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Supplementary Materials

5-(4-fluorophenyl)-3-(naphthalen-1-yl)-1-phenyl-1*H*-pyrazole

Jasril Jasril [1], Neni Frimayanti [2], Yuana Nurulita [1], Adel Zamri [1], Ihsan Ikhtiarudin [2] and Guntur Guntur [1,*]

[1] Department of Chemistry, Faculty of Mathematics and Natural Sciences, Universitas Riau, Jalan H.R. Subrantas KM. 12.5, Pekanbaru 28293, Indonesia; jasril.k@lecturer.unri.ac.id; guntur5607@student.unri.ac.id; ynurulita@lecturer.unri.ac.id; adel.zamri@lecturer.unri.ac.id

[2] Department of Pharmacy, Sekolah Tinggi Ilmu Farmasi (STIFAR) Riau, Jalan Kamboja, Pekanbaru 28293, Indonesia; nenifrimayanti@gmail.com; ihsanikhtiarudin@stifar-riau.ac.id

* Correspondence: guntur5607@student.unri.ac.id

Abstract: A new fluorinated pyrazole, 5-(4-fluorophenyl)-3-(naphthalen-1-yl)-1-phenyl-1*H*-pyrazole was successfully synthesized via a two-step reaction. Firstly, the synthesis of pyrazoline was performed via one-pot three-component reaction under microwave irradiation. Secondly, the synthesis of pyrazole was performed via oxidative aromatization of pyrazoline under conventional heating. The structure of the synthesized compound was confirmed by spectroscopic analysis, including FT-IR, HR-MS, 1D and 2D NMR analysis. Then, molecular docking study showed that the binding affinity of the synthesized compound to human estrogen alpha receptor (ERα) was close to 4-OHT as a native ligand.

Keywords: fluorinated pyrazole; one-pot reaction; three-component reaction; anti-breast cancer; molecular docking; human estrogen alpha

