Supporting Information

for

A Formal [3+2] Annulation Reaction of Propargyl Sulfonium Compounds and *N*-Ylides: Access to Pyrrolo[2,1-*a*]quinolines, Pyrrolo[2,1-*a*]phthalazines and Indolizines

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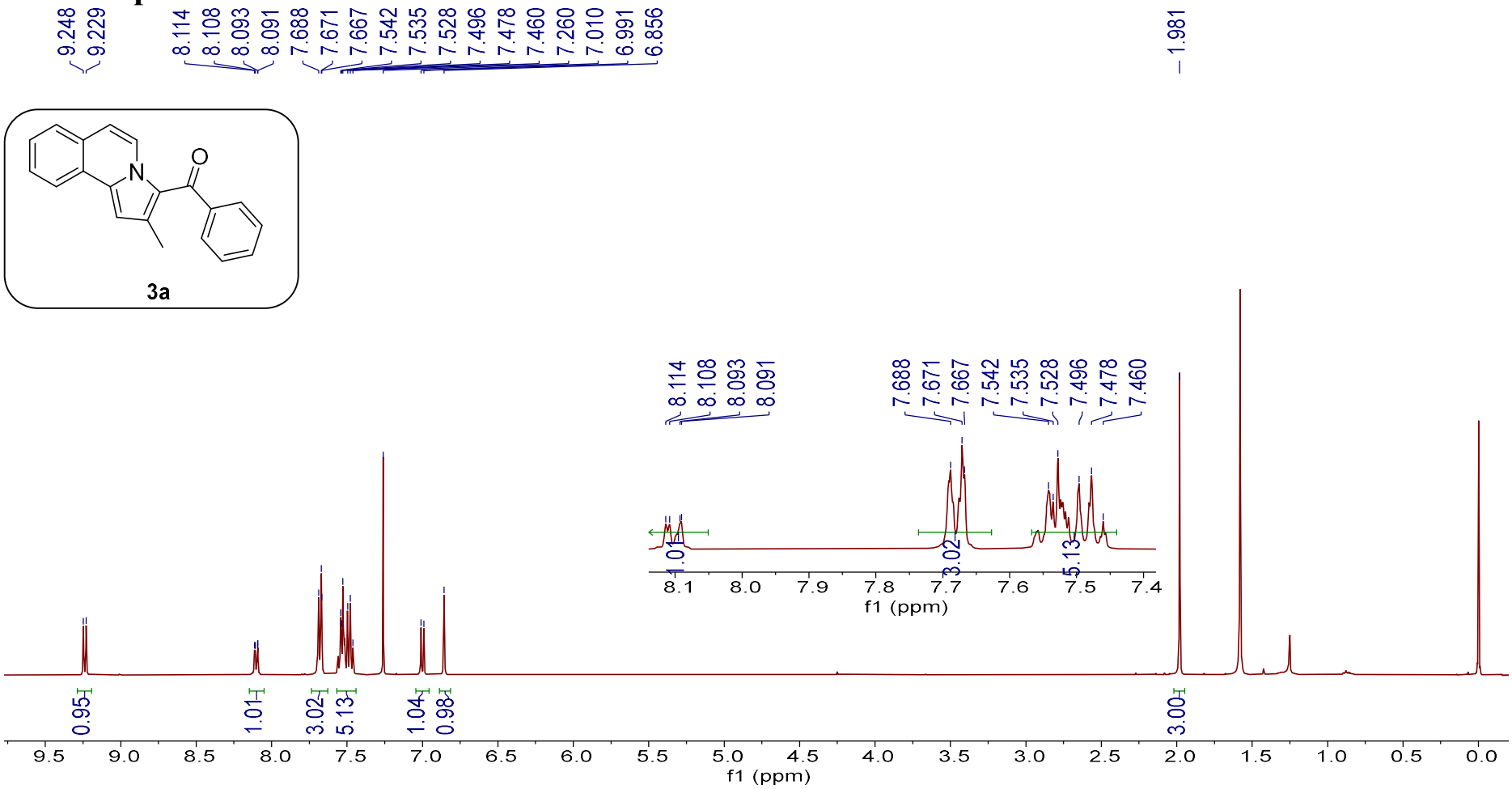
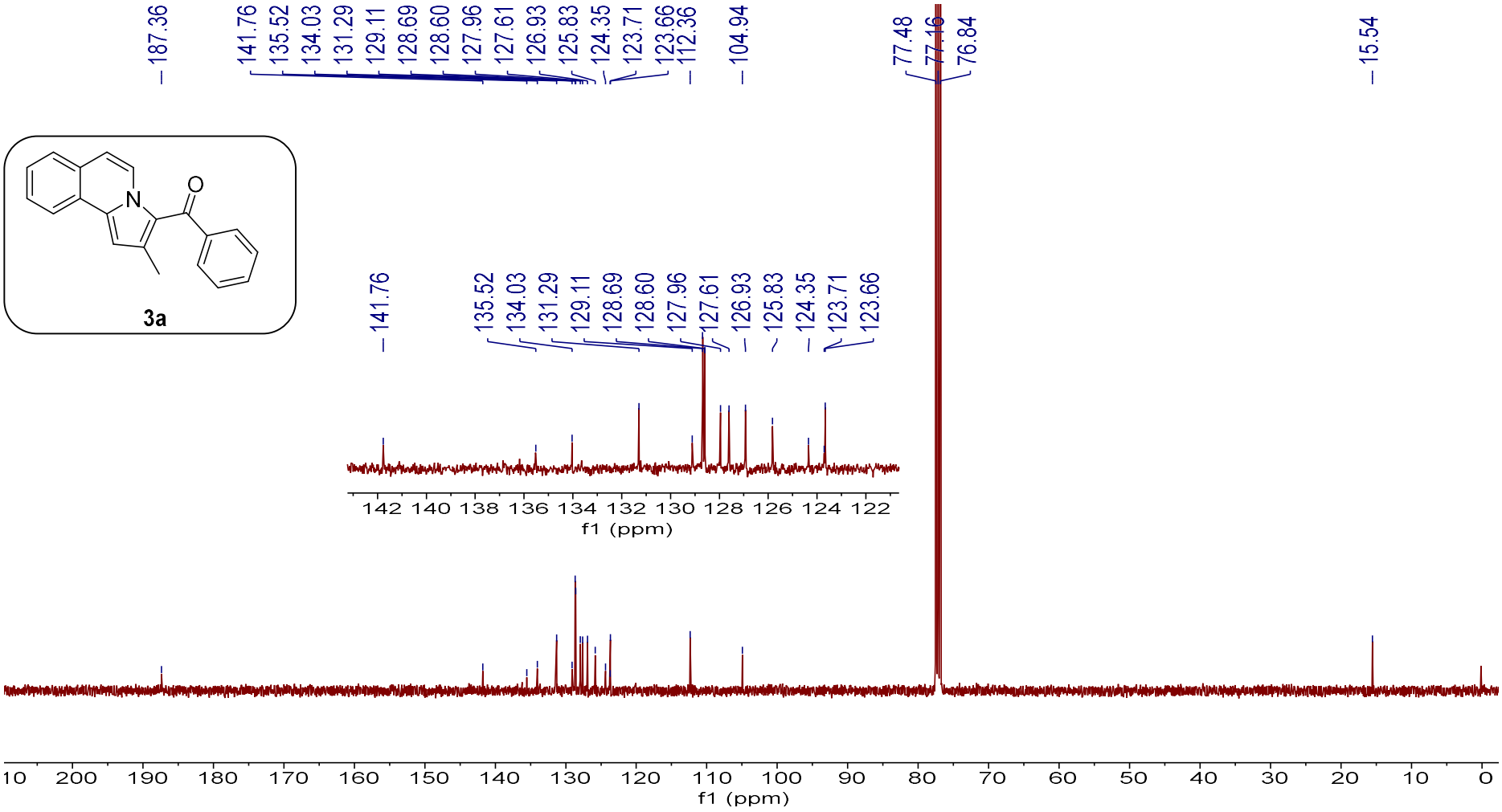
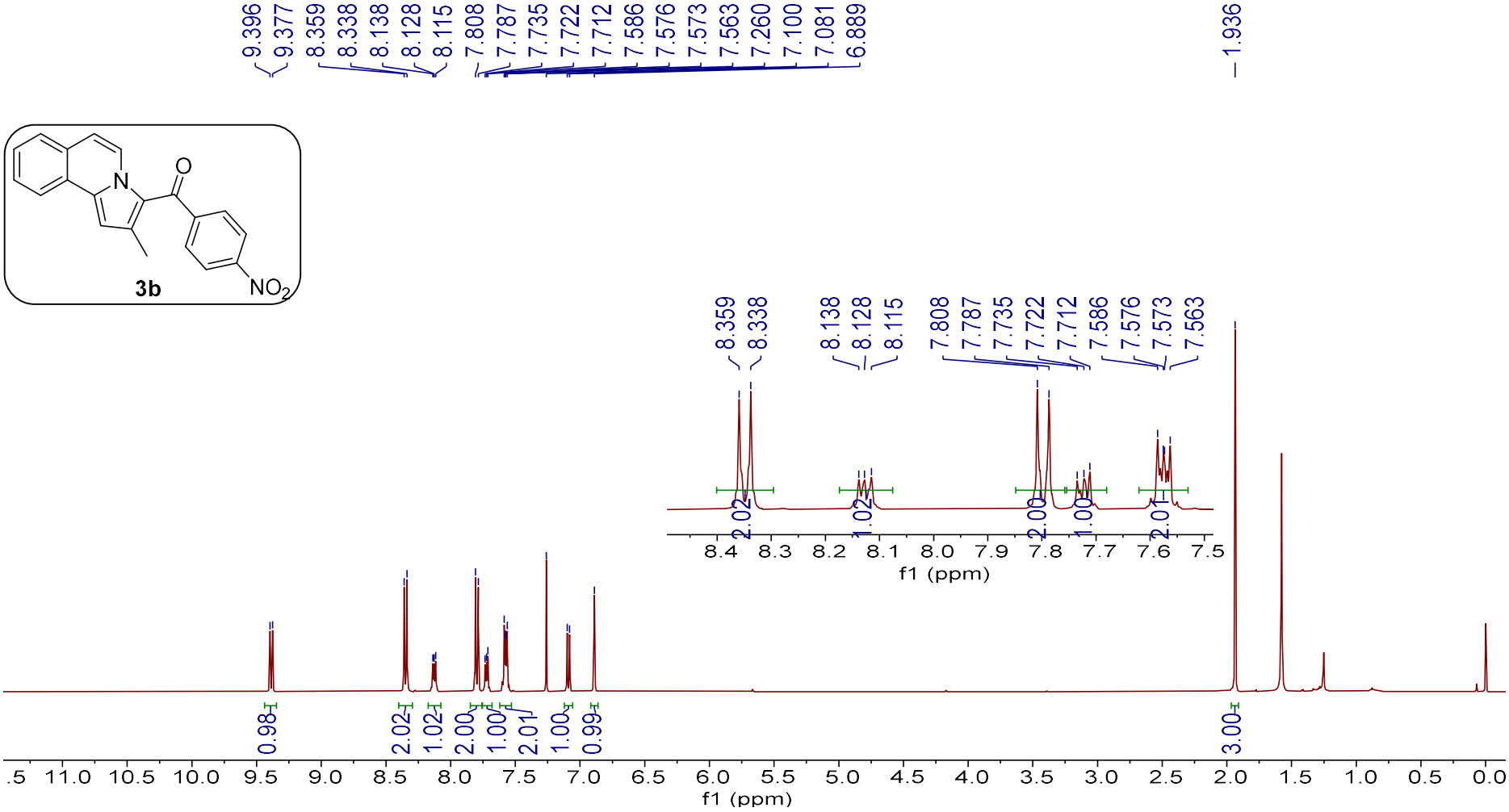
1.NMR spectra for all substrates



