depositor).



Mol	Chain	Residues	Atoms					ZeroOcc	AltConf
2	A	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	B	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	C	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	D	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	E	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	F	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	G	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	H	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	I	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	J	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	K	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	L	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	M	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		
2	N	1	Total	C	Cl	N	O	0	0
			31	24	1	5	1		

- Molecule 3 is water.

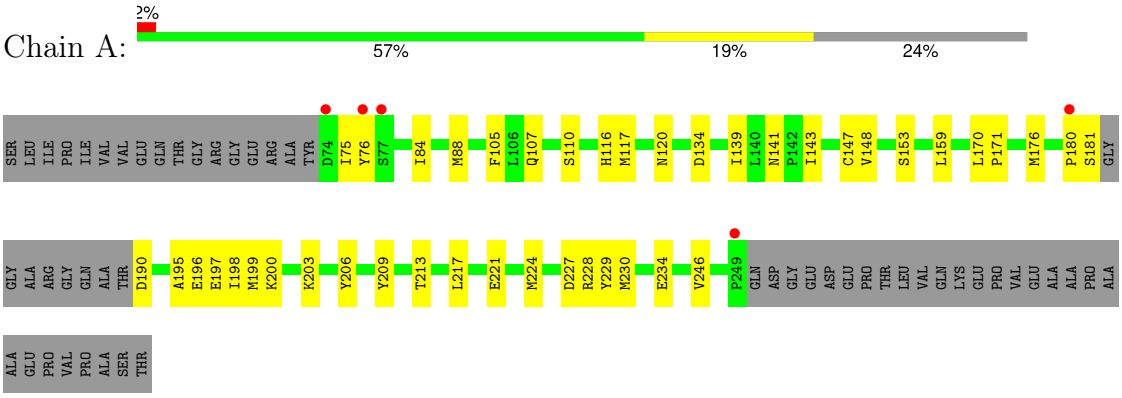
Mol	Chain	Residues	Atoms	ZeroOcc	AltConf
3	A	22	Total O 22 22	0	0
3	B	18	Total O 18 18	0	0
3	C	15	Total O 15 15	0	0
3	D	14	Total O 14 14	0	0
3	E	24	Total O 24 24	0	0
3	F	28	Total O 28 28	0	0
3	G	27	Total O 27 27	0	0
3	H	16	Total O 16 16	0	0
3	I	14	Total O 14 14	0	0
3	J	8	Total O 8 8	0	0
3	K	12	Total O 12 12	0	0
3	L	11	Total O 11 11	0	0
3	M	19	Total O 19 19	0	0
3	N	14	Total O 14 14	0	0

3 Residue-property plots (i)

These plots are drawn for all protein, RNA, DNA and oligosaccharide chains in the entry. The first graphic for a chain summarises the proportions of the various outlier classes displayed in the second graphic. The second graphic shows the sequence view annotated by issues in geometry and electron density. Residues are color-coded according to the number of geometric quality criteria for which they contain at least one outlier: green = 0, yellow = 1, orange = 2 and red = 3 or more. A red dot above a residue indicates a poor fit to the electron density (RSRZ > 2). Stretches of 2 or more consecutive residues without any outlier are shown as a green connector. Residues present in the sample, but not in the model, are shown in grey.

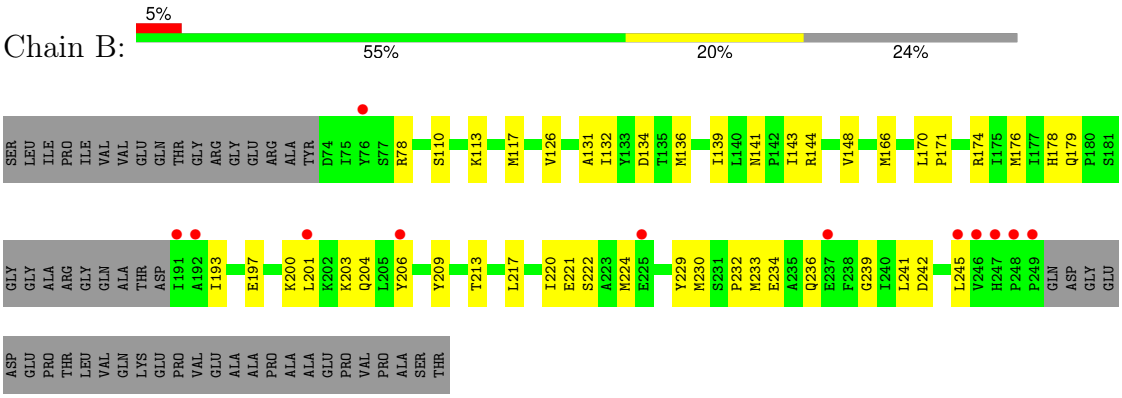
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain A:



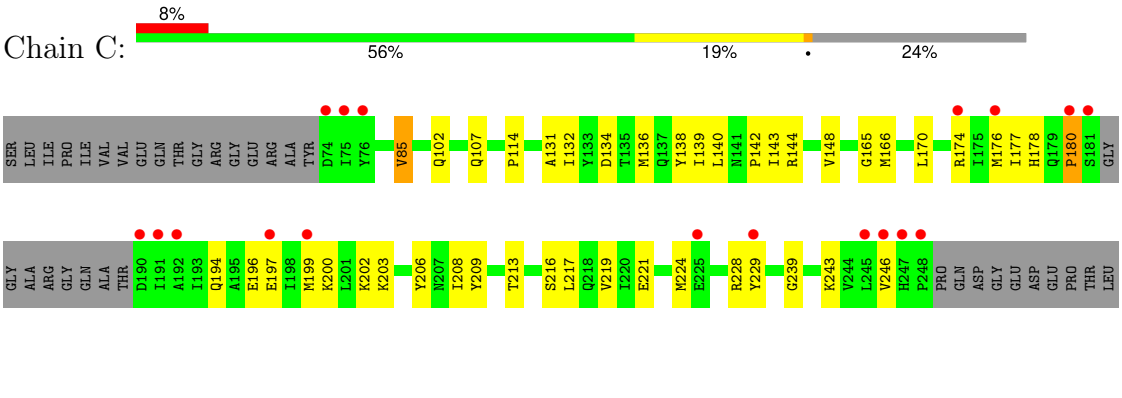
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain B:



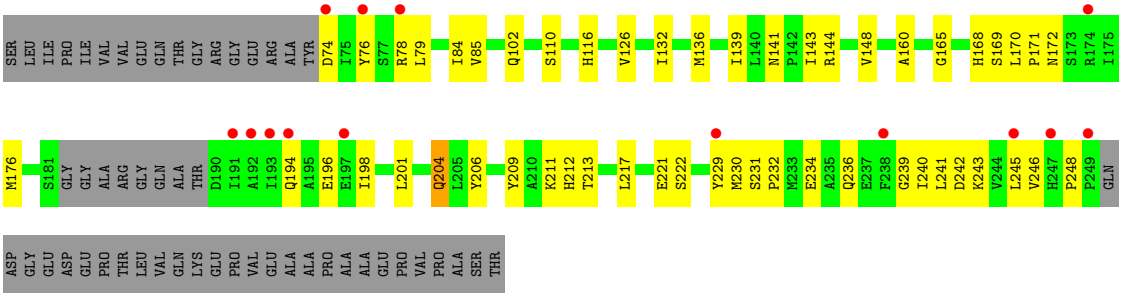
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain C:



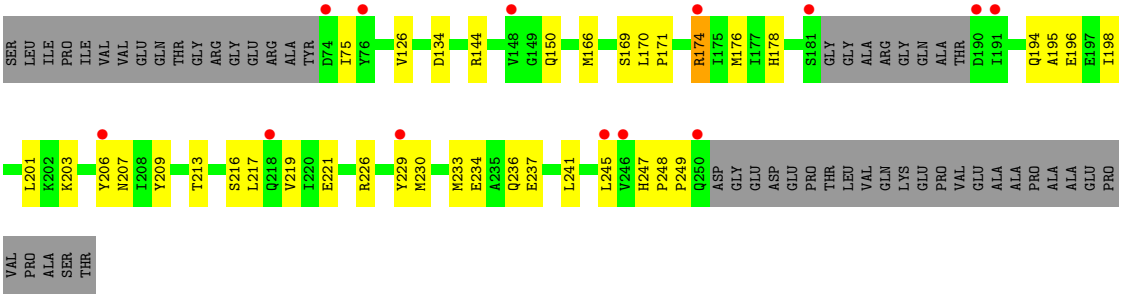
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain D:



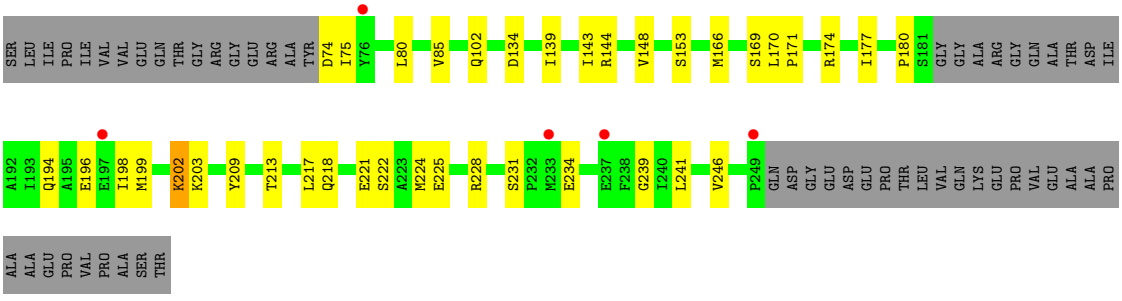
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain E:



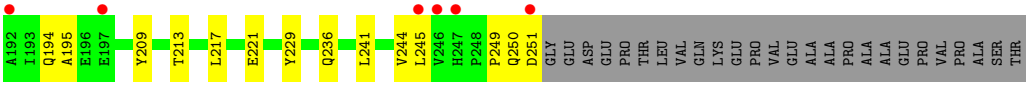
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain F:



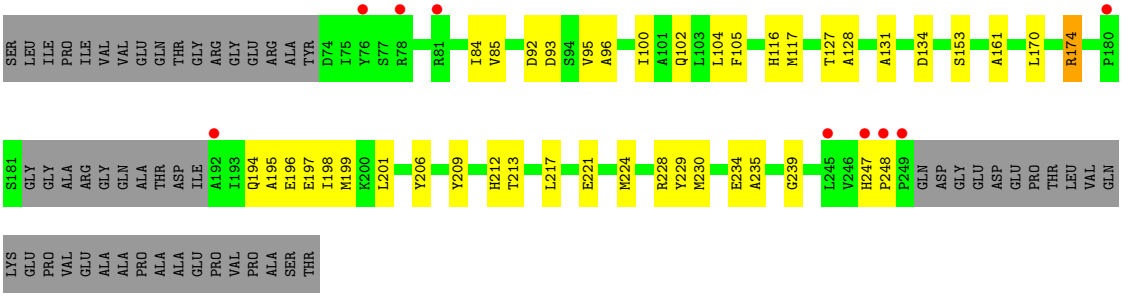
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain G:



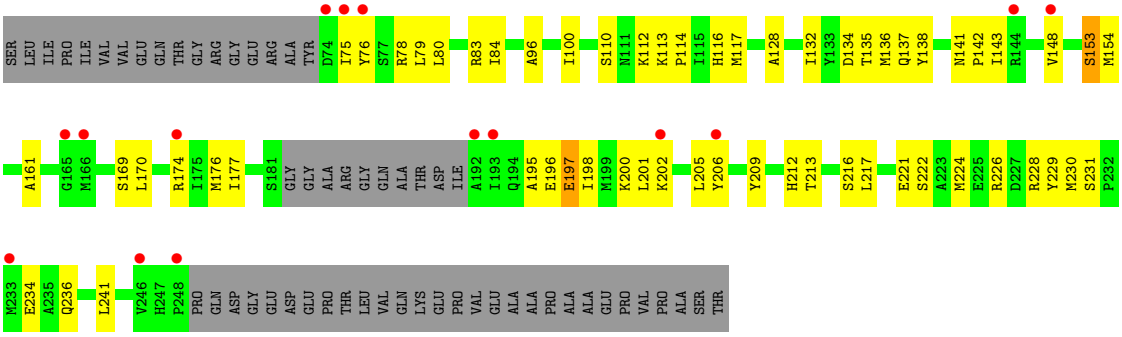
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain H:



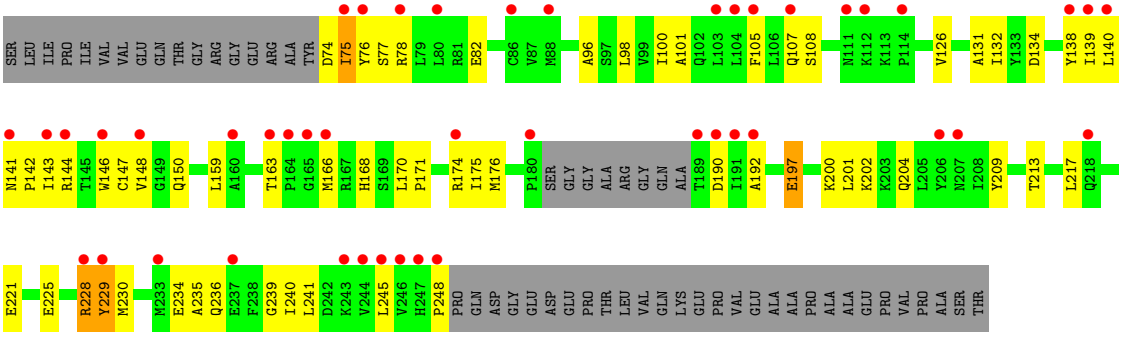
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain I:



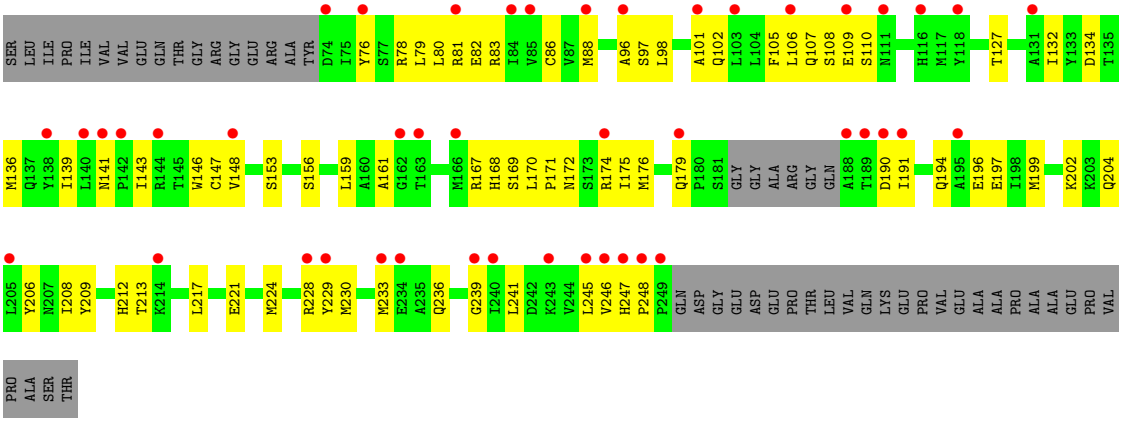
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain J:



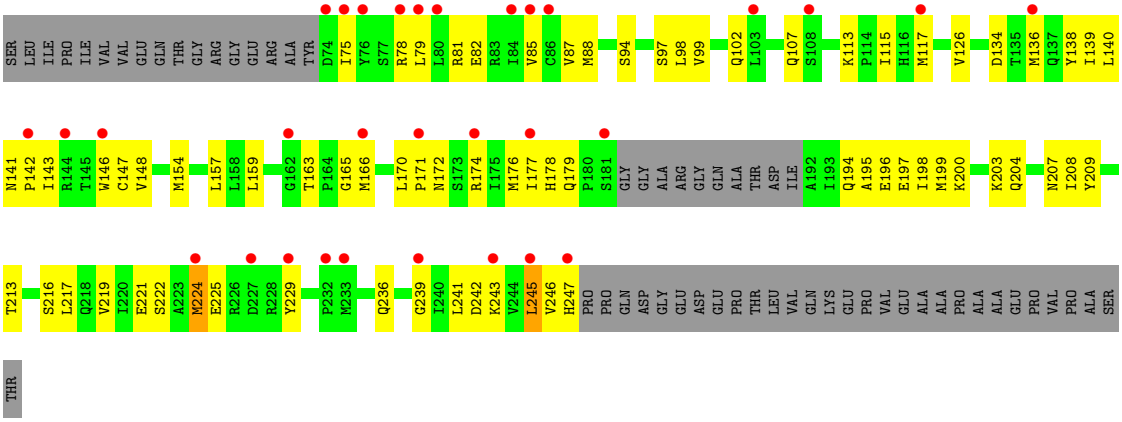
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain K:



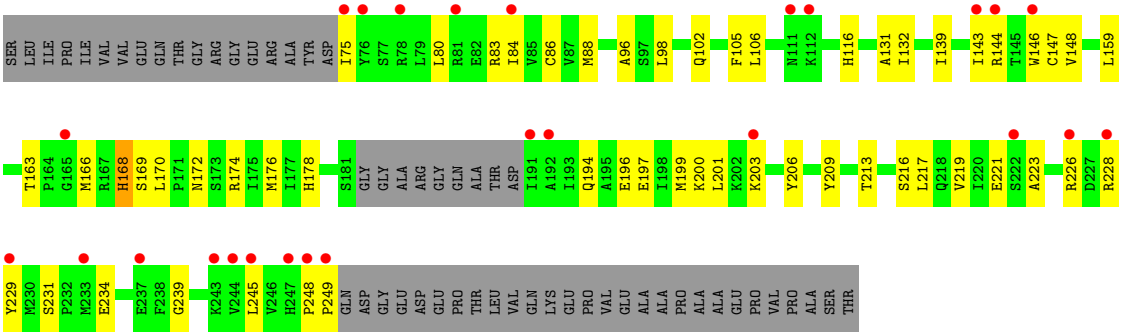
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain L:



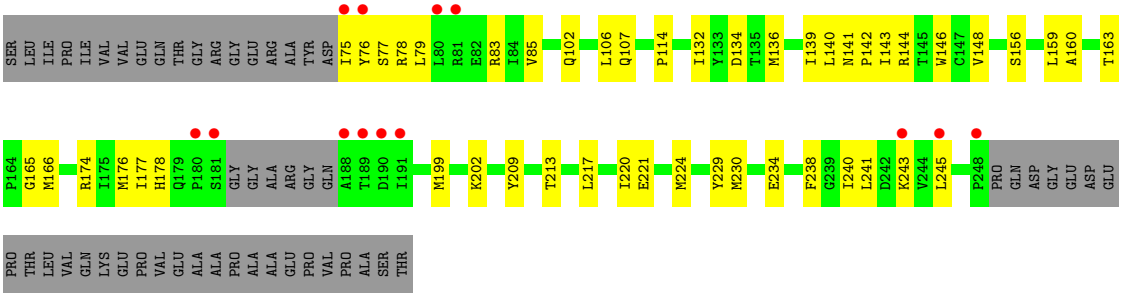
• Molecule 1: ATP-dependent Clp protease proteolytic subunit, mitochondrial

Chain M:



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

Chain N:


SER LEU ILE PRO ILE VAL VAL GLU GLN THR GLY ARG GLY GLU ARG ALA TYR ASP I75 Y76 S77 R78 L79 L80 R81 E82 R83 I84 V85 Q102 L106 Q107 P114 I132 Y133 D134 T135 M136 I139 L140 N141 P142 I143 R144 T145 W146 C147 V148 S156 L159 A160 T163
P164 G165 M166 R174 I175 M176 I177 H178 Q179 P180 S181 GLY GLY ALA ARG GLY GLN A188 T189 D190 I191 M199 K202 Y209 T213 L217 I220 E221 M224 Y229 M230 E234 F238 G239 I240 L241 D242 K243 V244 L245 P248 PRO GLN ASP GLY GLU ASP GLU
PRO THR LEU VAL GLN LYS GLU PRO VAL GLU ALA ALA PRO ALA ALA GLU PRO VAL PRO ALA SER THR

4 Data and refinement statistics (i)

Property	Value	Source
Space group	C 1 2 1	Depositor
Cell constants a, b, c, α, β, γ	181.23Å 148.50Å 151.33Å 90.00° 101.44° 90.00°	Depositor
Resolution (Å)	49.44 – 2.70 49.44 – 2.70	Depositor EDS
% Data completeness (in resolution range)	97.6 (49.44-2.70) 85.6 (49.44-2.70)	Depositor EDS
R_{merge}	0.18	Depositor
R_{sym}	(Not available)	Depositor
$< I/\sigma(I) >$ [1]	0.50 (at 2.69Å)	Xtriage
Refinement program	PHENIX 1.21.1_5286	Depositor
R, R_{free}	0.236 , 0.276 0.236 , 0.275	Depositor DCC
R_{free} test set	2000 reflections (1.85%)	wwPDB-VP
Wilson B-factor (Å^2)	44.5	Xtriage
Anisotropy	0.517	Xtriage
Bulk solvent k_{sol}(e/Å^3), B_{sol}(Å^2)	0.33 , 41.7	EDS
L-test for twinning[2]	$< \|L\| > = 0.49$, $< L^2 > = 0.32$	Xtriage
Estimated twinning fraction	No twinning to report.	Xtriage
F_o,F_c correlation	0.91	EDS
Total number of atoms	18941	wwPDB-VP
Average B, all atoms (Å^2)	62.0	wwPDB-VP

Xtriage's analysis on translational NCS is as follows: *The largest off-origin peak in the Patterson function is 5.26% of the height of the origin peak. No significant pseudotranslation is detected.*

[1] Intensities estimated from amplitudes.

[2] Theoretical values of $< |L| >$, $< L^2 >$ for acentric reflections are 0.5, 0.333 respectively for untwinned datasets, and 0.375, 0.2 for perfectly twinned datasets.

5 Model quality (i)

5.1 Standard geometry (i)

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

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	0.22	0/1336	0.53	0/1806
1	B	0.24	0/1328	0.55	0/1795
1	C	0.20	0/1328	0.52	0/1794
1	D	0.31	1/1336 (0.1%)	0.55	1/1806 (0.1%)
1	E	0.30	1/1345 (0.1%)	0.53	0/1818
1	F	0.19	0/1320	0.50	0/1784
1	G	0.21	0/1337	0.52	0/1807
1	H	0.22	0/1320	0.52	0/1784
1	I	0.27	0/1312	0.54	2/1772 (0.1%)
1	J	0.33	0/1329	0.67	3/1796 (0.2%)
1	K	0.35	0/1348	0.67	0/1823
1	L	0.28	0/1304	0.65	1/1760 (0.1%)
1	M	0.26	0/1320	0.59	0/1784
1	N	0.23	0/1332	0.58	0/1800
All	All	0.26	2/18595 (0.0%)	0.57	7/25129 (0.0%)

All (2) bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
1	E	174	ARG	CB-CG	-5.52	1.35	1.52
1	D	204	GLN	CD-NE2	5.03	1.43	1.33

The worst 5 of 7 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
1	I	197	GLU	CA-CB-CG	-8.38	97.33	114.10
1	L	224	MET	CB-CG-SD	-6.50	93.21	112.70
1	J	229	TYR	CA-CB-CG	6.42	125.46	113.90
1	D	204	GLN	CA-CB-CG	-6.18	101.74	114.10
1	J	228	ARG	CA-C-N	-5.60	113.14	122.21

There are no chirality outliers.

There are no planarity outliers.

5.2 Too-close contacts (i)

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

Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
1	A	1312	0	1349	33	0
1	B	1304	0	1345	41	0
1	C	1305	0	1342	46	0
1	D	1312	0	1349	45	0
1	E	1321	0	1357	37	0
1	F	1296	0	1334	35	0
1	G	1313	0	1346	26	0
1	H	1296	0	1334	34	0
1	I	1289	0	1327	52	0
1	J	1306	0	1344	74	0
1	K	1324	0	1361	83	0
1	L	1282	0	1320	83	0
1	M	1296	0	1341	57	0
1	N	1309	0	1350	49	0
2	A	31	0	0	0	0
2	B	31	0	0	0	0
2	C	31	0	0	1	0
2	D	31	0	0	1	0
2	E	31	0	0	0	0
2	F	31	0	0	0	0
2	G	31	0	0	0	0
2	H	31	0	0	0	0
2	I	31	0	0	0	0
2	J	31	0	0	1	0
2	K	31	0	0	4	0
2	L	31	0	0	6	0
2	M	31	0	0	0	0
2	N	31	0	0	0	0
3	A	22	0	0	2	0
3	B	18	0	0	0	0
3	C	15	0	0	3	0
3	D	14	0	0	2	0
3	E	24	0	0	0	0

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Mol	Chain	Non-H	H(model)	H(added)	Clashes	Symm-Clashes
3	F	28	0	0	2	0
3	G	27	0	0	1	0
3	H	16	0	0	3	0
3	I	14	0	0	0	0
3	J	8	0	0	1	0
3	K	12	0	0	1	0
3	L	11	0	0	6	0
3	M	19	0	0	2	0
3	N	14	0	0	0	0
All	All	18941	0	18799	589	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 16.

The worst 5 of 589 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:J:176:MET:SD	1:J:229:TYR:CE1	2.50	1.05
1:N:78:ARG:H	1:N:78:ARG:HD2	1.22	1.04
1:J:176:MET:HB2	1:J:229:TYR:CD1	1.92	1.03
1:K:80:LEU:HD11	1:K:106:LEU:HD21	1.43	0.99
1:M:176:MET:HB2	1:M:229:TYR:CE1	1.97	0.98

There are no symmetry-related clashes.

5.3 Torsion angles (i)

5.3.1 Protein backbone (i)

In the following table, the Percentiles column shows the percent Ramachandran outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the backbone conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles	
1	A	164/221 (74%)	160 (98%)	4 (2%)	0	100	100
1	B	163/221 (74%)	159 (98%)	4 (2%)	0	100	100

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Mol	Chain	Analysed	Favoured	Allowed	Outliers	Percentiles
1	C	163/221 (74%)	156 (96%)	6 (4%)	1 (1%)	21 44
1	D	164/221 (74%)	160 (98%)	4 (2%)	0	100 100
1	E	165/221 (75%)	160 (97%)	4 (2%)	1 (1%)	21 44
1	F	162/221 (73%)	158 (98%)	4 (2%)	0	100 100
1	G	164/221 (74%)	156 (95%)	6 (4%)	2 (1%)	10 27
1	H	162/221 (73%)	158 (98%)	4 (2%)	0	100 100
1	I	161/221 (73%)	155 (96%)	6 (4%)	0	100 100
1	J	163/221 (74%)	156 (96%)	5 (3%)	2 (1%)	10 27
1	K	166/221 (75%)	158 (95%)	6 (4%)	2 (1%)	10 27
1	L	160/221 (72%)	154 (96%)	6 (4%)	0	100 100
1	M	162/221 (73%)	158 (98%)	4 (2%)	0	100 100
1	N	164/221 (74%)	160 (98%)	4 (2%)	0	100 100
All	All	2283/3094 (74%)	2208 (97%)	67 (3%)	8 (0%)	30 54

5 of 8 Ramachandran outliers are listed below:

Mol	Chain	Res	Type
1	C	180	PRO
1	G	75	ILE
1	J	75	ILE
1	K	191	ILE
1	G	249	PRO

5.3.2 Protein sidechains (i)

In the following table, the Percentiles column shows the percent sidechain outliers of the chain as a percentile score with respect to all X-ray entries followed by that with respect to entries of similar resolution.

The Analysed column shows the number of residues for which the sidechain conformation was analysed, and the total number of residues.