Figure 1. The IR spectra of compound **5.**

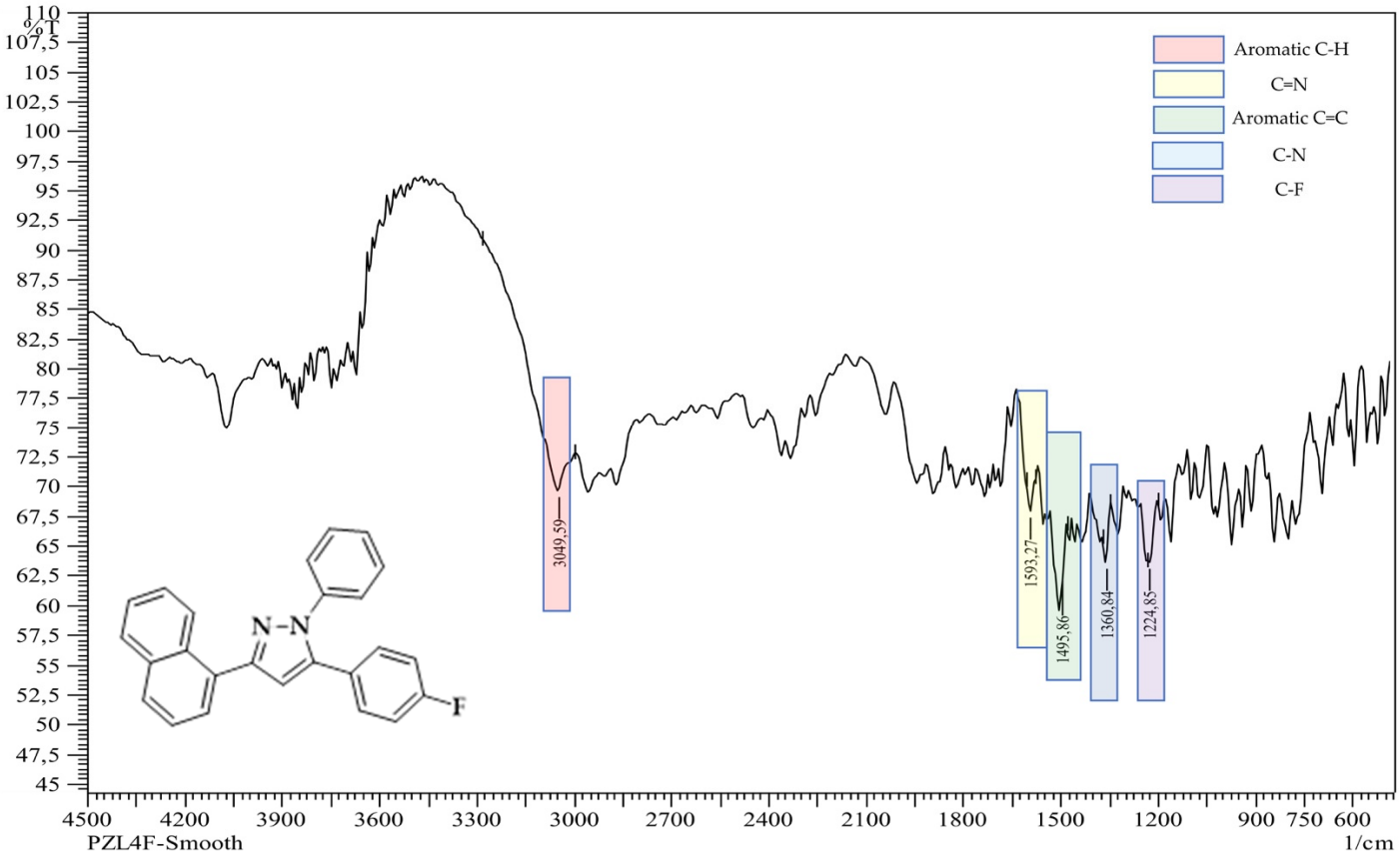


Figure 2. The ^{1}H NMR spectra of compound 5 (in $CDCl_3$, 500 MHz).