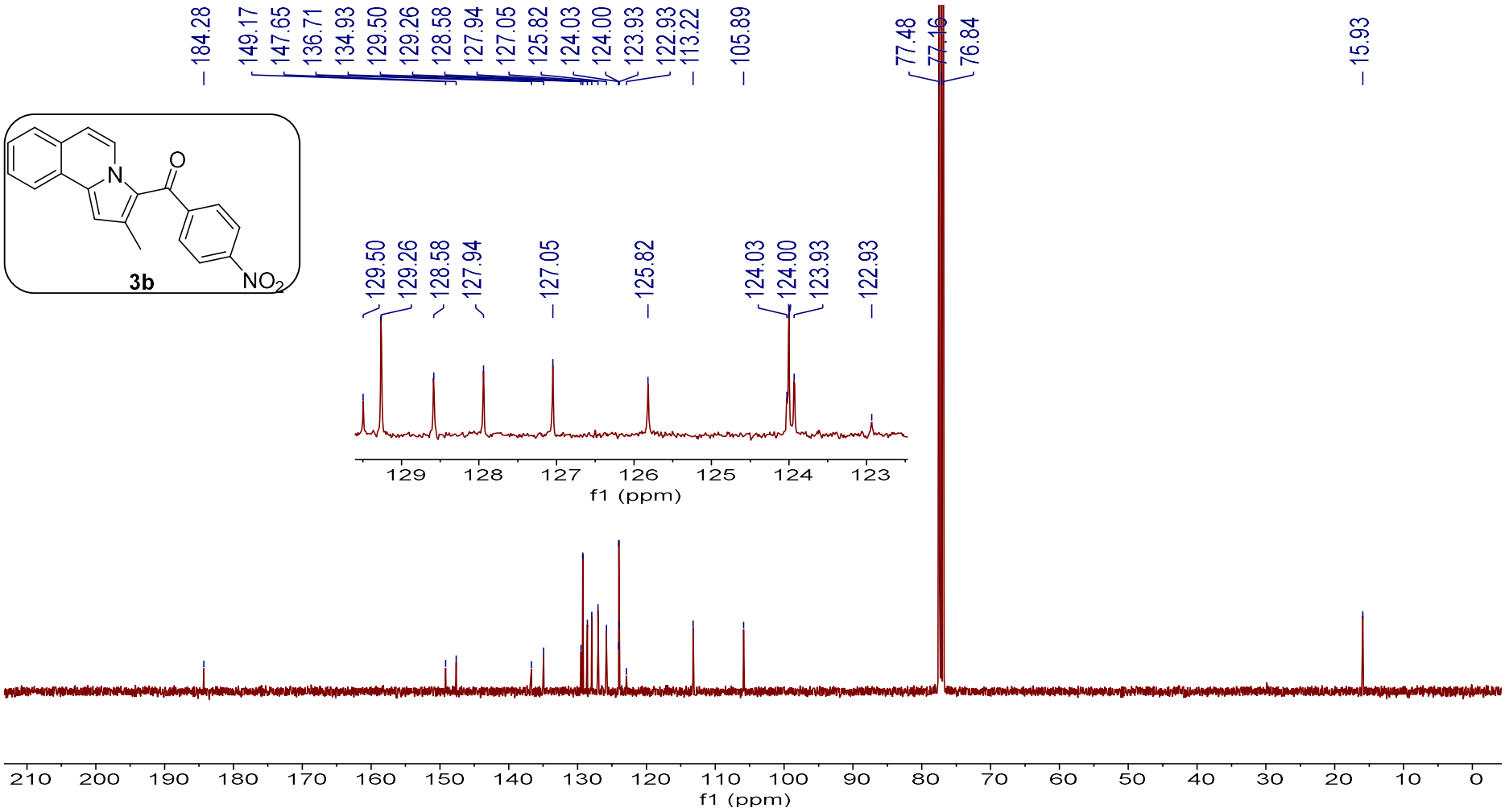
3a (^{1}H NMR, 400 MHz, $CDCl_3$)



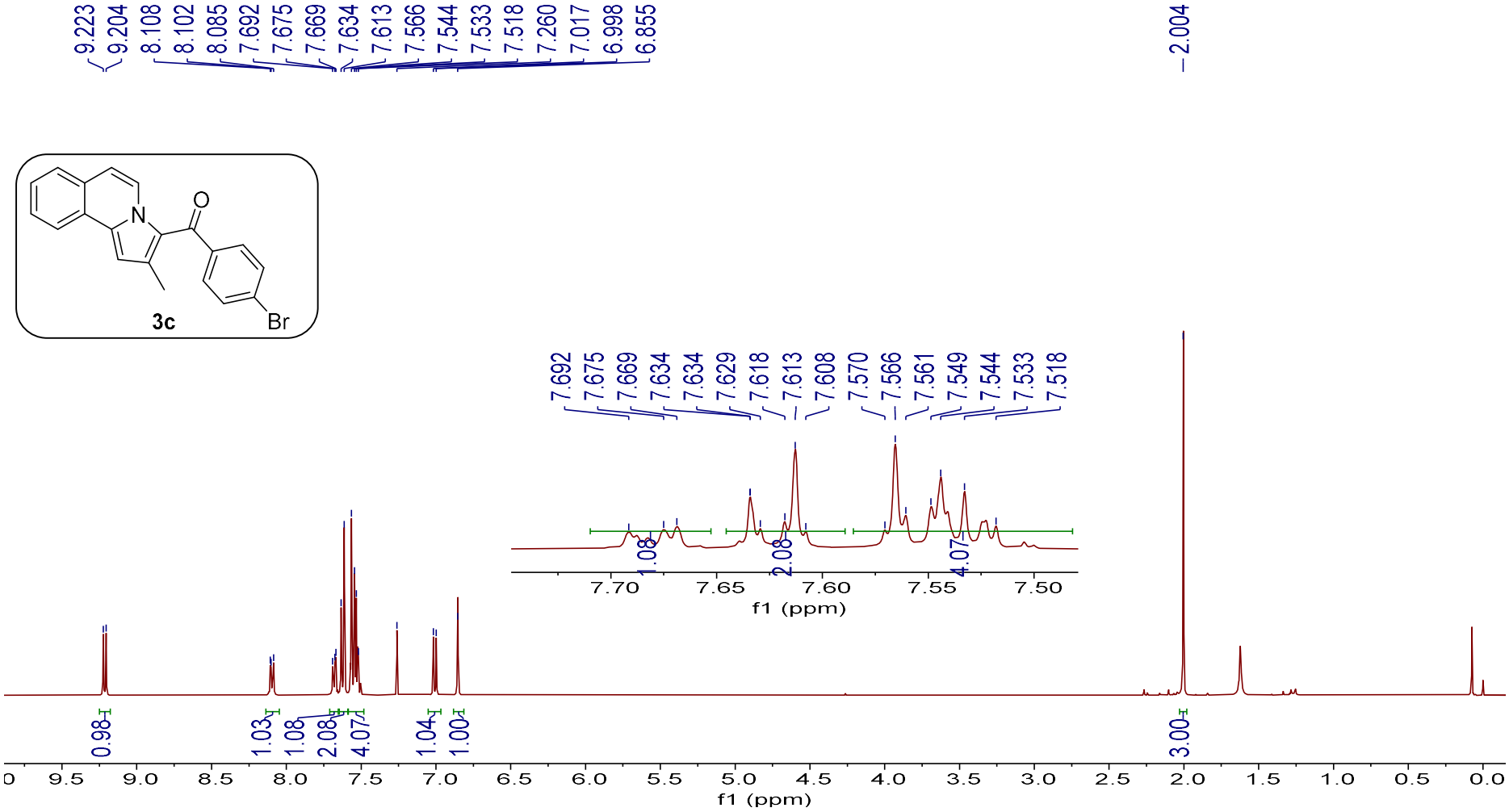
3a (^{13}C NMR, 101 MHz, $CDCl_3$)