Mol	Chain	Analysed	Rotameric	Outliers	Percentiles
1	A	146/185 (79%)	144 (99%)	2 (1%)	59 82
1	B	145/185 (78%)	144 (99%)	1 (1%)	76 90
1	C	145/185 (78%)	144 (99%)	1 (1%)	76 90
1	D	146/185 (79%)	145 (99%)	1 (1%)	76 90

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Mol	Chain	Analysed	Rotameric	Outliers	Percentiles	
1	E	147/185 (80%)	147 (100%)	0	100	100
1	F	144/185 (78%)	142 (99%)	2 (1%)	59	82
1	G	146/185 (79%)	144 (99%)	2 (1%)	59	82
1	H	144/185 (78%)	143 (99%)	1 (1%)	76	90
1	I	143/185 (77%)	139 (97%)	4 (3%)	38	68
1	J	145/185 (78%)	142 (98%)	3 (2%)	47	75
1	K	147/185 (80%)	144 (98%)	3 (2%)	48	76
1	L	142/185 (77%)	140 (99%)	2 (1%)	59	82
1	M	144/185 (78%)	142 (99%)	2 (1%)	59	82
1	N	145/185 (78%)	145 (100%)	0	100	100
All	All	2029/2590 (78%)	2005 (99%)	24 (1%)	63	84

5 of 24 residues with a non-rotameric sidechain are listed below:

Mol	Chain	Res	Type
1	J	75	ILE
1	K	108	SER
1	J	202	LYS
1	K	110	SER
1	F	202	LYS

Sometimes sidechains can be flipped to improve hydrogen bonding and reduce clashes. 5 of 49 such sidechains are listed below:

Mol	Chain	Res	Type
1	H	247	HIS
1	K	137	GLN
1	I	102	GLN
1	J	204	GLN
1	K	179	GLN

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)

14 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	PJF	J	301	-	35,35,35	0.73	1 (2%)	43,50,50	0.96	3 (6%)
2	PJF	M	301	-	35,35,35	0.80	2 (5%)	43,50,50	1.06	4 (9%)
2	PJF	I	301	-	35,35,35	0.71	1 (2%)	43,50,50	1.00	3 (6%)
2	PJF	D	301	-	35,35,35	0.76	2 (5%)	43,50,50	1.07	3 (6%)
2	PJF	G	301	-	35,35,35	0.77	1 (2%)	43,50,50	0.96	3 (6%)
2	PJF	E	301	-	35,35,35	0.73	1 (2%)	43,50,50	0.91	3 (6%)
2	PJF	A	301	-	35,35,35	0.75	1 (2%)	43,50,50	0.94	3 (6%)
2	PJF	H	301	-	35,35,35	0.75	1 (2%)	43,50,50	0.99	3 (6%)
2	PJF	N	301	-	35,35,35	0.73	1 (2%)	43,50,50	1.00	3 (6%)
2	PJF	K	301	-	35,35,35	0.80	2 (5%)	43,50,50	1.01	4 (9%)
2	PJF	L	301	-	35,35,35	0.88	2 (5%)	43,50,50	1.40	5 (11%)
2	PJF	B	301	-	35,35,35	0.72	1 (2%)	43,50,50	1.11	4 (9%)
2	PJF	F	301	-	35,35,35	0.72	1 (2%)	43,50,50	1.10	5 (11%)
2	PJF	C	301	-	35,35,35	0.70	1 (2%)	43,50,50	1.03	4 (9%)

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	PJF	J	301	-	-	0/10/25/25	0/5/5/5
2	PJF	M	301	-	-	0/10/25/25	0/5/5/5
2	PJF	I	301	-	-	0/10/25/25	0/5/5/5
2	PJF	D	301	-	-	0/10/25/25	0/5/5/5
2	PJF	G	301	-	-	0/10/25/25	0/5/5/5
2	PJF	E	301	-	-	1/10/25/25	0/5/5/5
2	PJF	A	301	-	-	0/10/25/25	0/5/5/5
2	PJF	H	301	-	-	0/10/25/25	0/5/5/5
2	PJF	N	301	-	-	1/10/25/25	0/5/5/5
2	PJF	K	301	-	-	0/10/25/25	0/5/5/5
2	PJF	L	301	-	-	0/10/25/25	0/5/5/5
2	PJF	B	301	-	-	2/10/25/25	0/5/5/5
2	PJF	F	301	-	-	0/10/25/25	0/5/5/5
2	PJF	C	301	-	-	0/10/25/25	0/5/5/5

The worst 5 of 18 bond length outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(Å)	Ideal(Å)
2	K	301	PJF	C13-N3	-3.15	1.34	1.40
2	L	301	PJF	C13-N3	-3.09	1.34	1.40
2	D	301	PJF	C13-N3	-2.70	1.35	1.40
2	M	301	PJF	C13-N3	-2.39	1.36	1.40
2	G	301	PJF	C13-N3	-2.39	1.36	1.40

The worst 5 of 50 bond angle outliers are listed below:

Mol	Chain	Res	Type	Atoms	Z	Observed(^{o})	Ideal(^{o})
2	L	301	PJF	C22-C23-N5	-5.26	97.50	101.30
2	D	301	PJF	C2-C1-N1	-3.29	169.74	177.87
2	K	301	PJF	C11-C13-N3	3.00	120.37	115.16
2	B	301	PJF	C11-C13-N3	2.99	120.35	115.16
2	L	301	PJF	C11-C13-N3	2.98	120.34	115.16

There are no chirality outliers.

All (4) torsion outliers are listed below:

Mol	Chain	Res	Type	Atoms
2	B	301	PJF	C6-C7-N2-C12
2	B	301	PJF	C6-C7-N2-C8
2	E	301	PJF	N1-C1-C2-C3
2	N	301	PJF	N1-C1-C2-C3

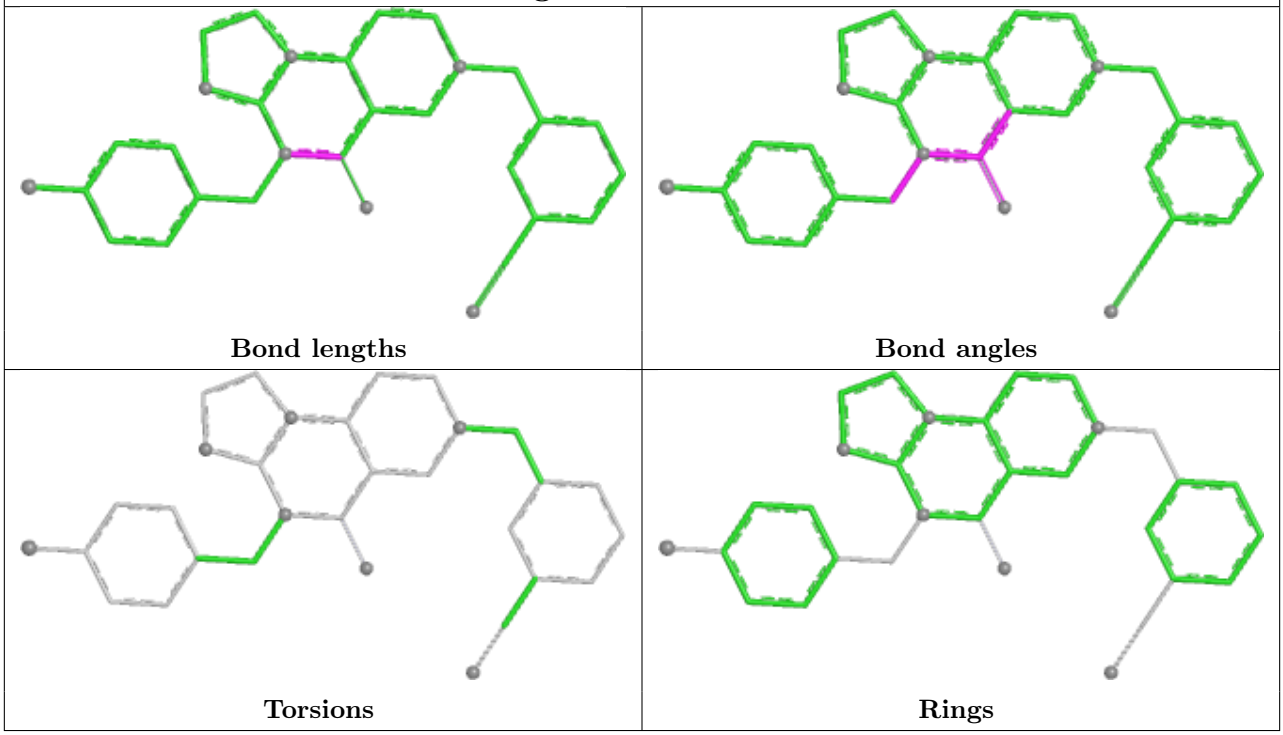
There are no ring outliers.

5 monomers are involved in 13 short contacts:

Mol	Chain	Res	Type	Clashes	Symm-Clashes
2	J	301	PJF	1	0
2	D	301	PJF	1	0
2	K	301	PJF	4	0
2	L	301	PJF	6	0
2	C	301	PJF	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 then 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 PJF J 301



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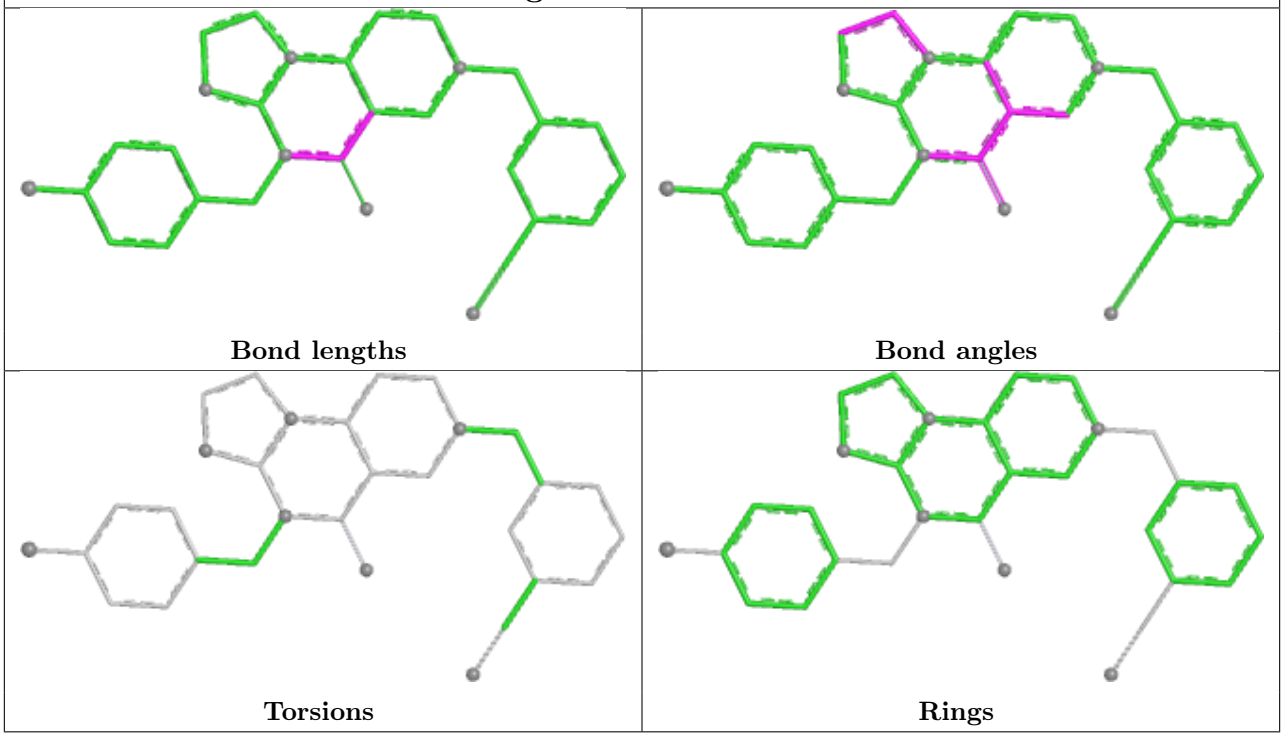

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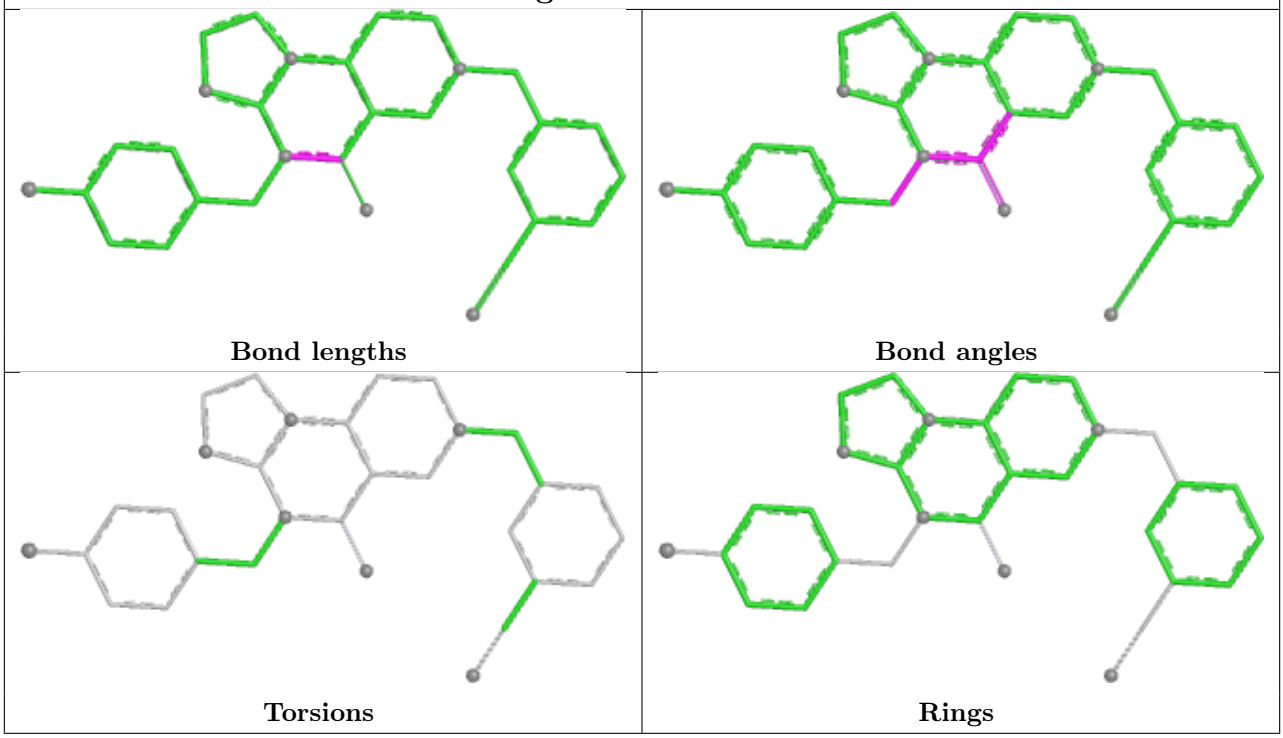