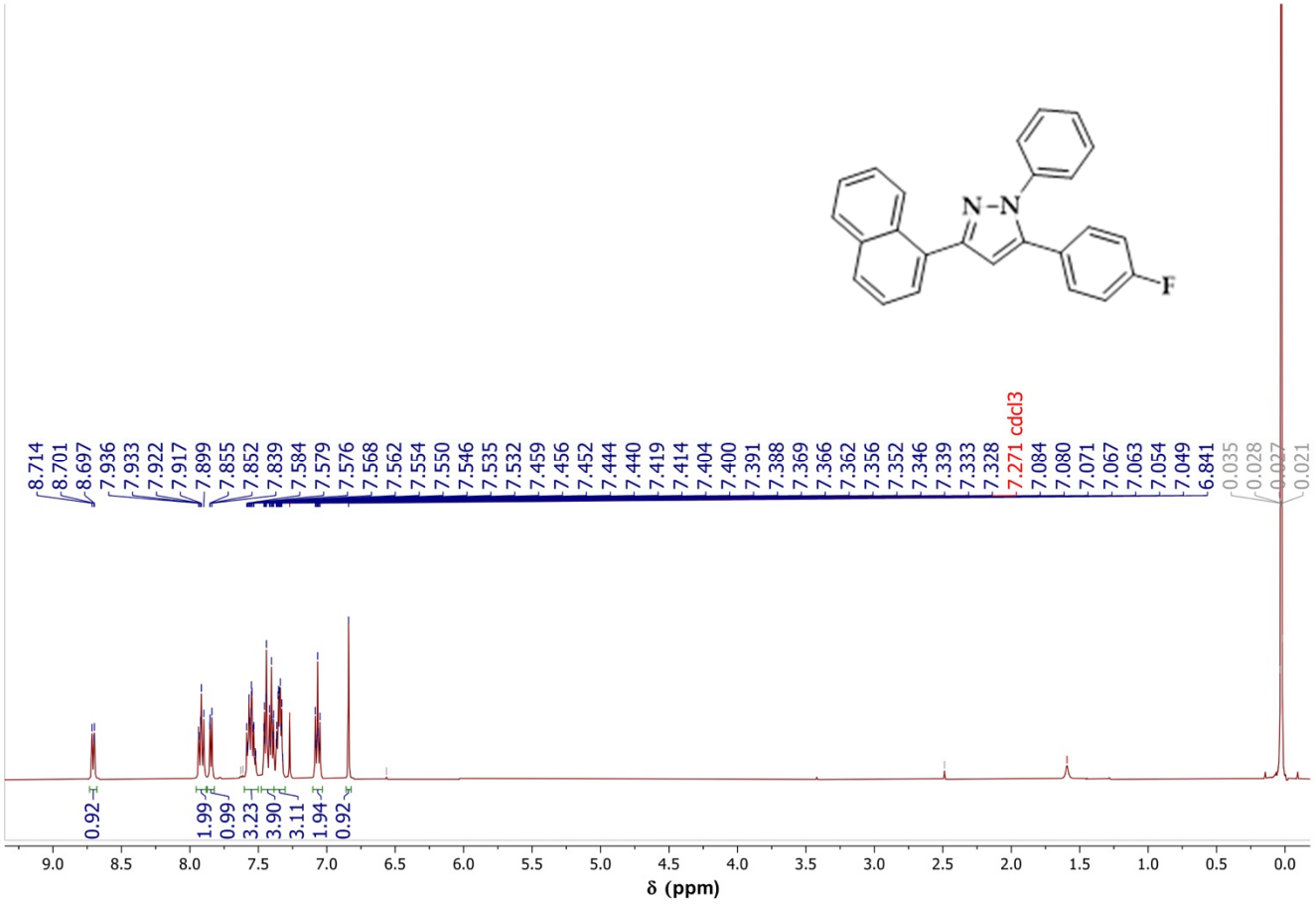


Figure 3. The ^{1}H NMR spectra of compound 5, expansion in aromatic region (in $CDCl_3$, 500 MHz).