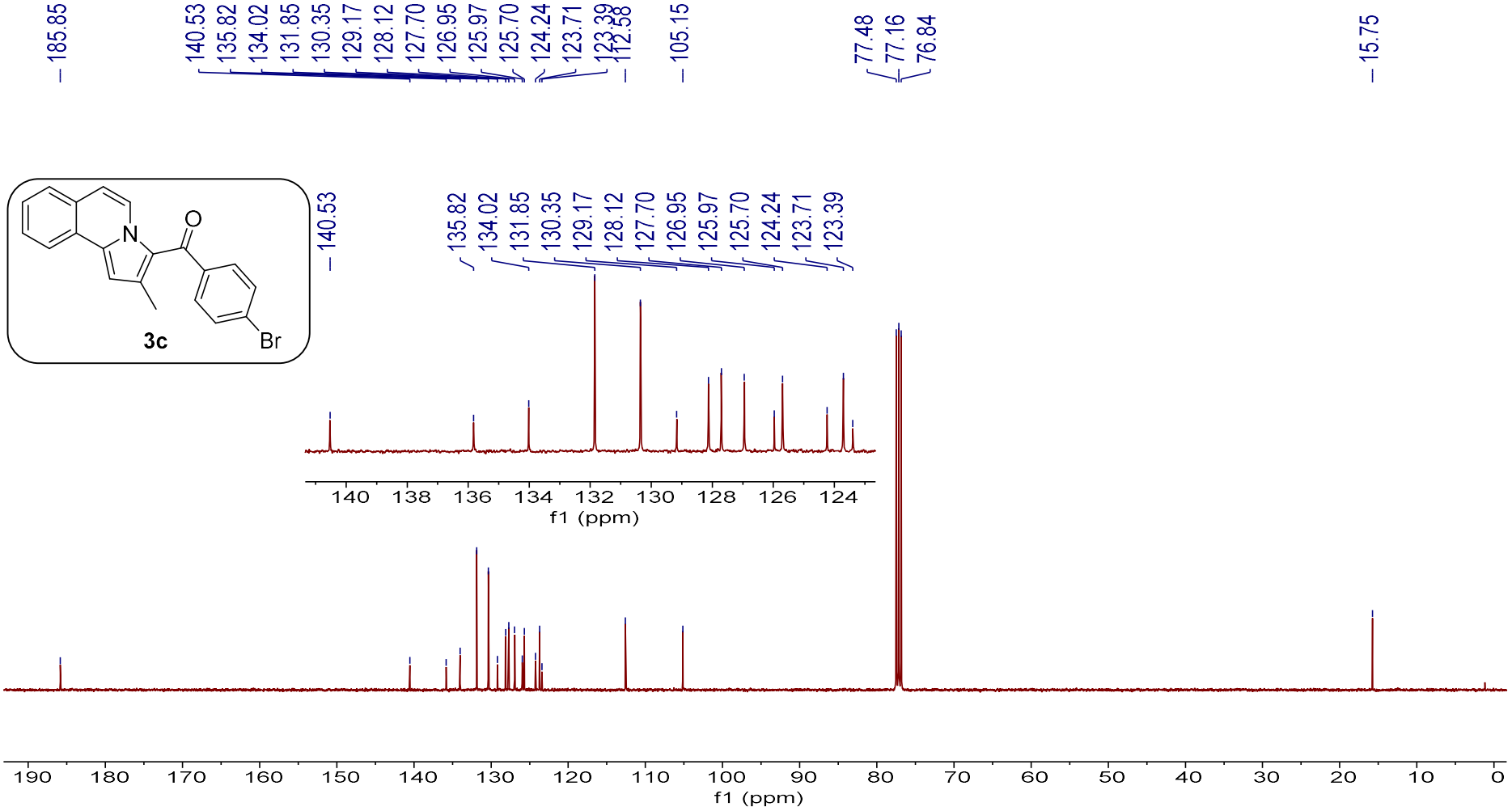
3b (^{1}H NMR, 400 MHz, $CDCl_3$)



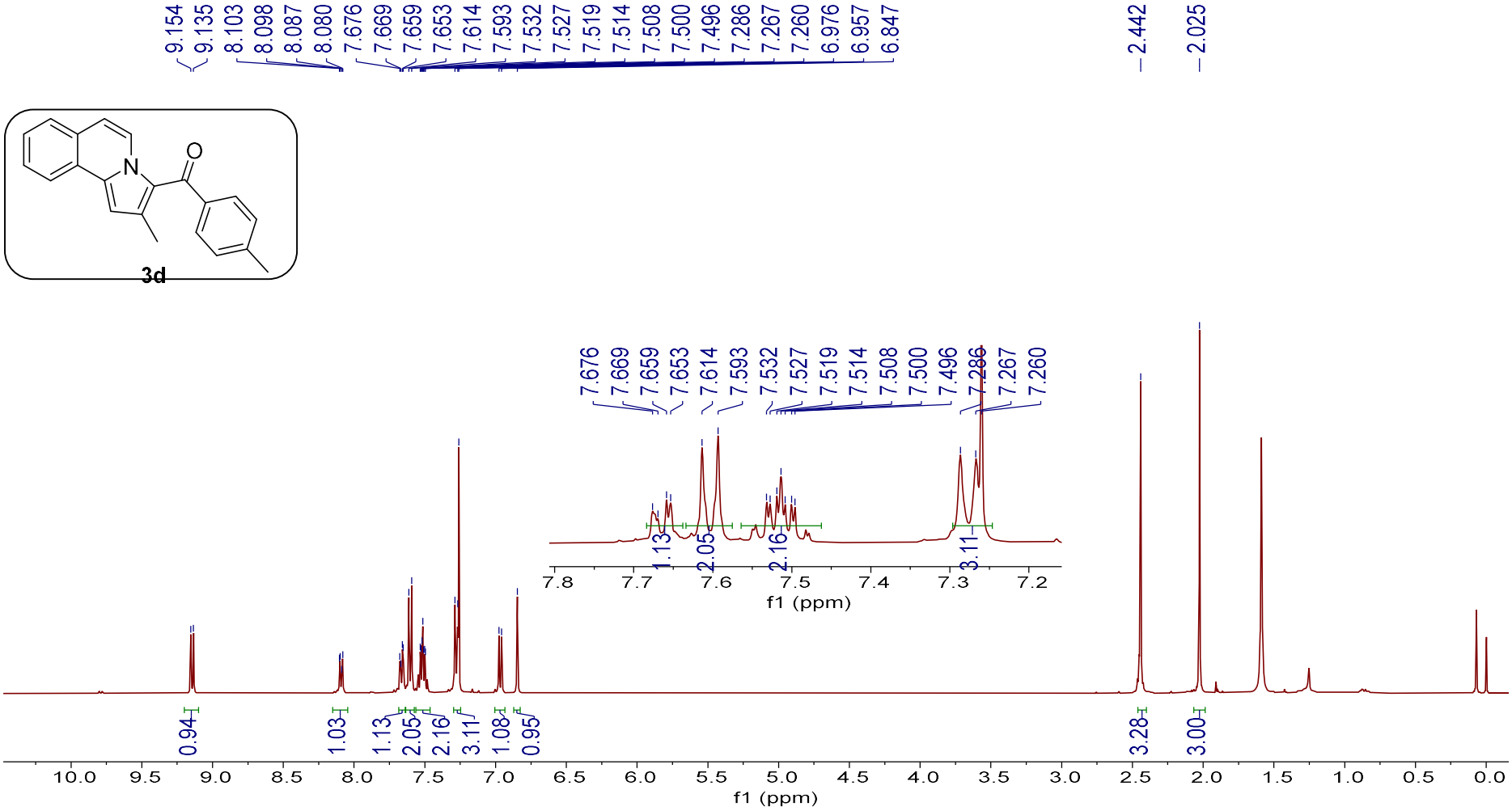
3b (^{13}C NMR, 101 MHz, $CDCl_3$)