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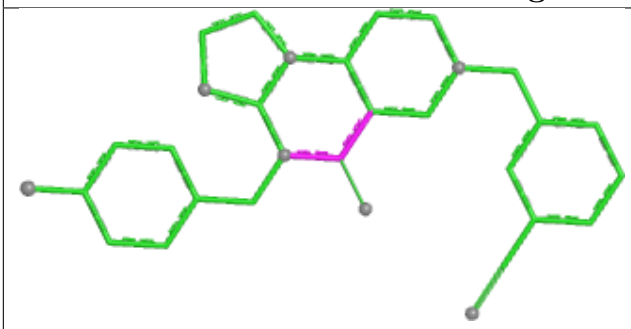

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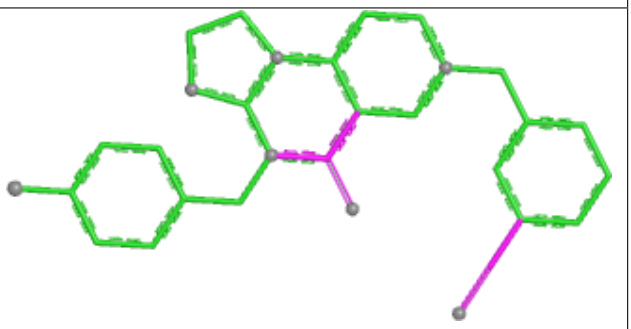
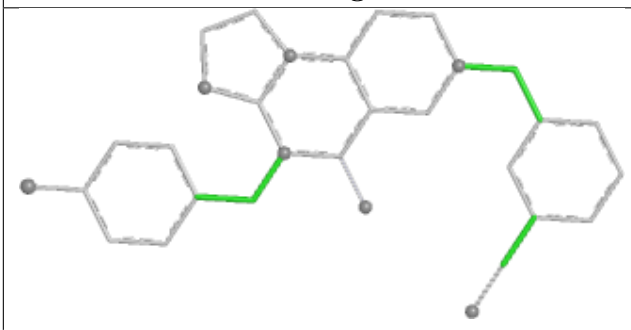
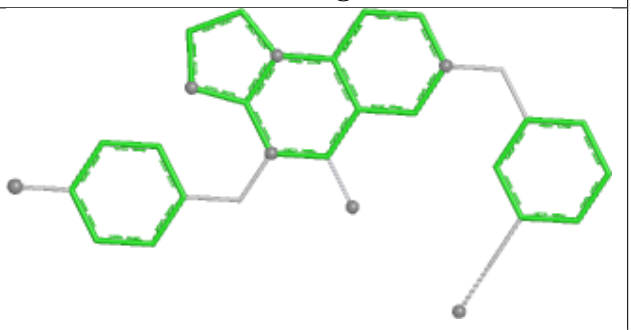


Bond angles

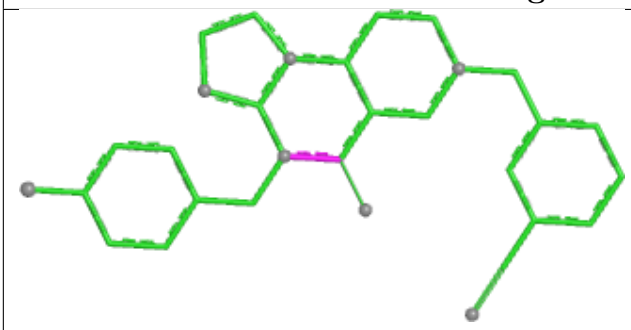


Torsions



Rings

Ligand PJF G 301



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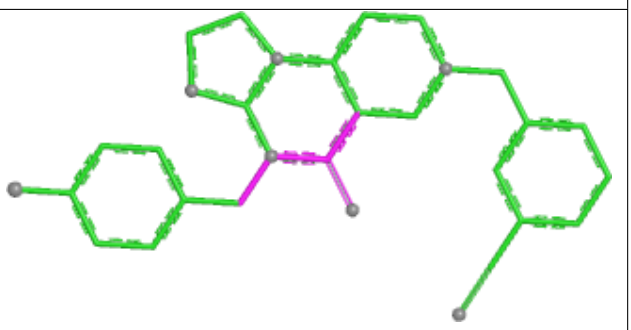

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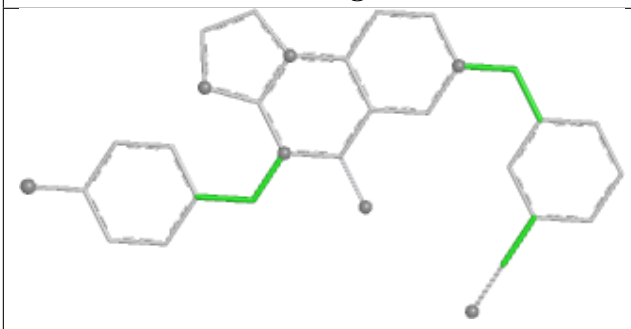

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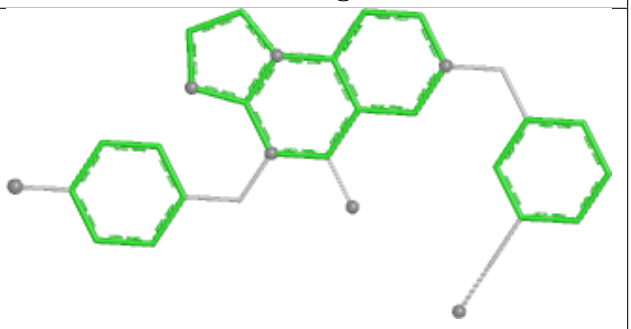
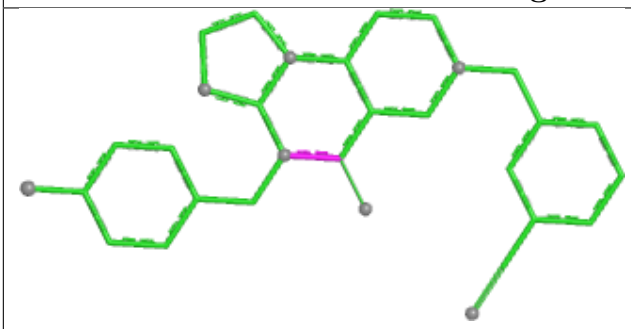


Rings

Ligand PJF E 301



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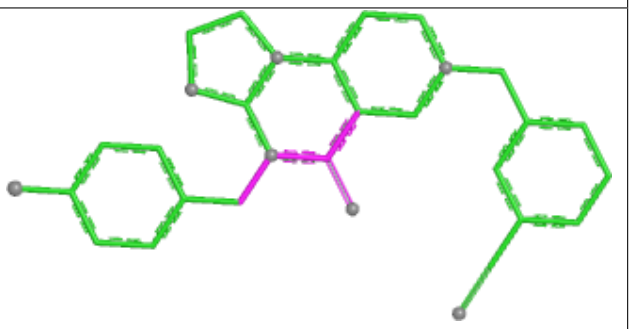

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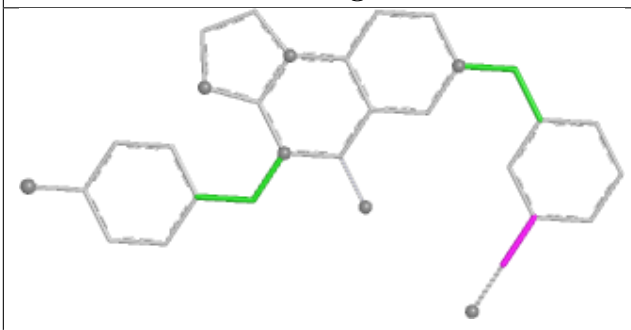

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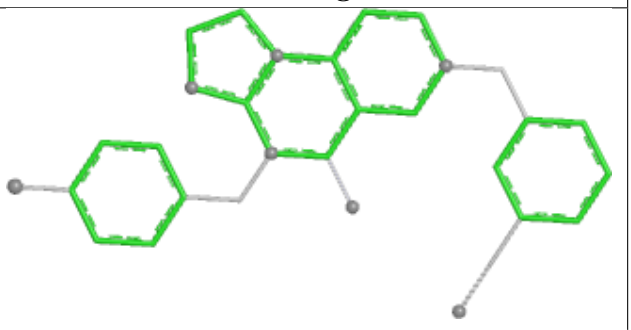
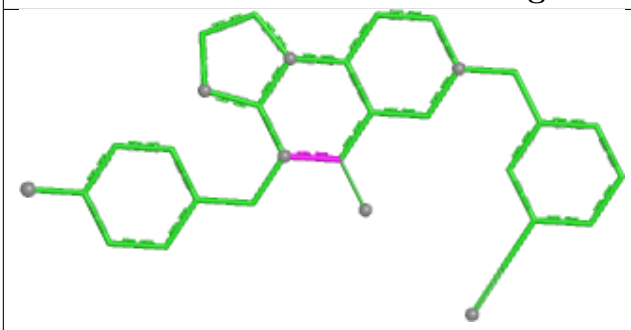


Rings

Ligand PJF A 301



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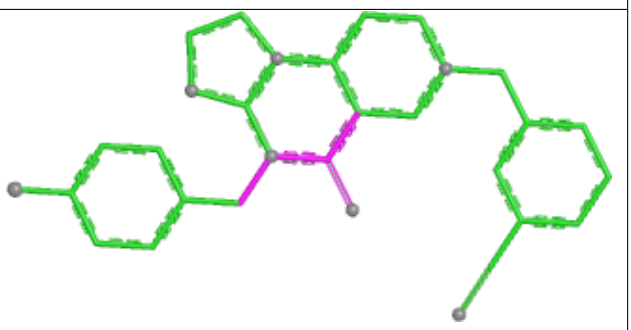

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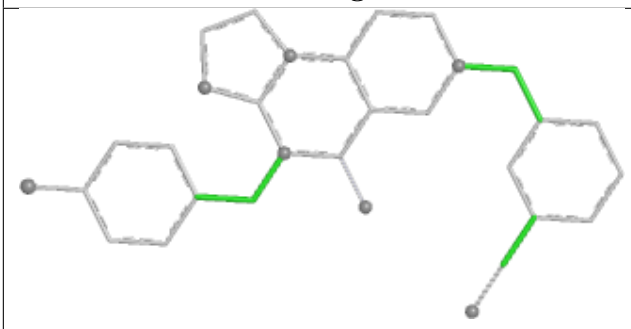

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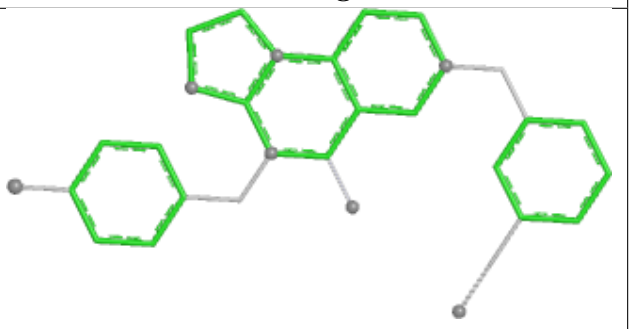
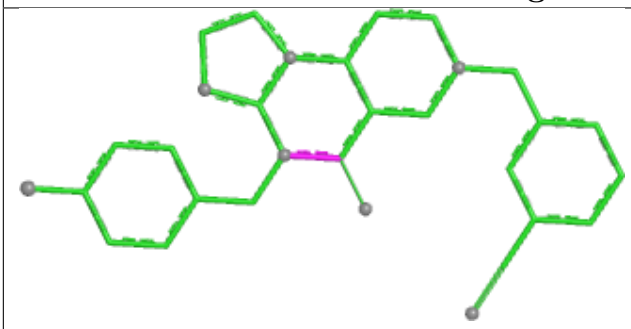


Rings

Ligand PJF H 301



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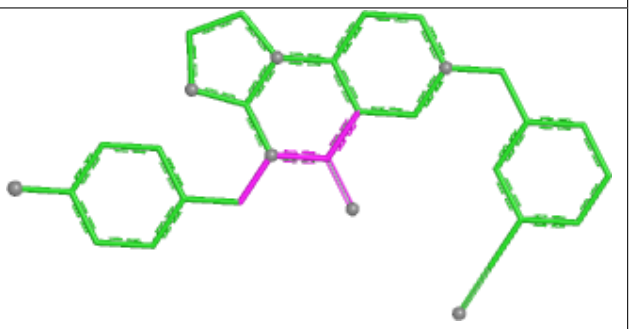

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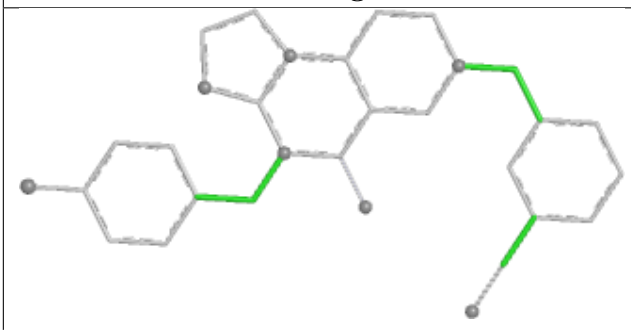