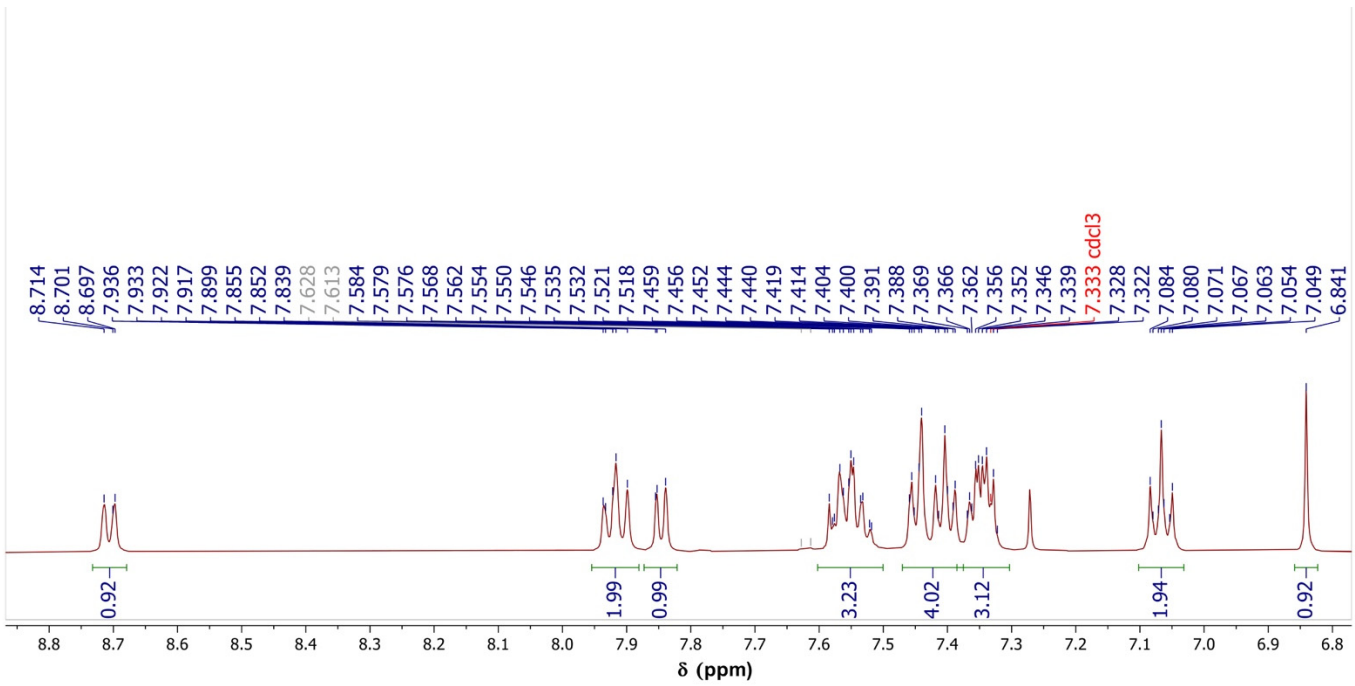


Figure 4. The ^{13}C NMR spectra of compound 5 (in $CDCl_3$, 125 MHz).