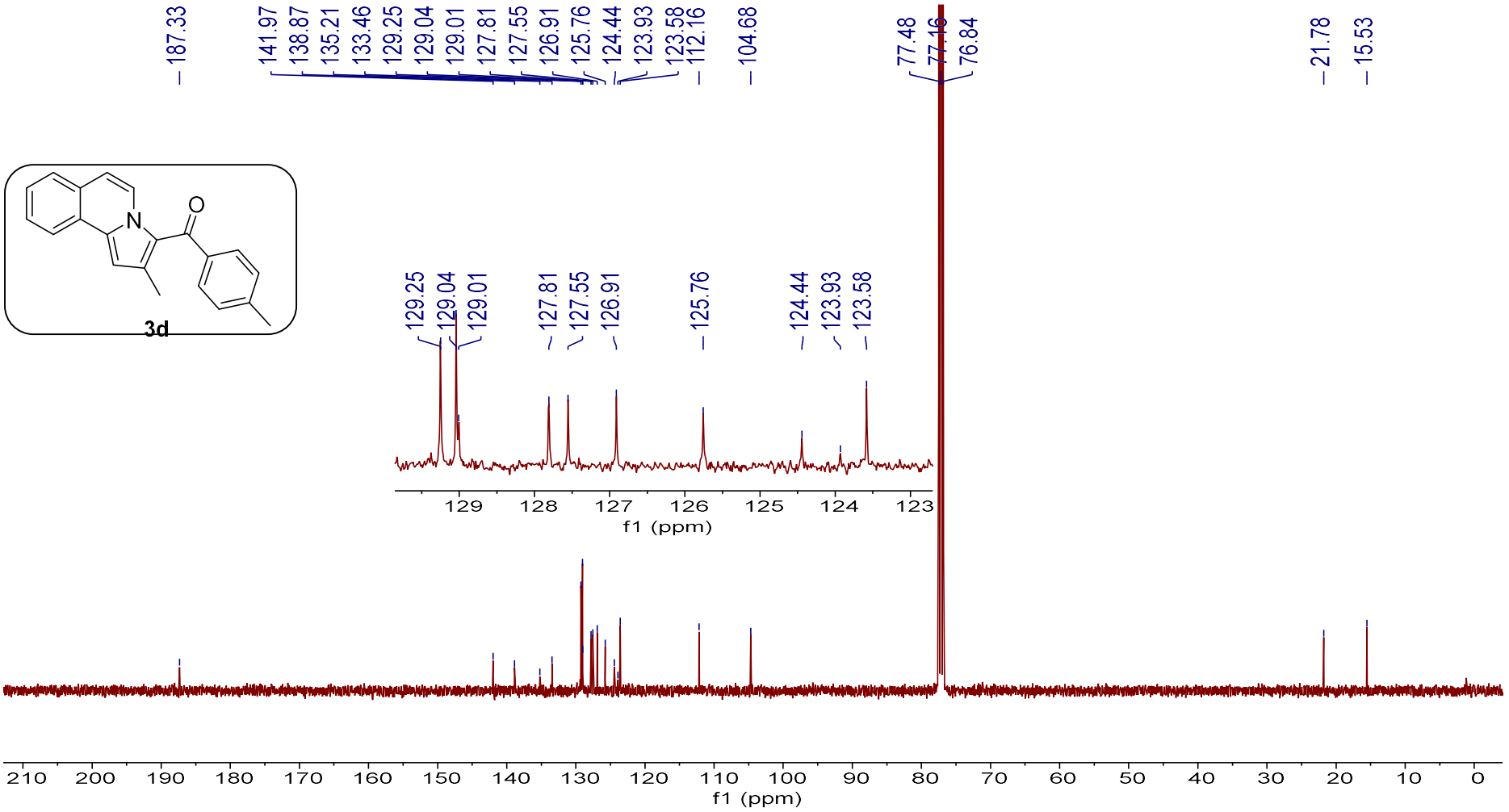
3c (^{1}H NMR, 400 MHz, $CDCl_3$



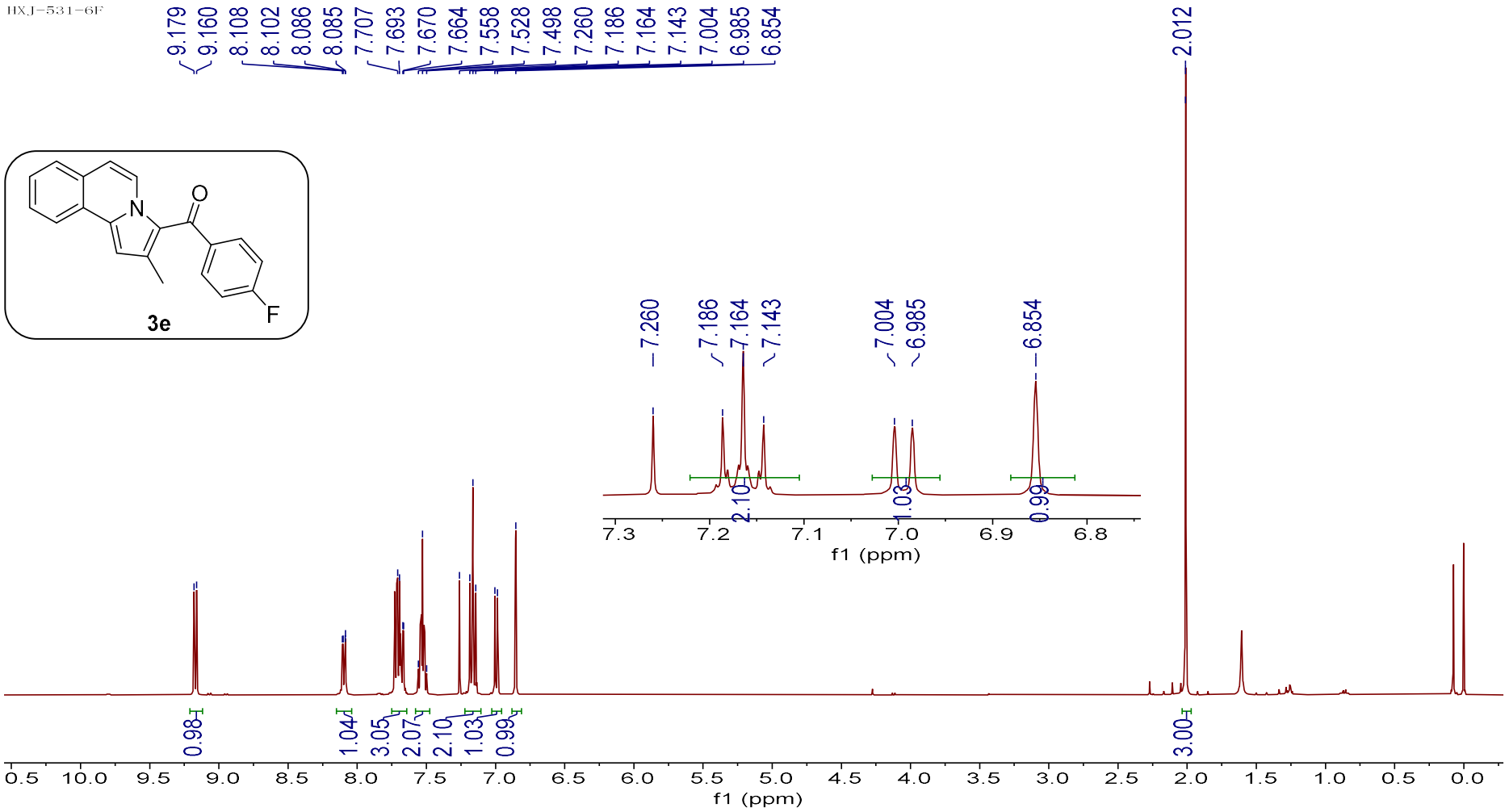
3c (^{13}C NMR, 101 MHz, $CDCl_3$)



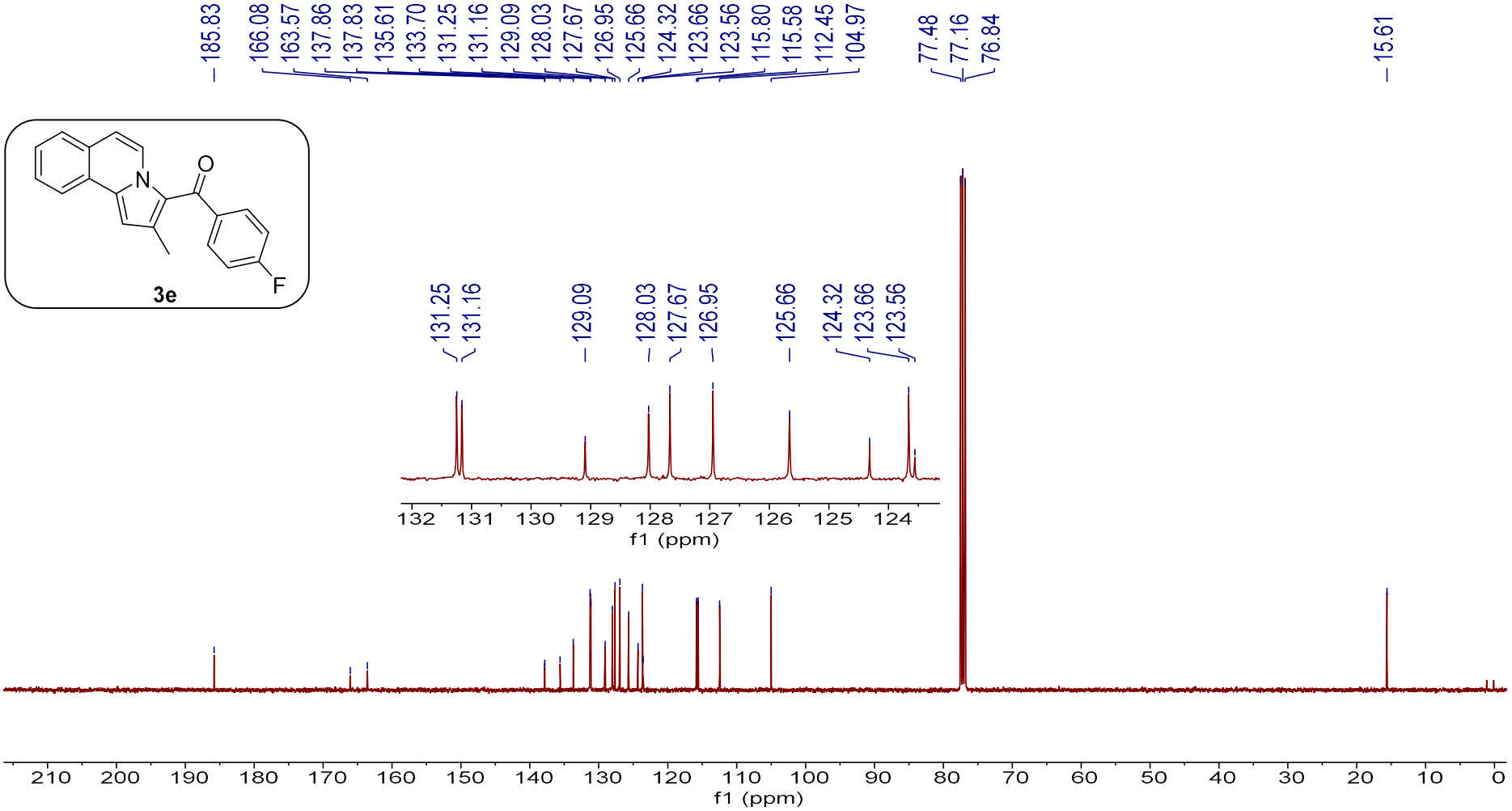
3d (^{1}H NMR, 400 MHz, $CDCl_3$)