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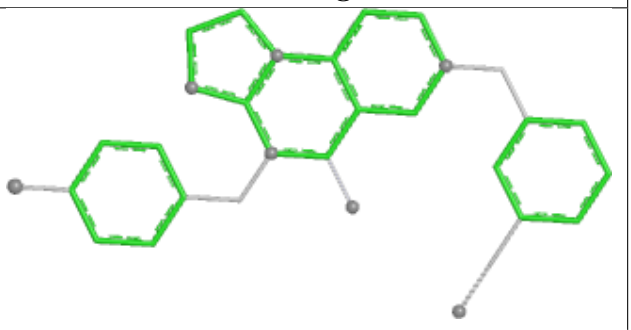
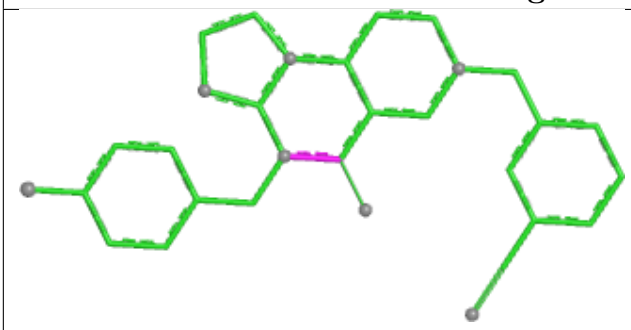


Rings

Ligand PJF N 301



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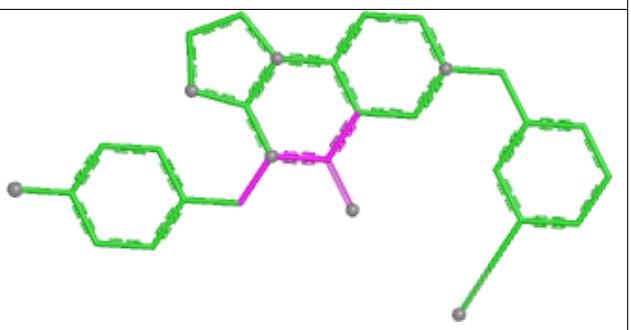
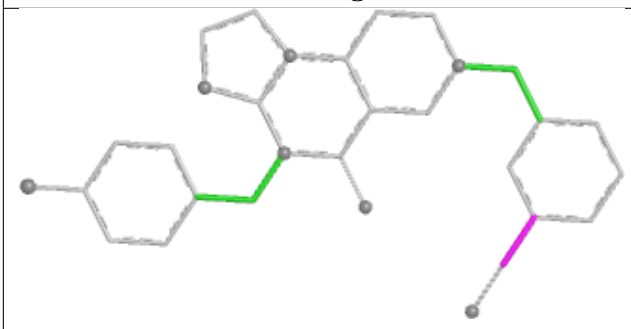


Bond angles



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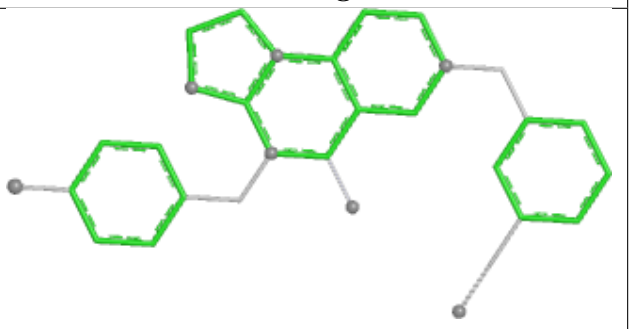
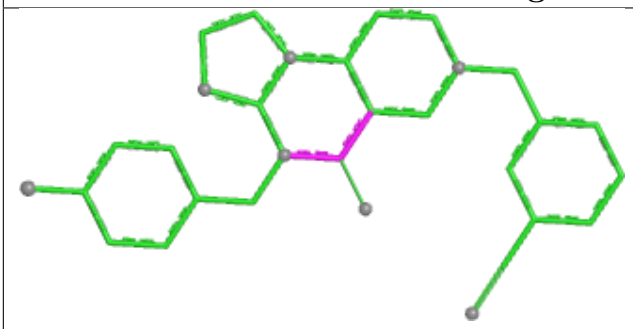
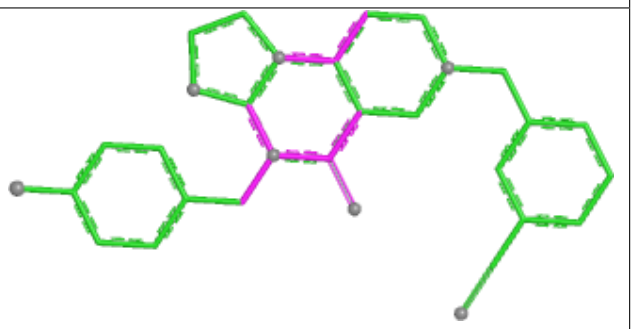