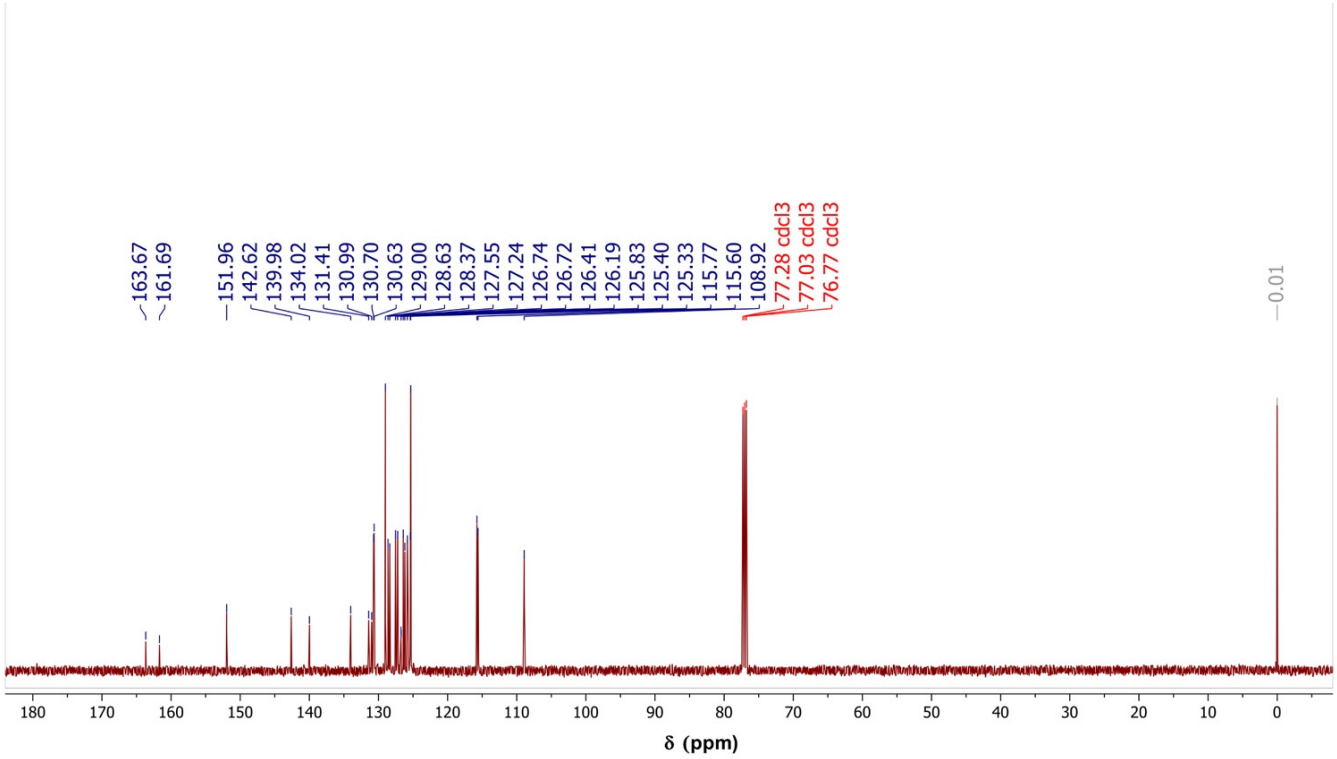


Figure 5. The ^{13}C NMR spectra of compound 5, expansion in aromatic region (in $CDCl_3$, 125 MHz).

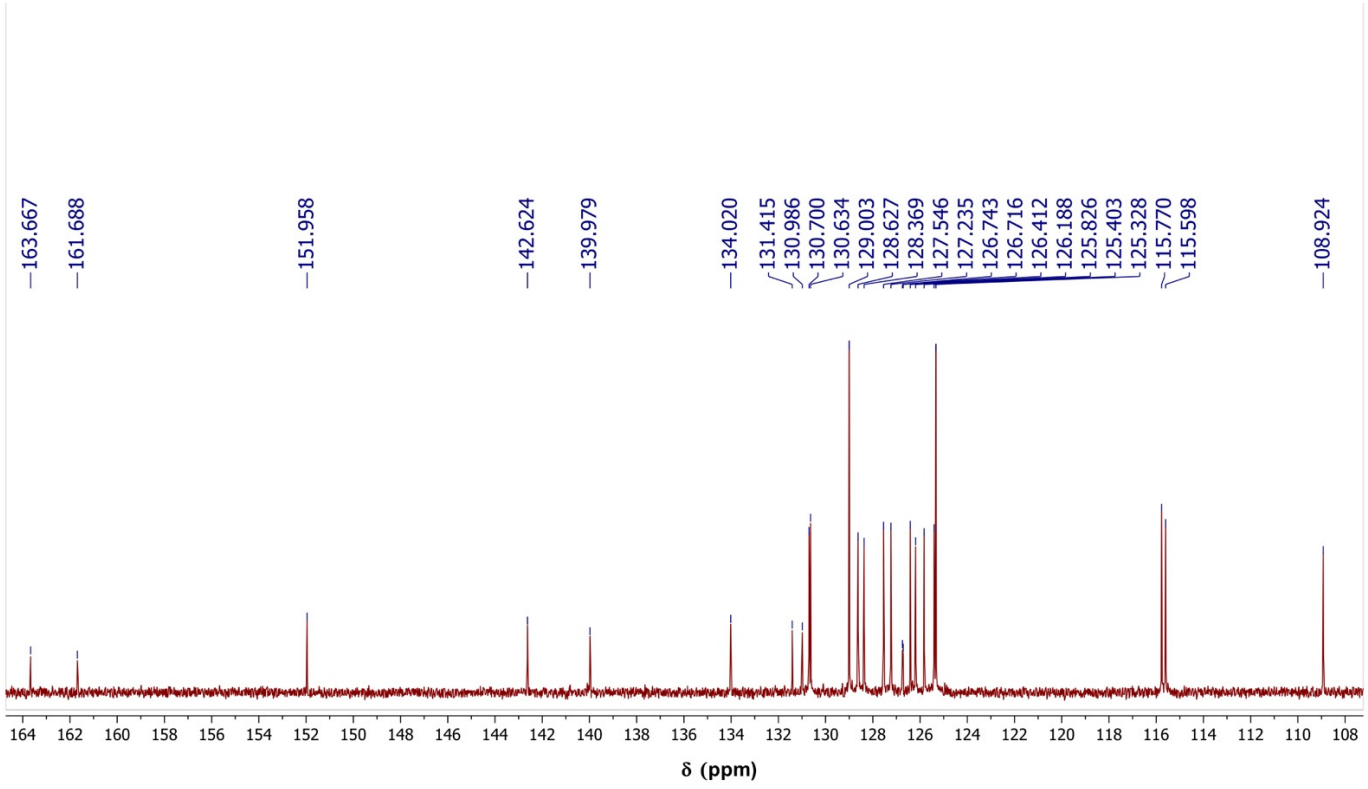


Figure 6. The HSQC spectrum of compound 5.