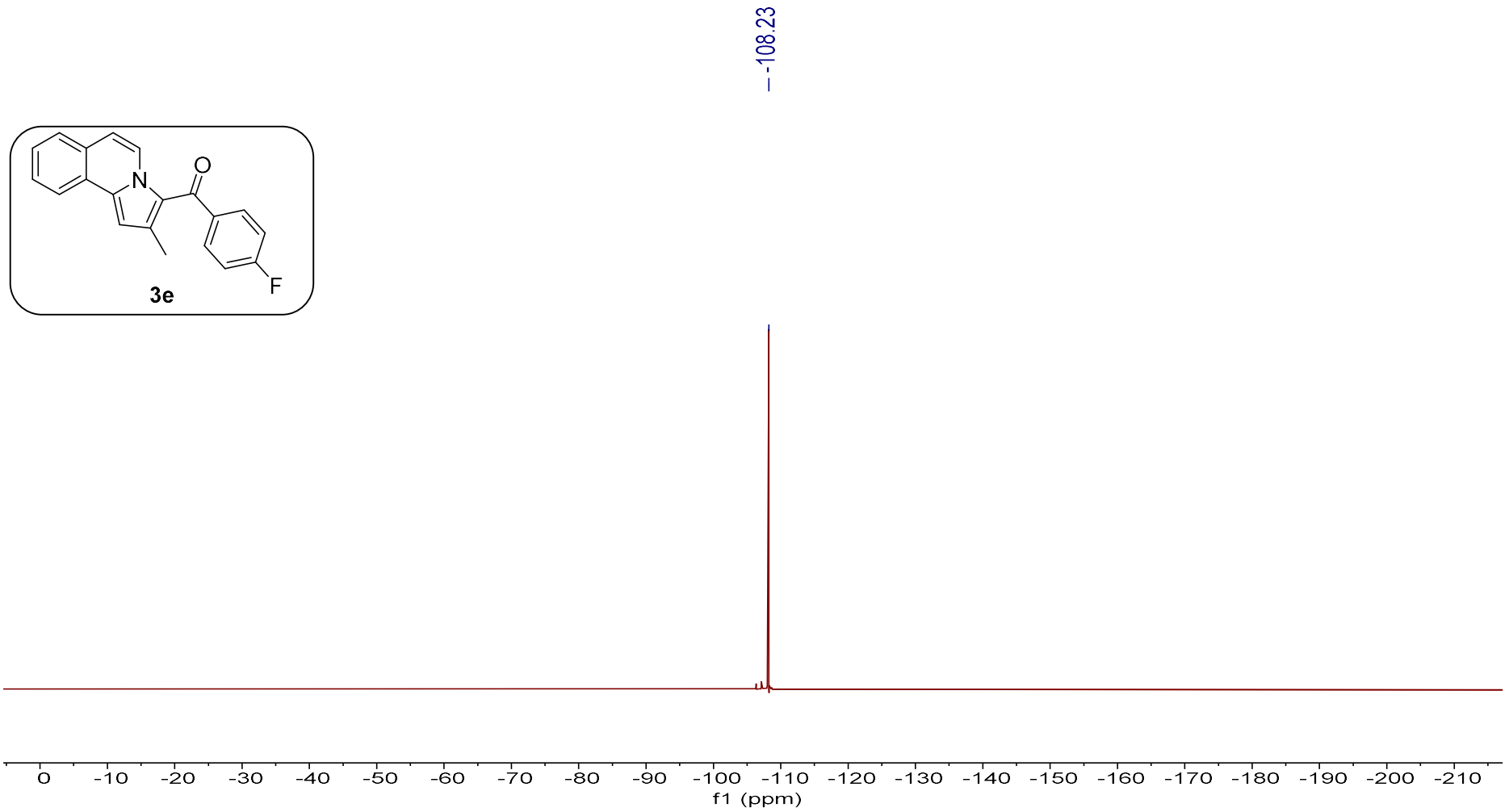
3d (^{13}C NMR, 101 MHz, $CDCl_3$)



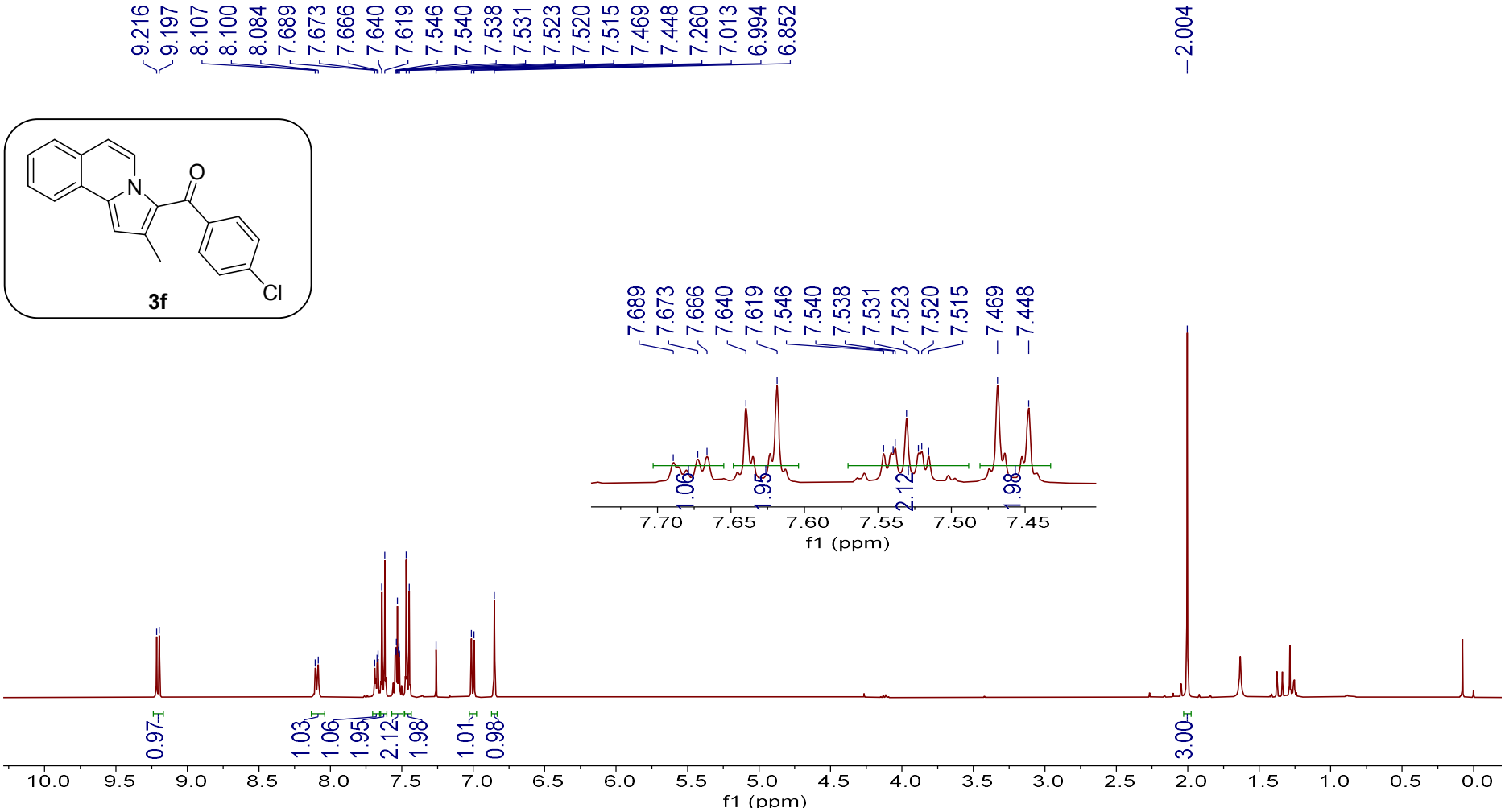
3e (^{1}H NMR, 400 MHz, $CDCl_3$)



3e (^{13}C NMR, 101 MHz, $CDCl_3$)



3e (^{19}F NMR, 101 MHz, $CDCl_3$)