Rings

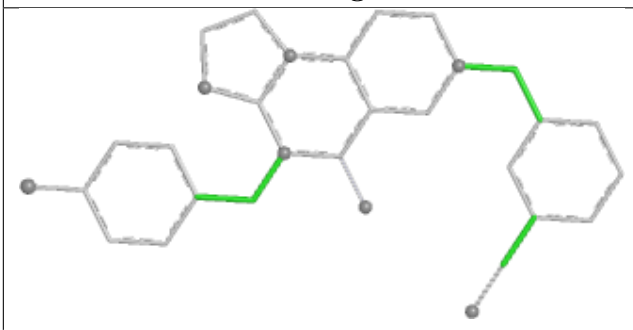
Ligand PJF K 301



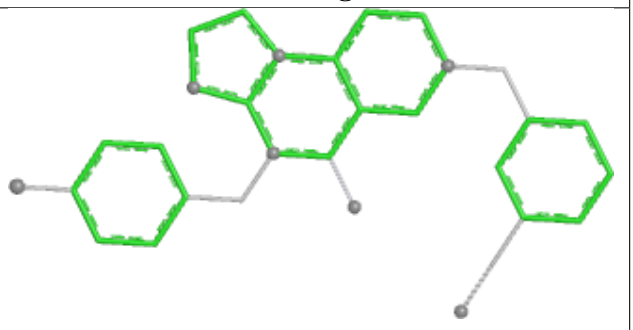
Bond lengths



Bond angles

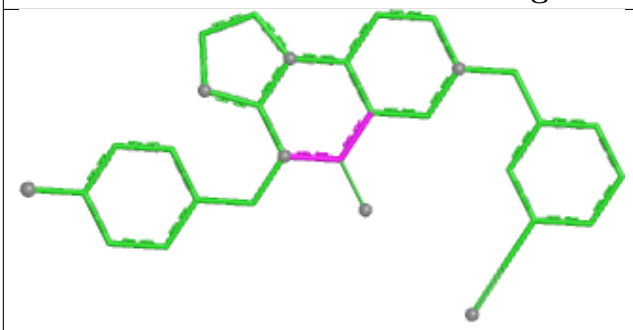


Torsions

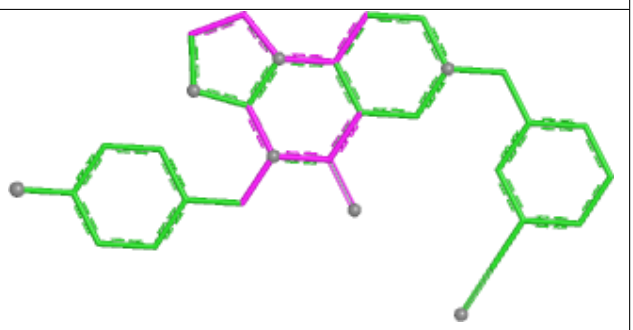


Rings

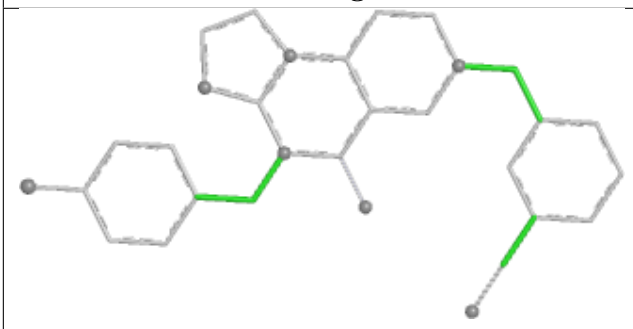
Ligand PJF L 301



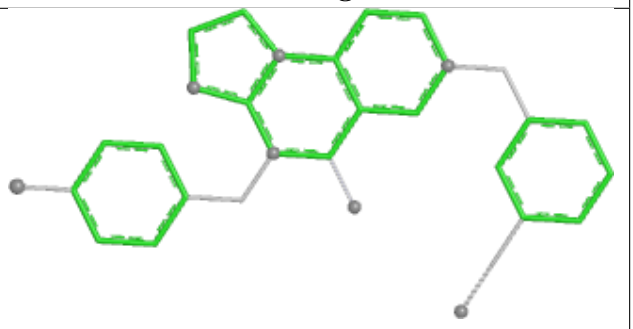
Bond lengths



Bond angles

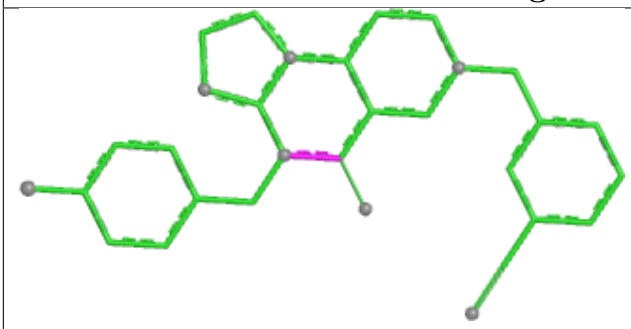


Torsions

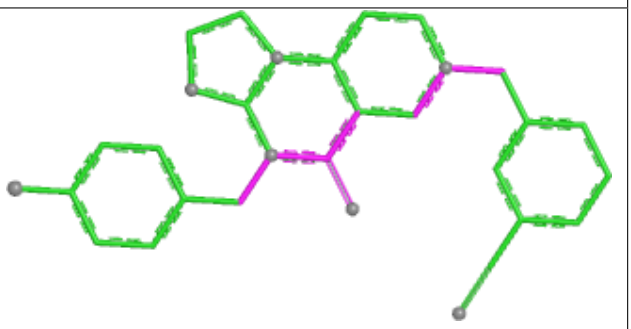


Rings

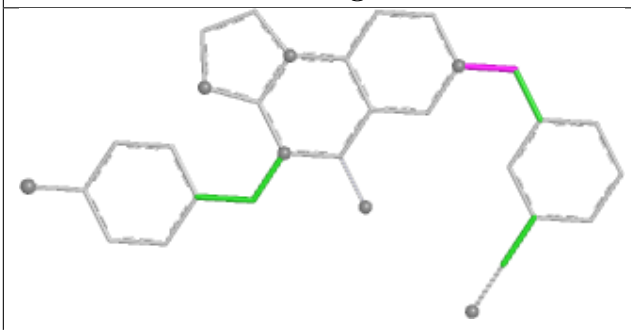
Ligand PJF B 301



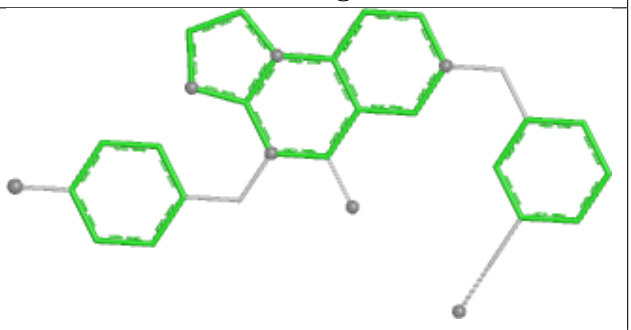
Bond lengths



Bond angles

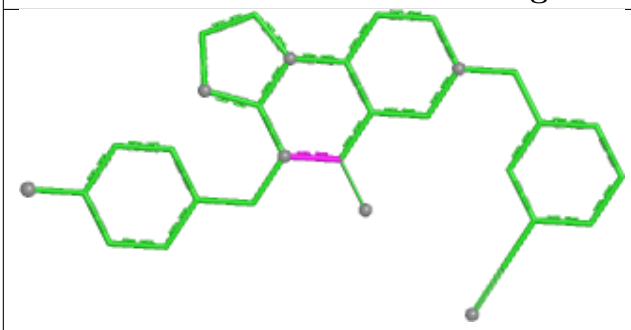


Torsions

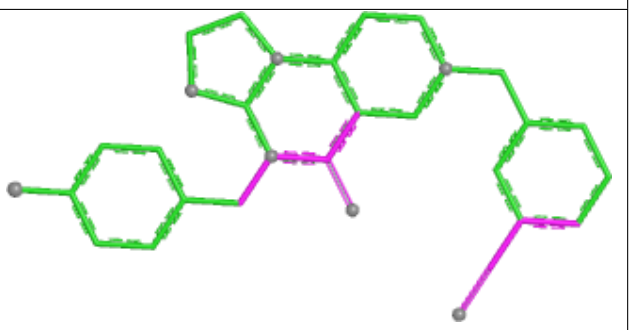


Rings

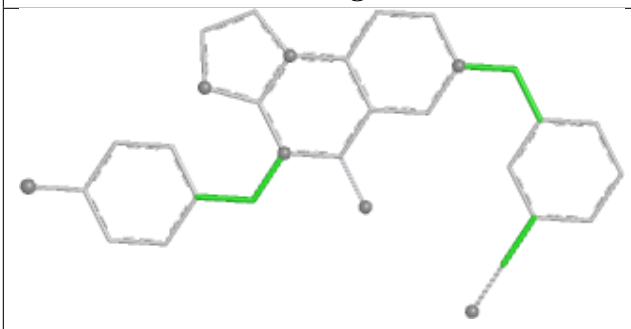
Ligand PJF F 301



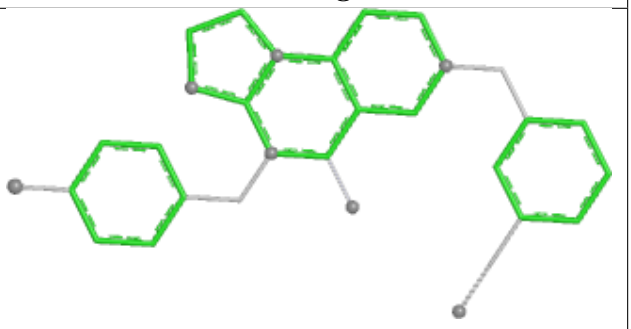
Bond lengths



Bond angles

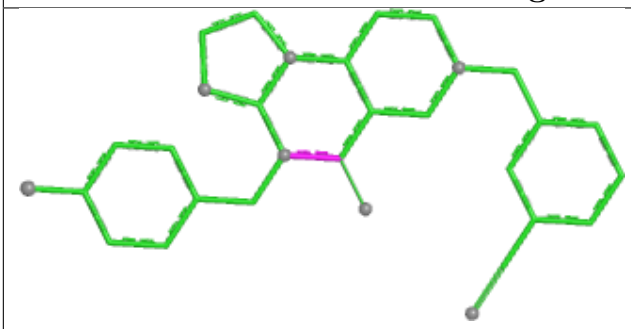


Torsions

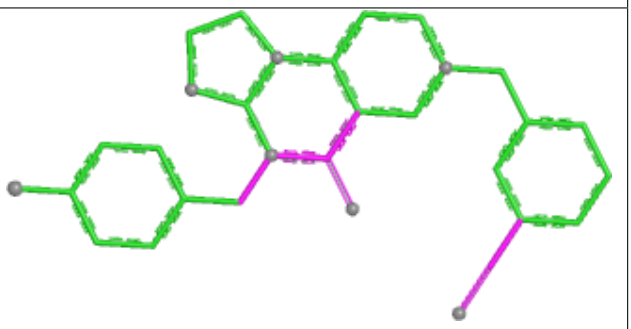


Rings

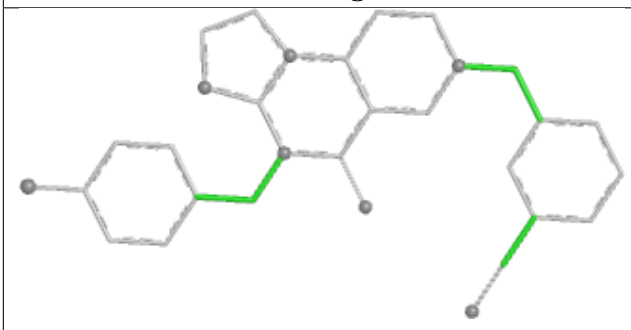
Ligand PJF C 301



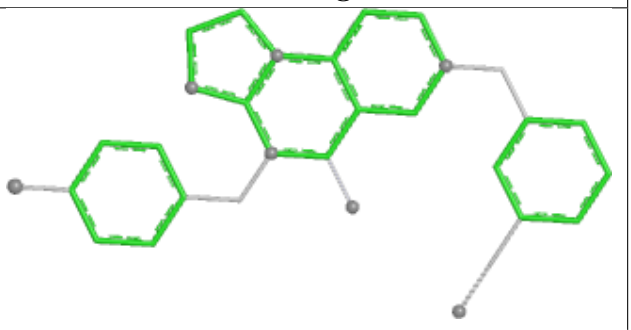
Bond lengths



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, 95^{th} 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	168/221 (76%)	0.57	5 (2%) 52 49	38, 50, 72, 96	0
1	B	167/221 (75%)	0.75	12 (7%) 21 18	43, 55, 83, 100	0
1	C	167/221 (75%)	0.91	18 (10%) 11 9	47, 61, 82, 107	0
1	D	168/221 (76%)	0.86	14 (8%) 17 14	46, 62, 86, 105	0
1	E	169/221 (76%)	0.79	13 (7%) 19 17	42, 56, 78, 95	0
1	F	166/221 (75%)	0.54	5 (3%) 52 49	40, 53, 70, 91	0
1	G	168/221 (76%)	0.40	7 (4%) 40 37	32, 46, 71, 88	0
1	H	166/221 (75%)	0.69	9 (5%) 31 27	46, 58, 77, 106	0
1	I	165/221 (74%)	0.93	15 (9%) 15 12	45, 63, 80, 95	0
1	J	167/221 (75%)	1.53	45 (26%) 1 1	49, 73, 94, 116	0
1	K	170/221 (76%)	1.65	45 (26%) 1 1	55, 73, 99, 116	0
1	L	164/221 (74%)	1.42	31 (18%) 3 3	43, 71, 88, 119	0
1	M	166/221 (75%)	1.21	26 (15%) 5 4	47, 63, 87, 103	0
1	N	168/221 (76%)	0.79	13 (7%) 19 17	45, 59, 76, 106	0
All	All	2339/3094 (75%)	0.93	258 (11%) 10 9	32, 61, 86, 119	0

The worst 5 of 258 RSRZ outliers are listed below:

Mol	Chain	Res	Type	RSRZ
1	N	75	ILE	6.9
1	M	191	ILE	6.4
1	A	76	TYR	6.2
1	N	76	TYR	5.8
1	K	249	PRO	5.6

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)

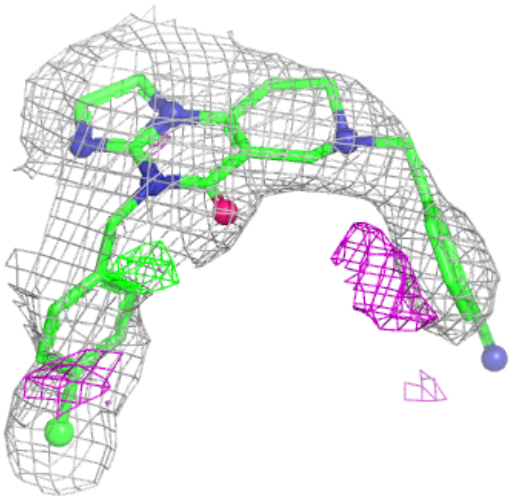
In the following table, the Atoms column lists the number of modelled atoms in the group and the number defined in the chemical component dictionary. The B-factors column lists the minimum, median, 95^{th} percentile and maximum values of B factors of atoms in the group. The column labelled 'Q< 0.9'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

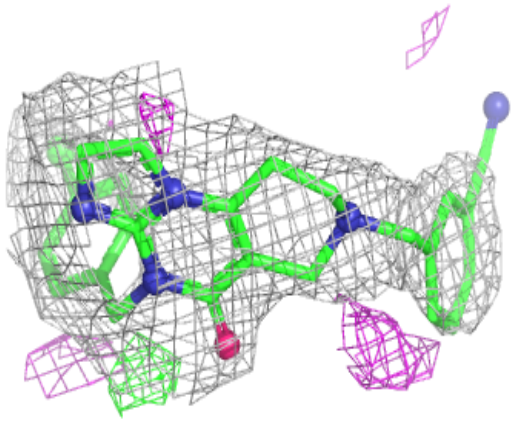
Mol	Type	Chain	Res	Atoms	RSCC	RSR	B-factors(Å^2)	Q<0.9
2	PJF	K	301	31/31	0.84	0.17	66,79,91,97	0
2	PJF	L	301	31/31	0.85	0.18	71,82,93,105	0
2	PJF	M	301	31/31	0.88	0.14	54,64,78,84	0
2	PJF	J	301	31/31	0.91	0.14	64,76,83,89	0
2	PJF	H	301	31/31	0.92	0.12	49,62,69,75	0
2	PJF	B	301	31/31	0.93	0.11	36,51,60,70	0
2	PJF	I	301	31/31	0.93	0.12	57,65,70,72	0
2	PJF	D	301	31/31	0.93	0.11	50,60,66,69	0
2	PJF	N	301	31/31	0.93	0.11	48,61,69,80	0
2	PJF	A	301	31/31	0.94	0.10	40,46,53,69	0
2	PJF	E	301	31/31	0.94	0.12	51,56,65,66	0
2	PJF	C	301	31/31	0.94	0.10	43,51,58,60	0
2	PJF	G	301	31/31	0.95	0.10	39,46,52,58	0
2	PJF	F	301	31/31	0.95	0.10	40,47,54,66	0

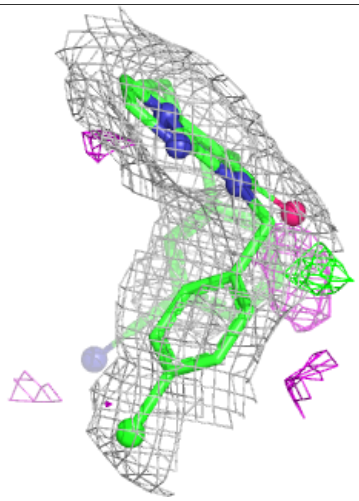
The following is a graphical depiction of the model fit to experimental electron density of all instances of the Ligand of Interest. In addition, ligands with molecular weight > 250 and outliers as shown on the geometry validation Tables will also be included. Each fit is shown from different orientation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

Electron density around PJF K 301:

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

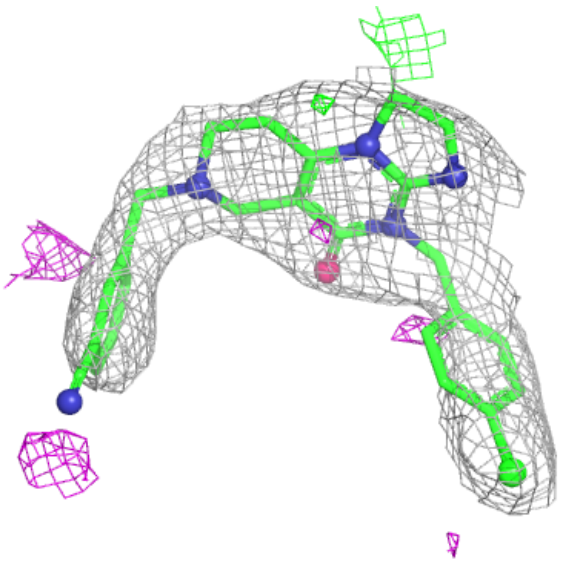


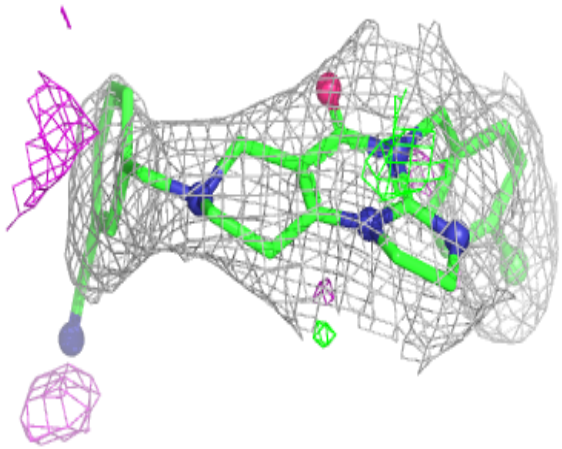


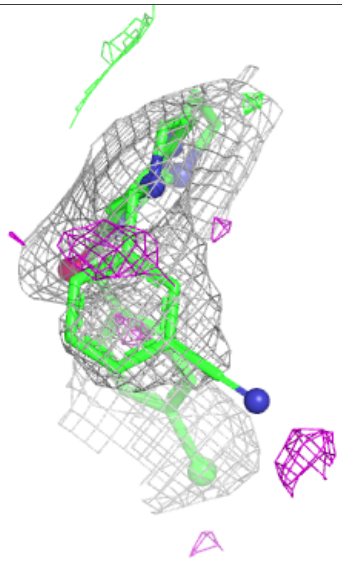


Electron density around PJF L 301:

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

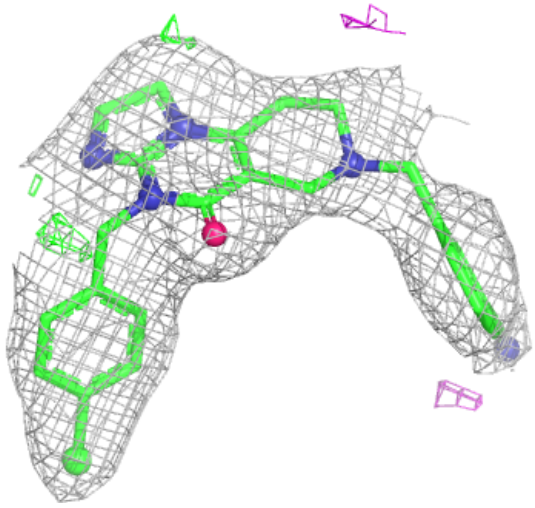


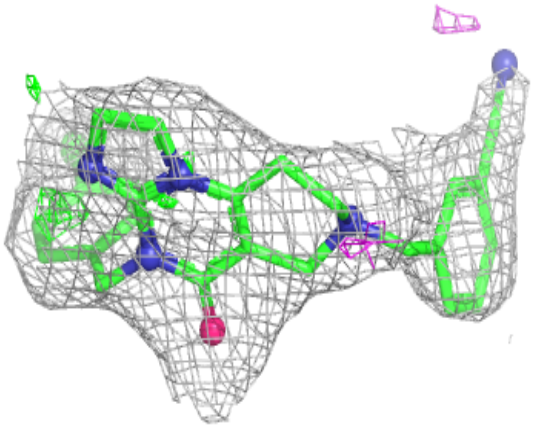


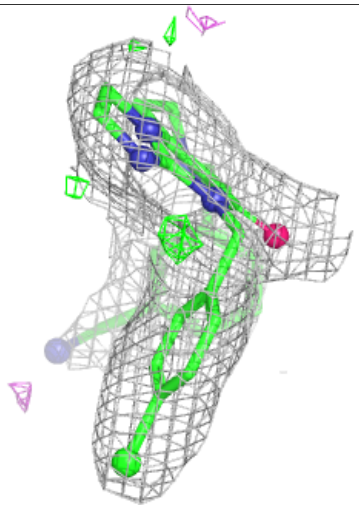


Electron density around PJF M 301:

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

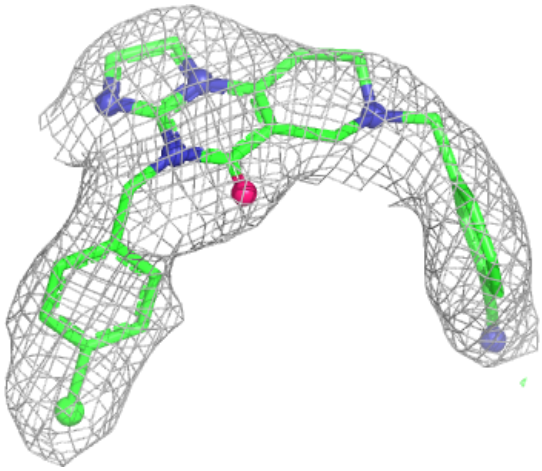


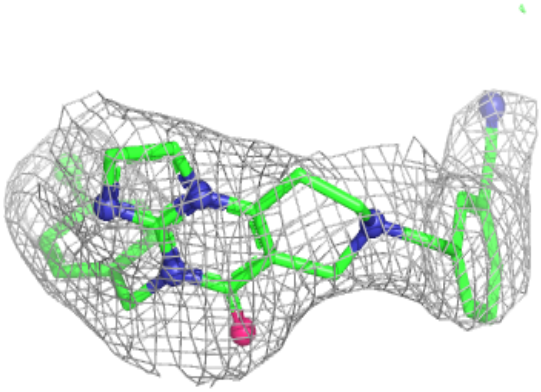


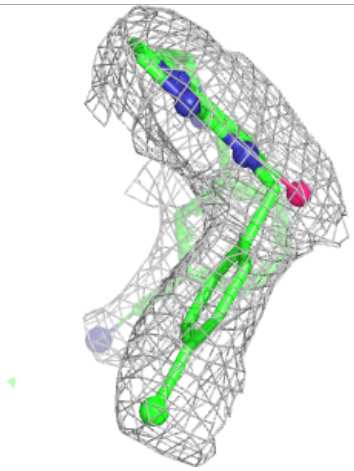


Electron density around PJF J 301:

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

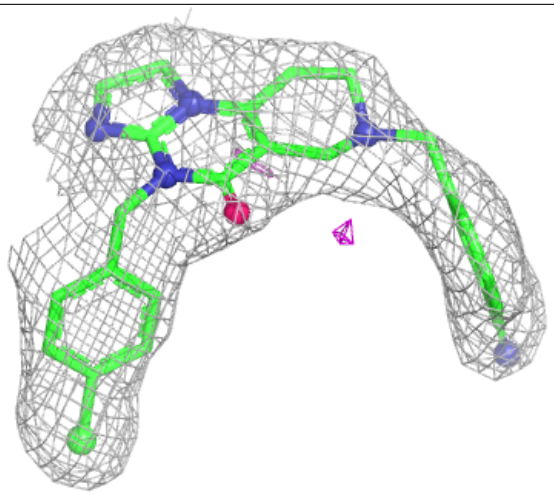


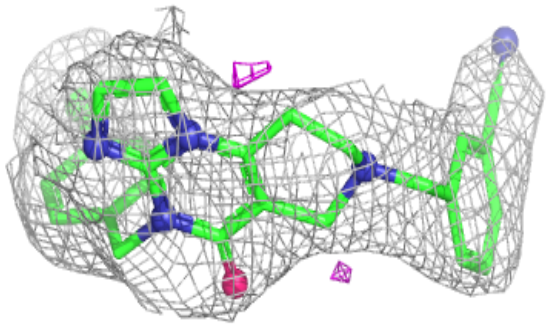


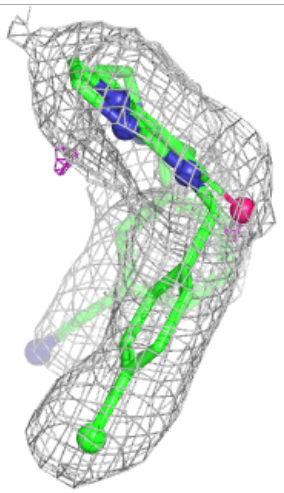


Electron density around PJF H 301:

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

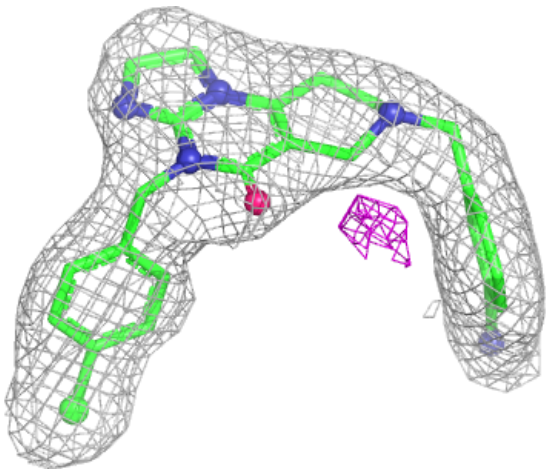


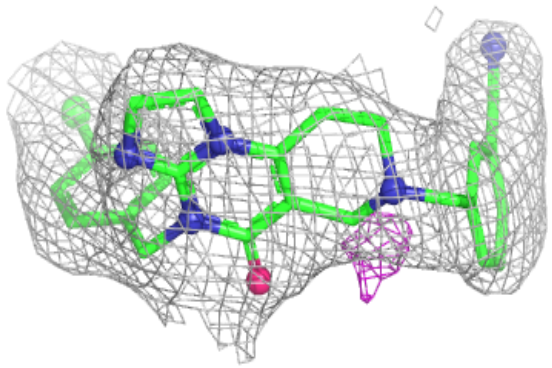


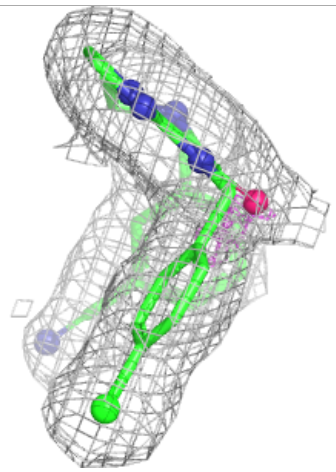


Electron density around PJF B 301:

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

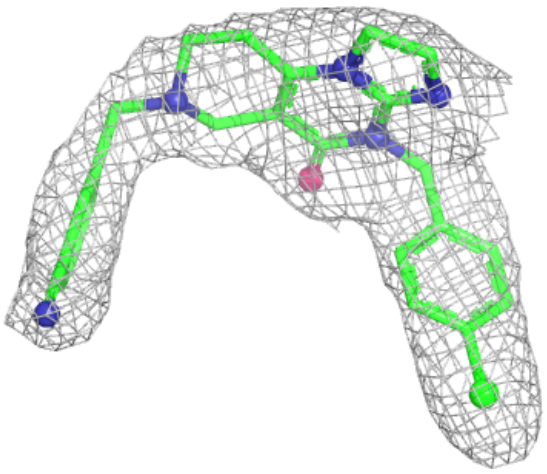


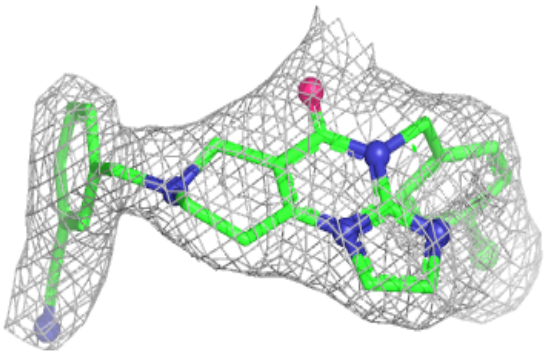


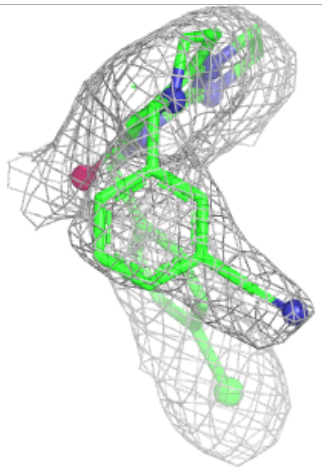


Electron density around PJF I 301:

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

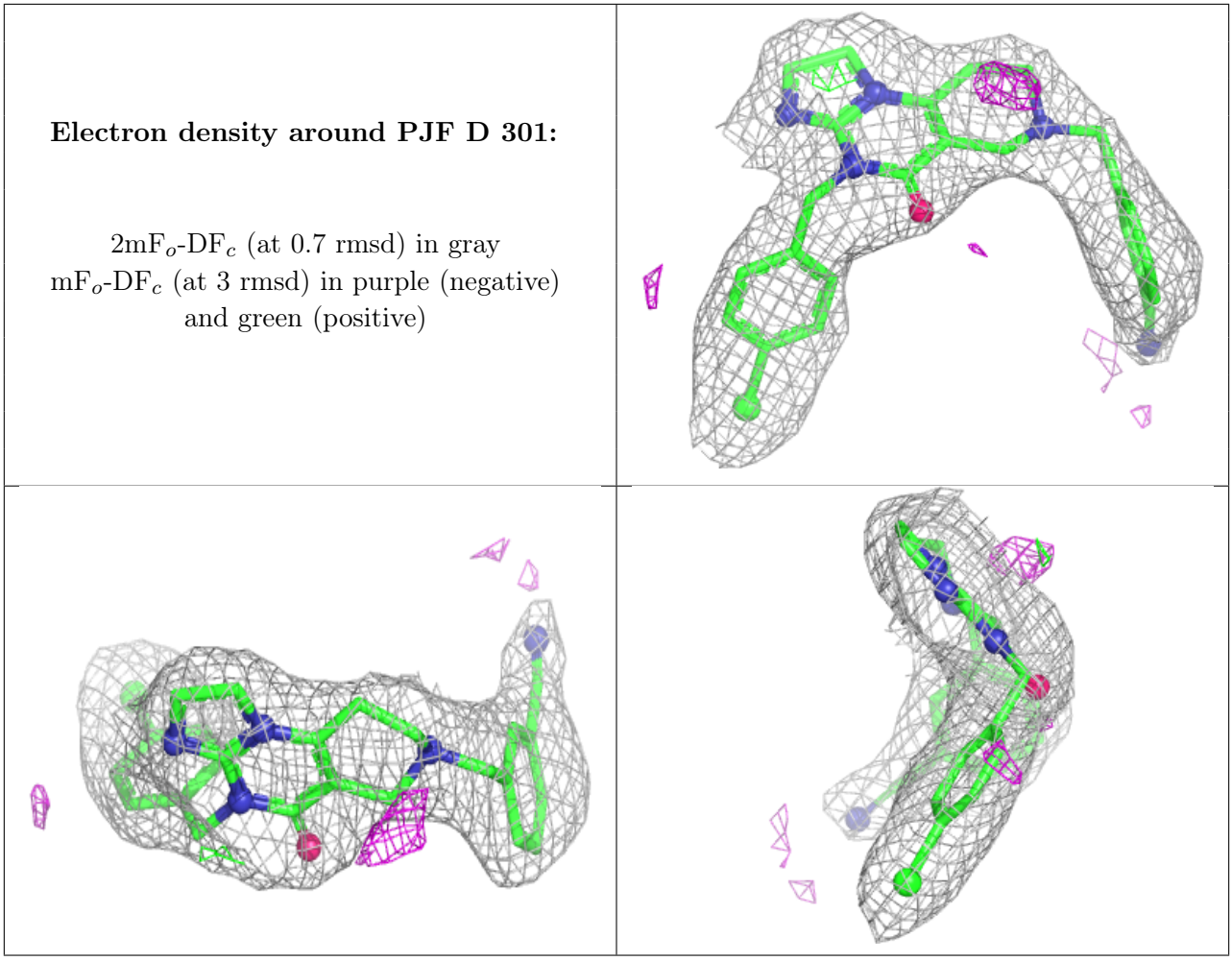






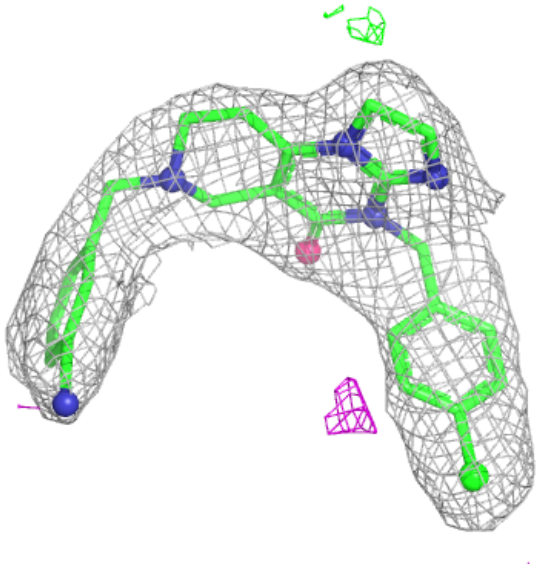
Electron density around PJF D 301:

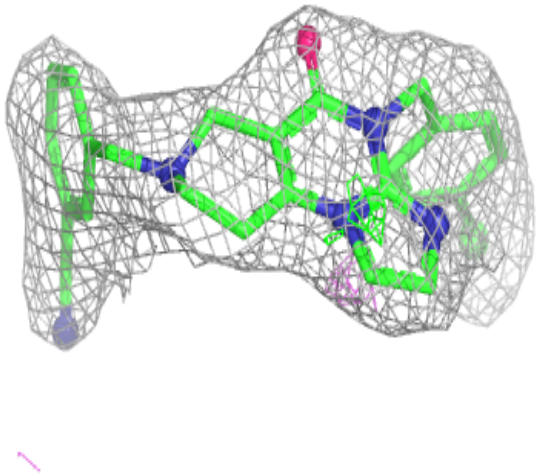
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

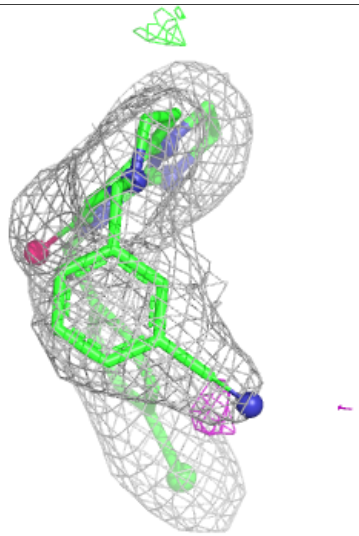


Electron density around PJF N 301:

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

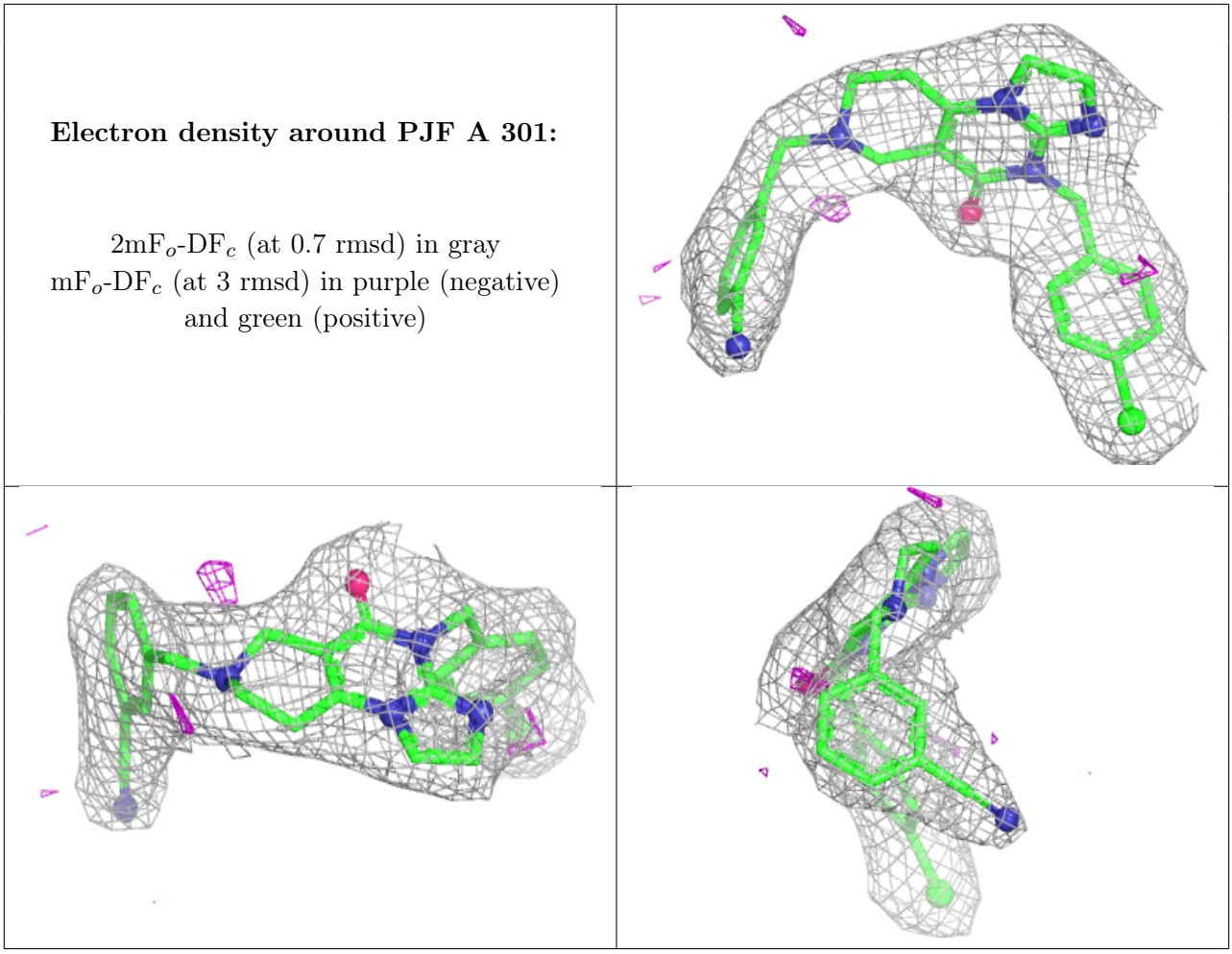






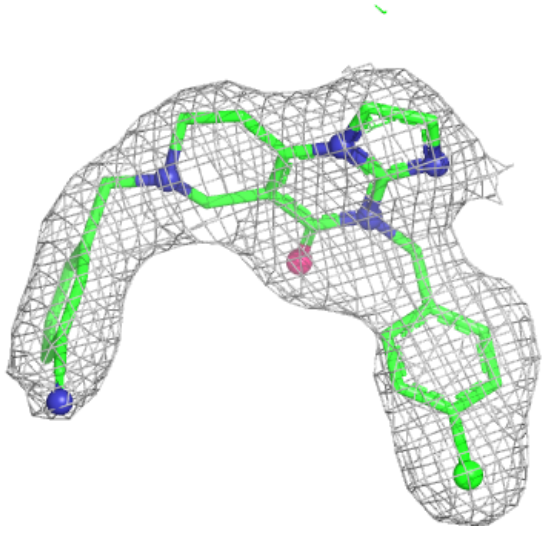
Electron density around PJF A 301:

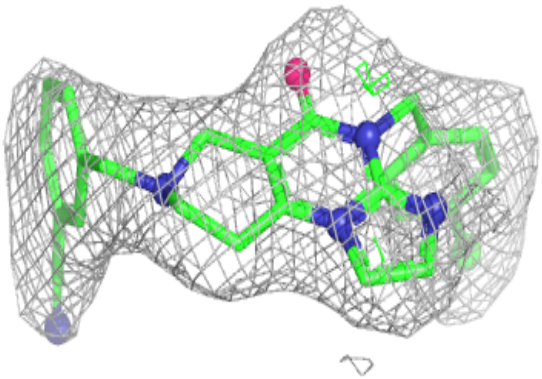
$2mF_o$-DF_c (at 0.7 rmsd) in gray
mF_o-DF_c (at 3 rmsd) in purple (negative) and green (positive)

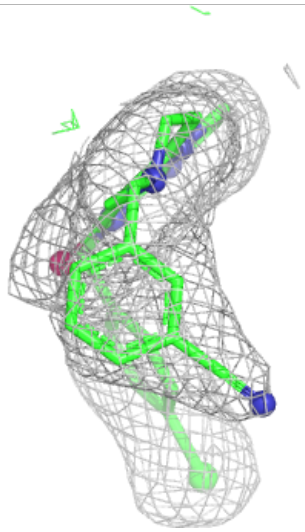


Electron density around PJF E 301:

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

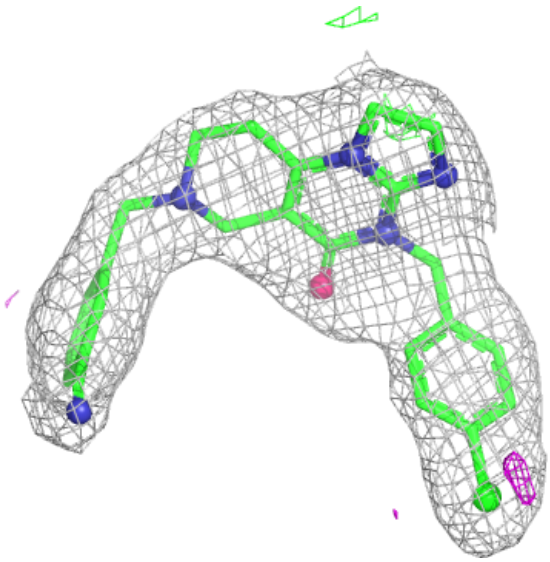


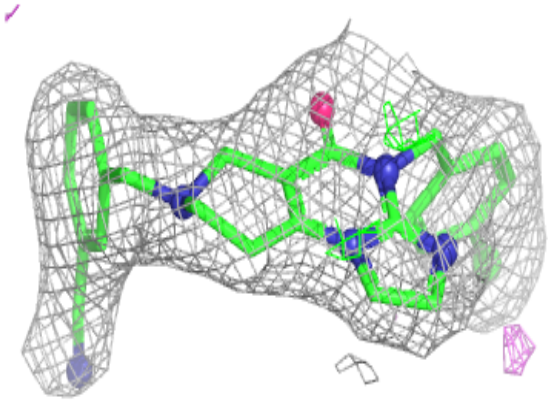


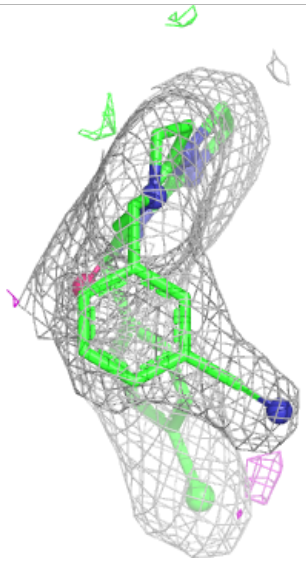


Electron density around PJF C 301:

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

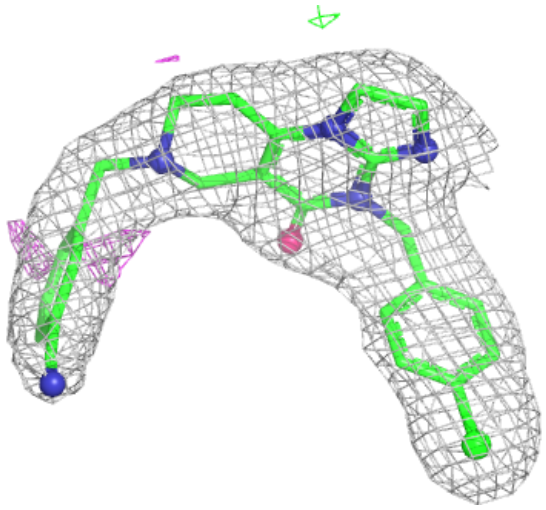


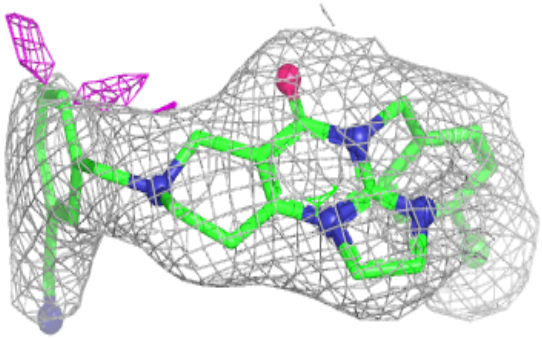


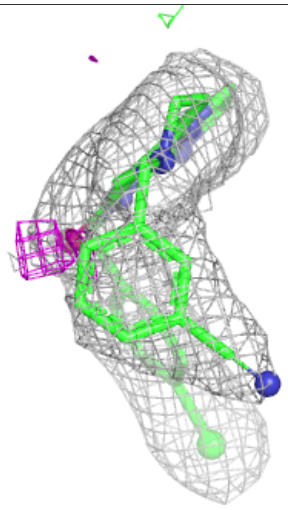


Electron density around PJF G 301:

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

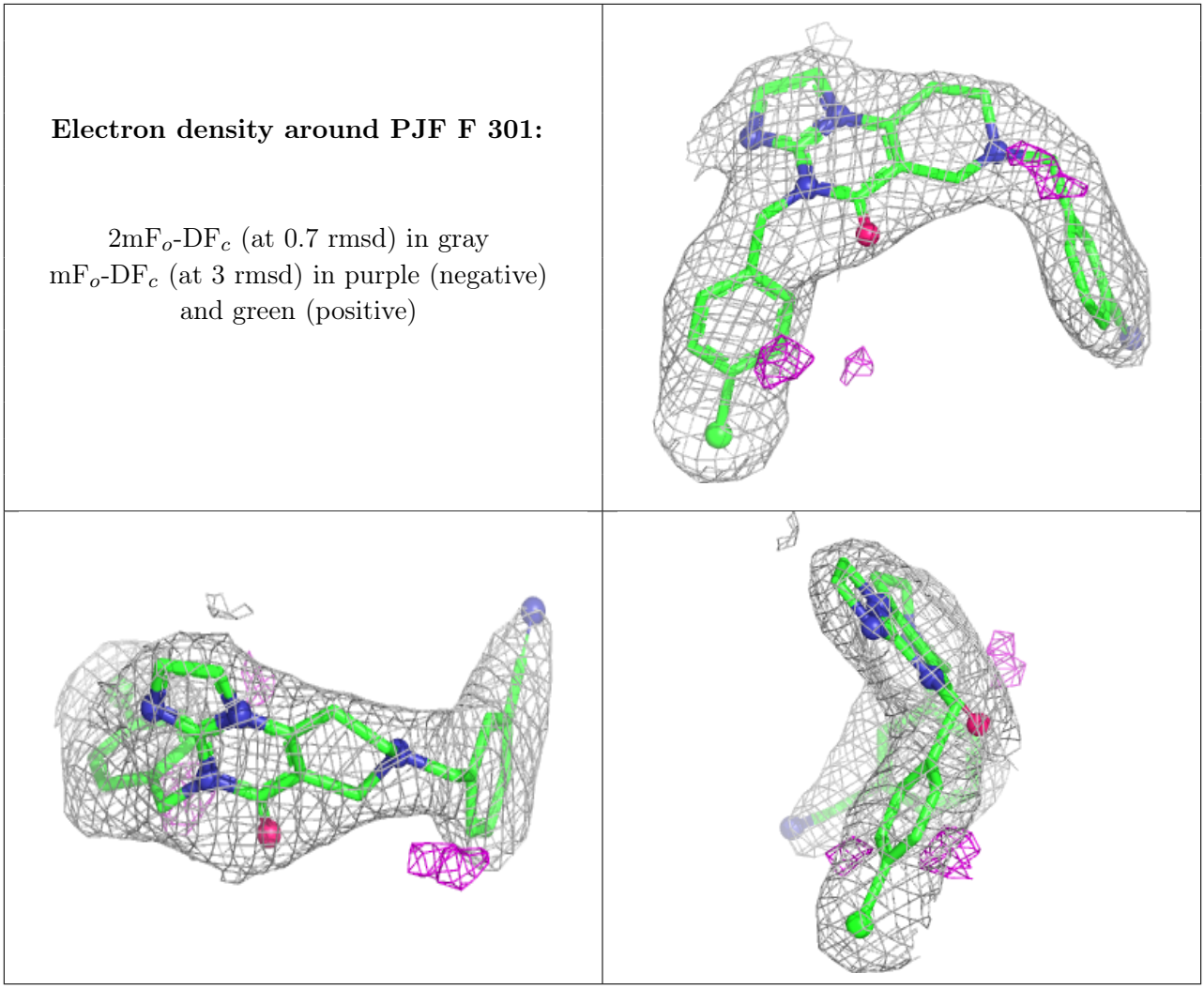






Electron density around PJF F 301:

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



6.5 Other polymers

There are no such residues in this entry.