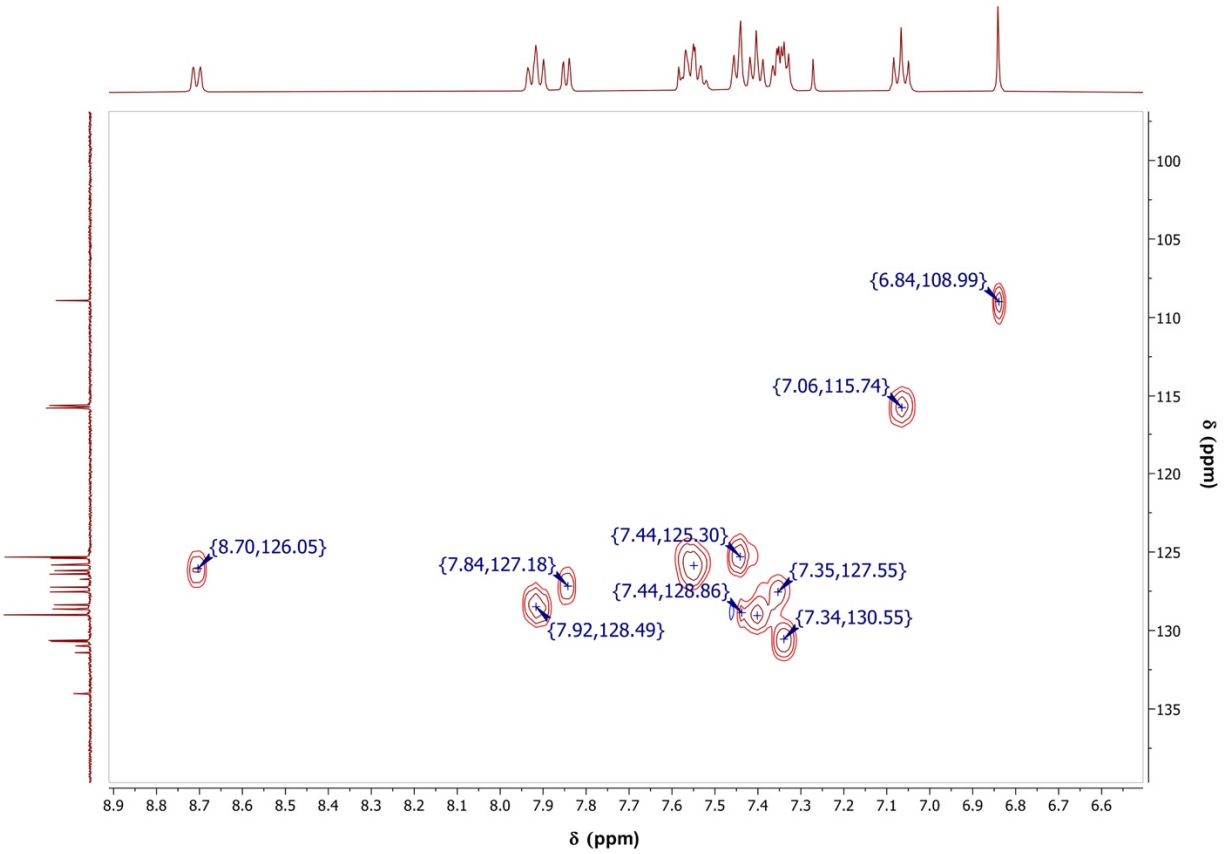


Figure 7. The HMBC spectra of compound 5.