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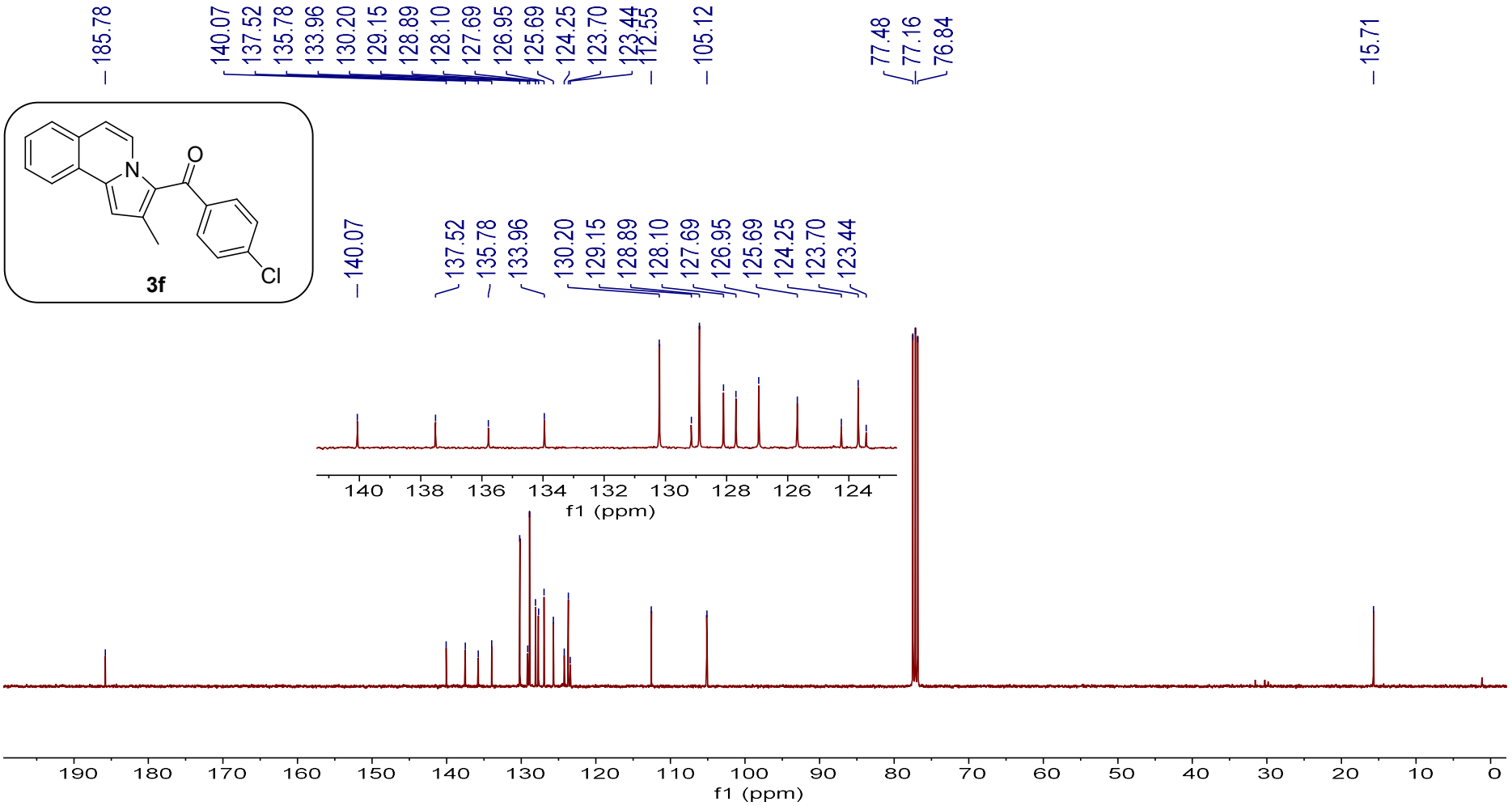
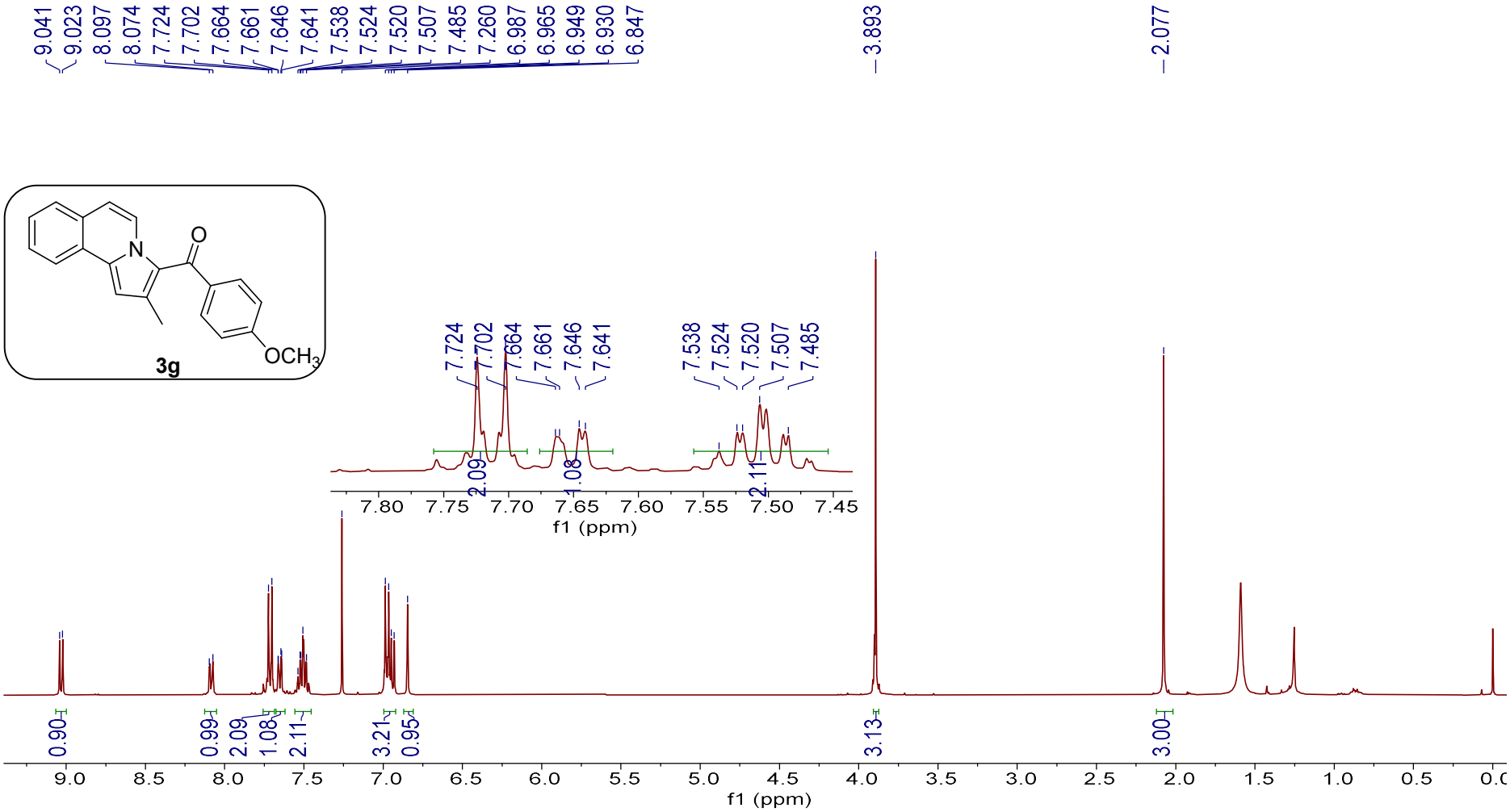
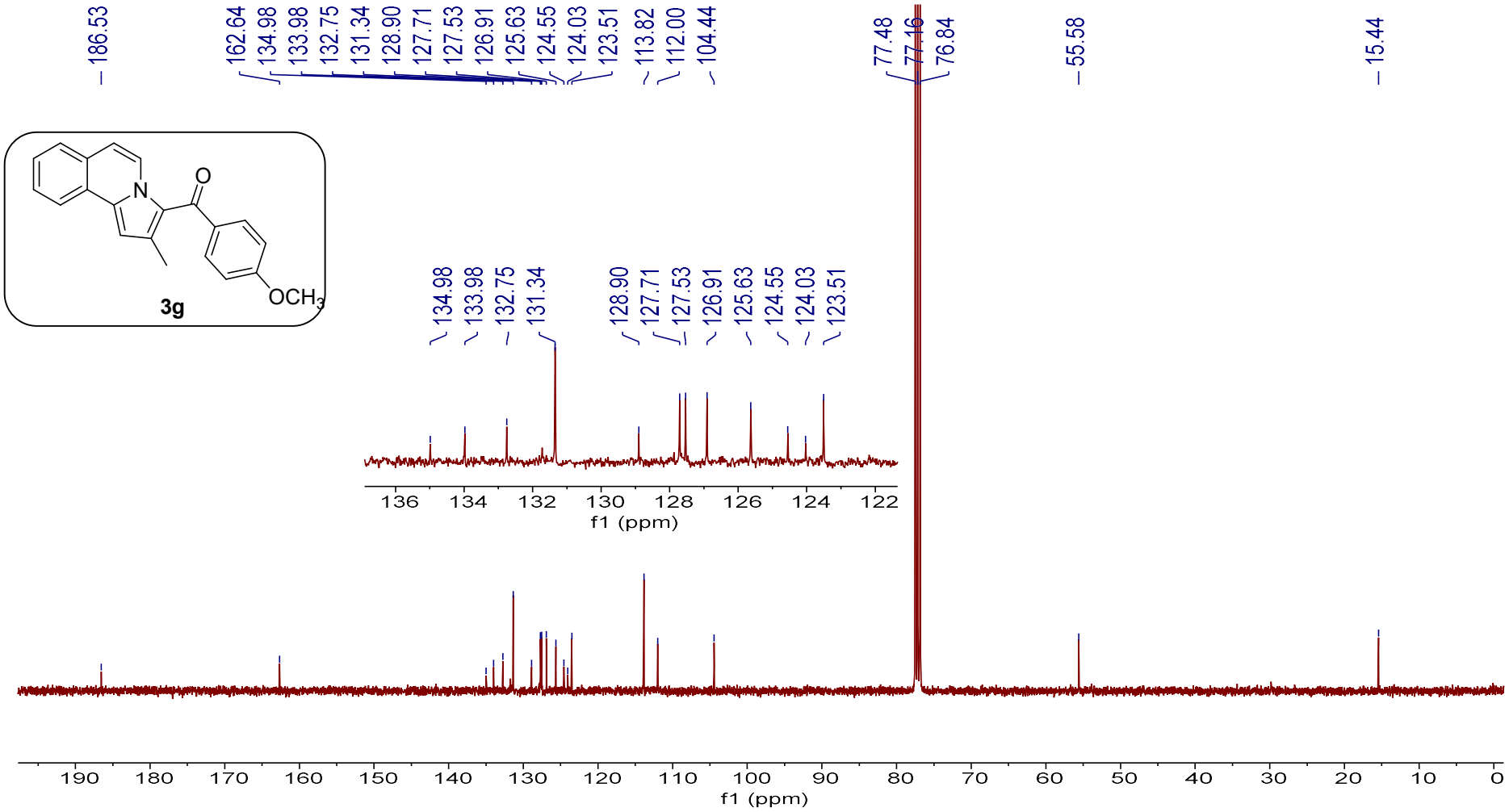