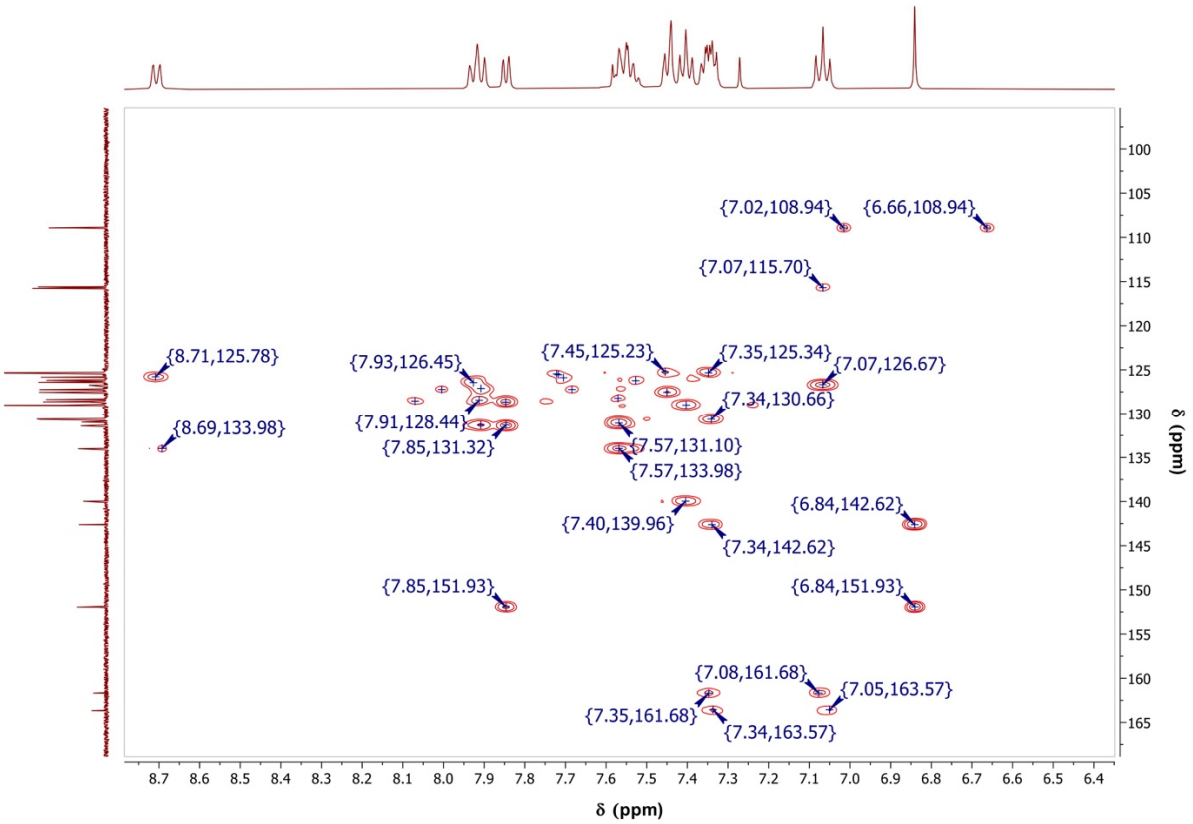
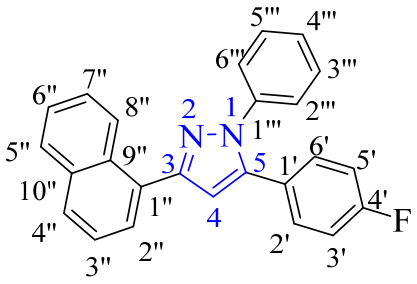


Table 1. The NMR Spectroscopic data of compound **5** (500 MHz for ^{1}H and 125 Hz for ^{13}C in $CDCl_3$).