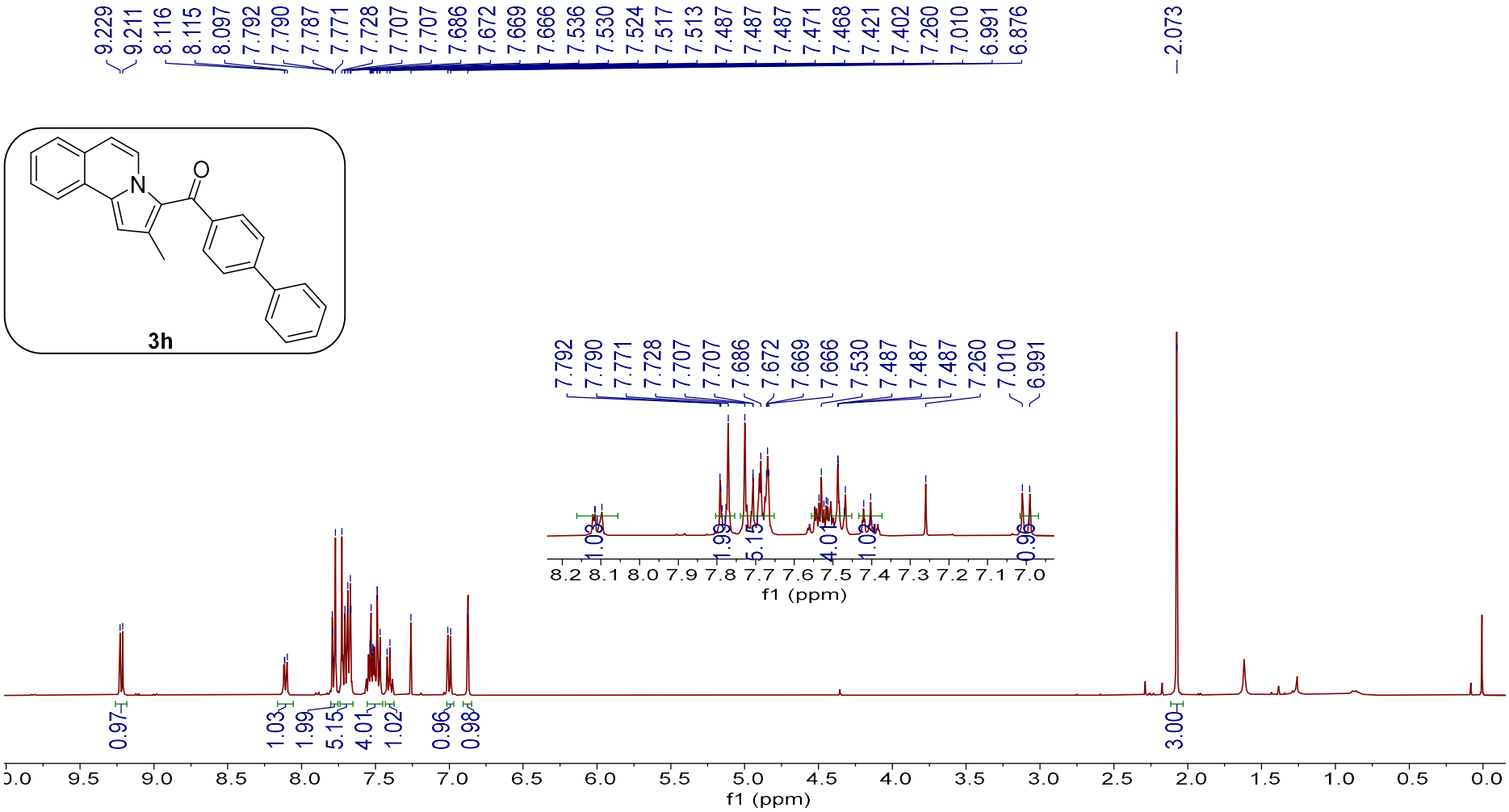
3f (^{13}C NMR, 101 MHz, $CDCl_3$)



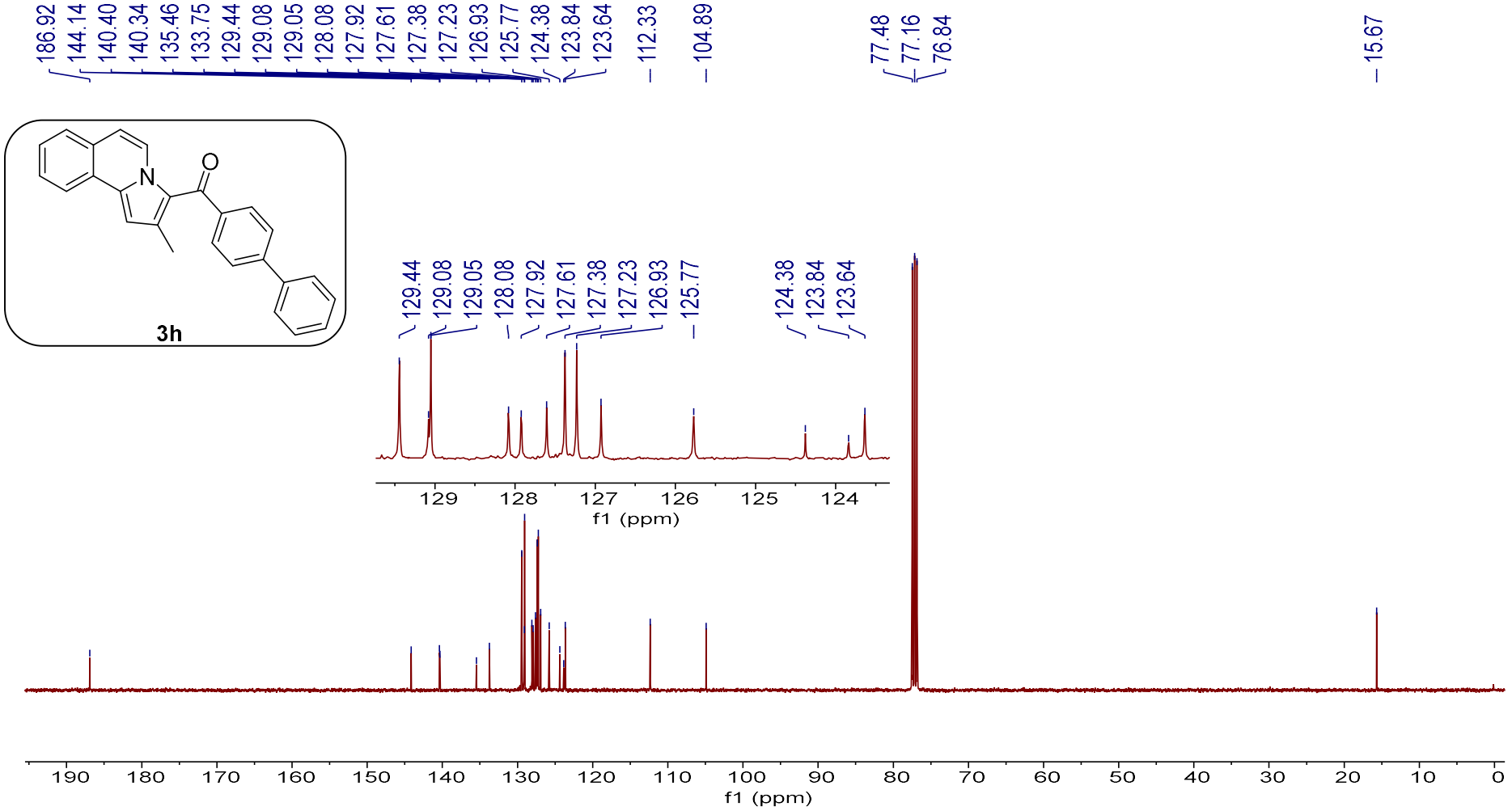
3g (^{1}H NMR, 400 MHz, $CDCl_3$)



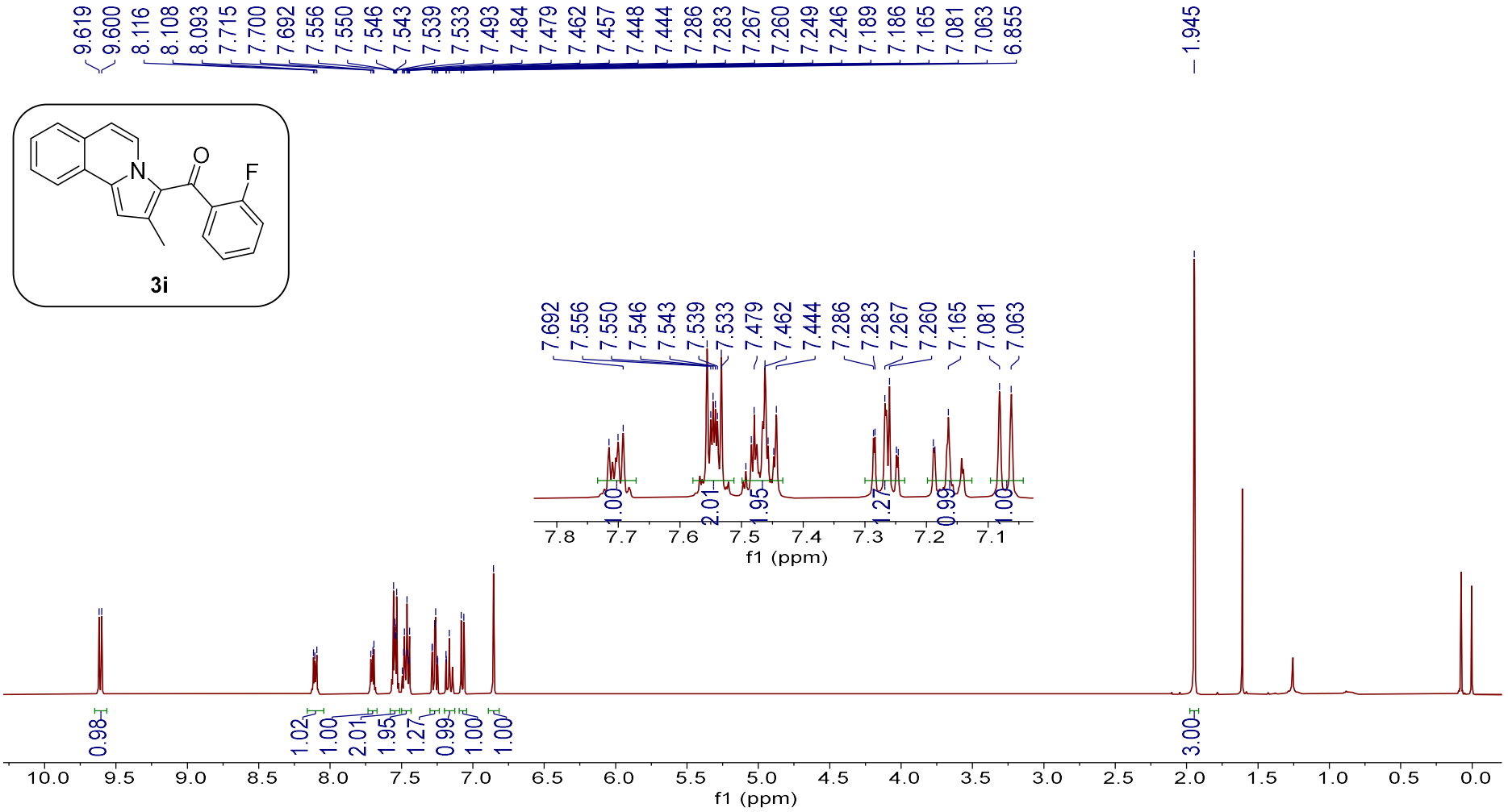
3g (^{13}C NMR, 101 MHz, $CDCl_3$)