Position	δ_C (ppm), multiplicity. *J*	δ_H (ppm), multiplicity. *J*	HMBC
3	151.90	-	-
4	108.91	6.83 (s)	3, 5
5	142.58	-	-
1'	126.73	-	-
	(d, $^{4}J_{C-F}$ = 3.3. Hz)		
2'	130.67	7.35 (dd. *J* = 5.8; 2.8 Hz)	1', 6', 5
	(d, $^{3}J_{C-F}$ = 8.2 Hz)		
3'	115.68	7.07 (t, *J* = 8.6)	4', 1'
	(d, $^{2}J_{C-F}$ = 21.6)		
4'	162.68	-	-
	(d, $^{1}J_{C-F}$ = 248.9)		
5'	115.68	7.07 (t, *J* = 8.6)	4', 1'
	(d, $^{2}J_{C-F}$ = 21.6)		
6'	130.67	7.35 (dd *J* = 5.8; 2.8 Hz)	4', 5, 1'
	(d, $^{3}J_{C-F}$ = 8.2 Hz)		
1''	128.63	-	-
2''	127.11	7.85 (d, *J* = 7 Hz)	3, 4''
3''	125.40	7.60 - 7.51 (m)	1'', 10''
4''	131.28	7.91 (d, 8.9 Hz)	9'', 5'', 2''
5''	128.39	7.93 (d, *J* = 6.9 Hz)	7''
6''	125.80	7.60 - 7.51 (m)	5'', 7''
7''	126.40	7.60 - 7.51 (m)	5'', 6'', 9''
8''	125.99	8.71 (d, *J* = 8.6)	9'', 6'', 10''
9''	134.05	-	-
10''	130.10	-	-
1'''	139.92	-	-
2'''	125.24	7.45 (d, *J* = 7.8 Hz)	1''', 4'''
3'''	129.00	7.40 (t, *J* = 7.6 Hz)	1''', 5'''
4'''	127.23	7.42 - 7.35 (m)	2'''
5'''	129.00	7.40 (t, *J* = 7.6 Hz)	1''', 3'''
6'''	125.24	7.45 (d, *J* = 7.8 Hz)	4''', 1'''

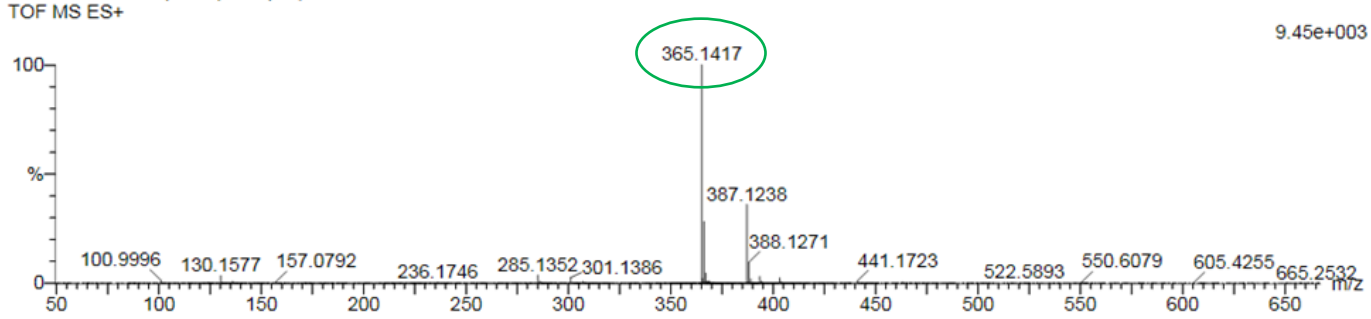
Figure 8. The HRMS spectrum of compound 5.

Elemental Composition Report **Page 1**

Single Mass Analysis
Tolerance = 10.0 mDa / DBE: min = -1.5, max = 50.0
Element prediction: Off
Number of isotope peaks used for i-FIT = 3

Monoisotopic Mass, Even Electron Ions
206 formula(e) evaluated with 8 results within limits (up to 50 closest results for each mass)
Elements Used:
C: 0-500 H: 0-1000 N: 0-200 F: 0-1

N-PIRAZOL-4F 5 (0.102) Cm (2:5)
TOF MS ES+



Minimum:				-1.5			
Maximum:		10.0	3.0	50.0			
Mass	Calc. Mass	mDa	PPM	DBE	i-FIT	i-FIT (Norm)	Formula
365.1417	365.1454	-3.7	-10.1	17.5	164.7	0.0	C25 H18 N2 F