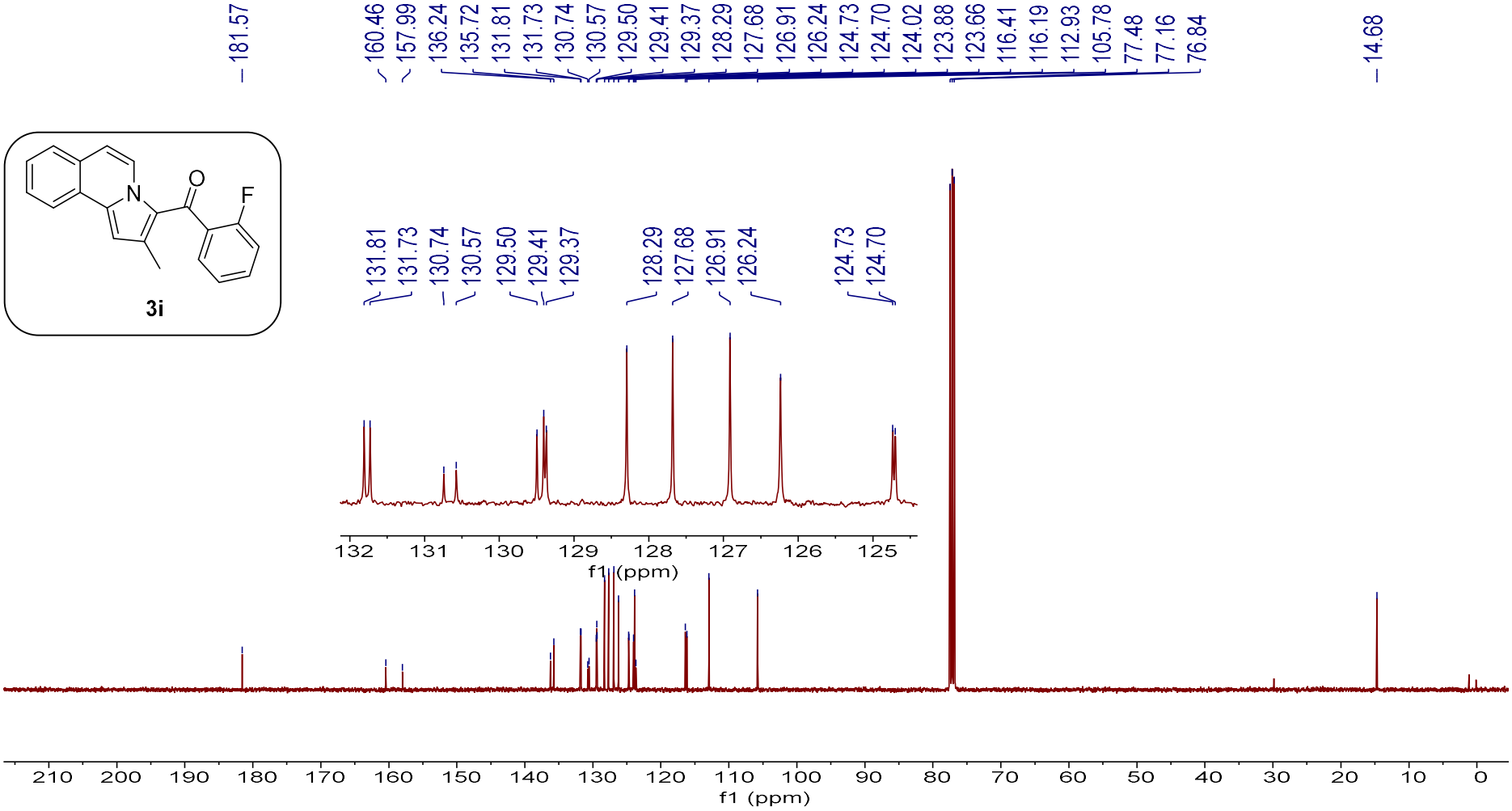
3h (^{1}H NMR, 400 MHz, $CDCl_3$)



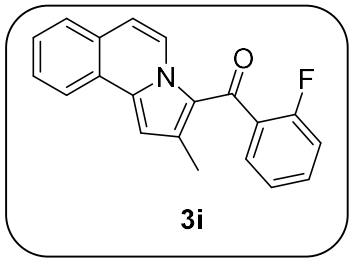
3h (^{13}C NMR, 101 MHz, $CDCl_3$)



3i (^{1}H NMR, 400 MHz, $CDCl_3$)

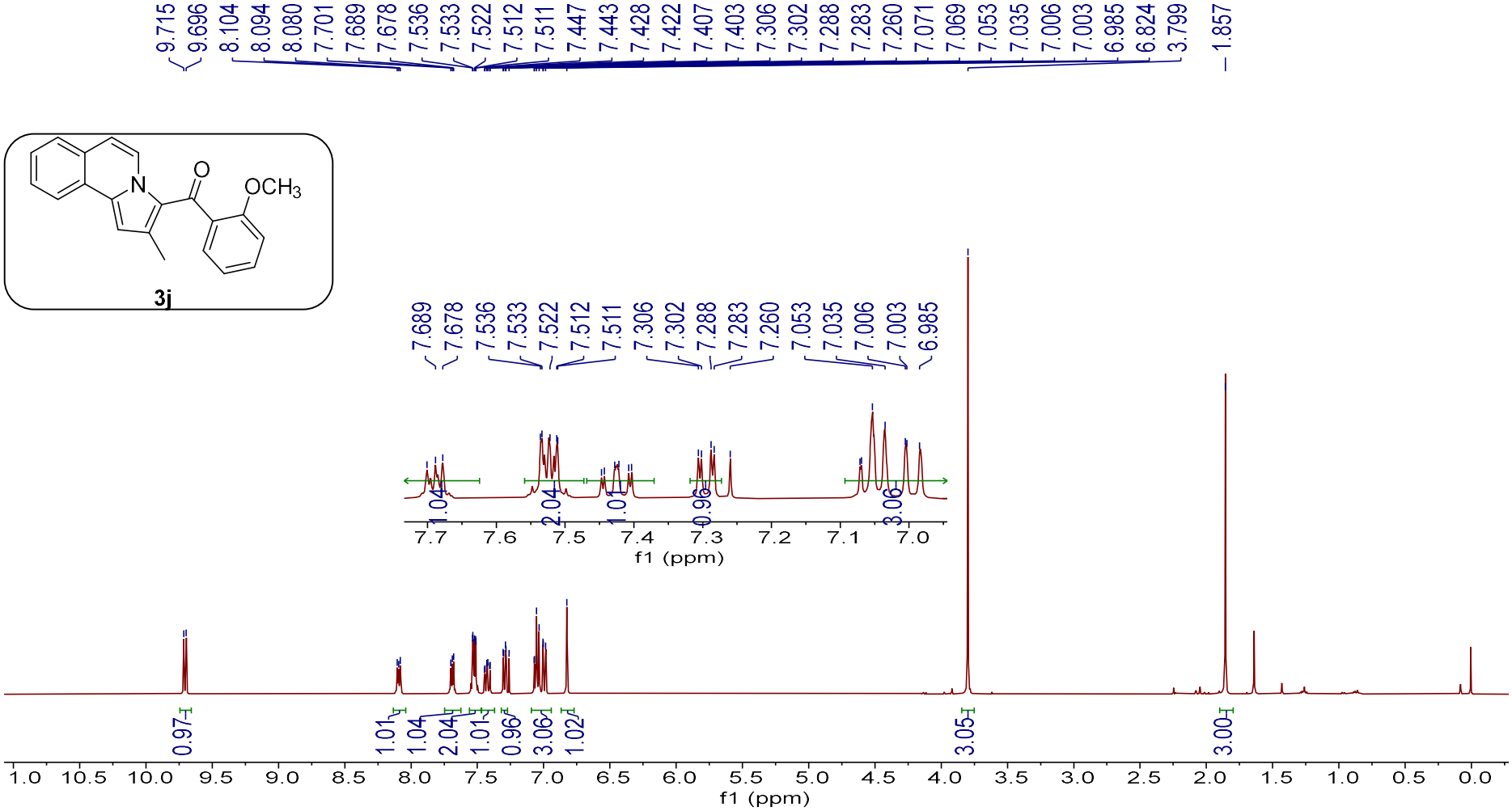


3i (^{13}C NMR, 101 MHz, $CDCl_3$)

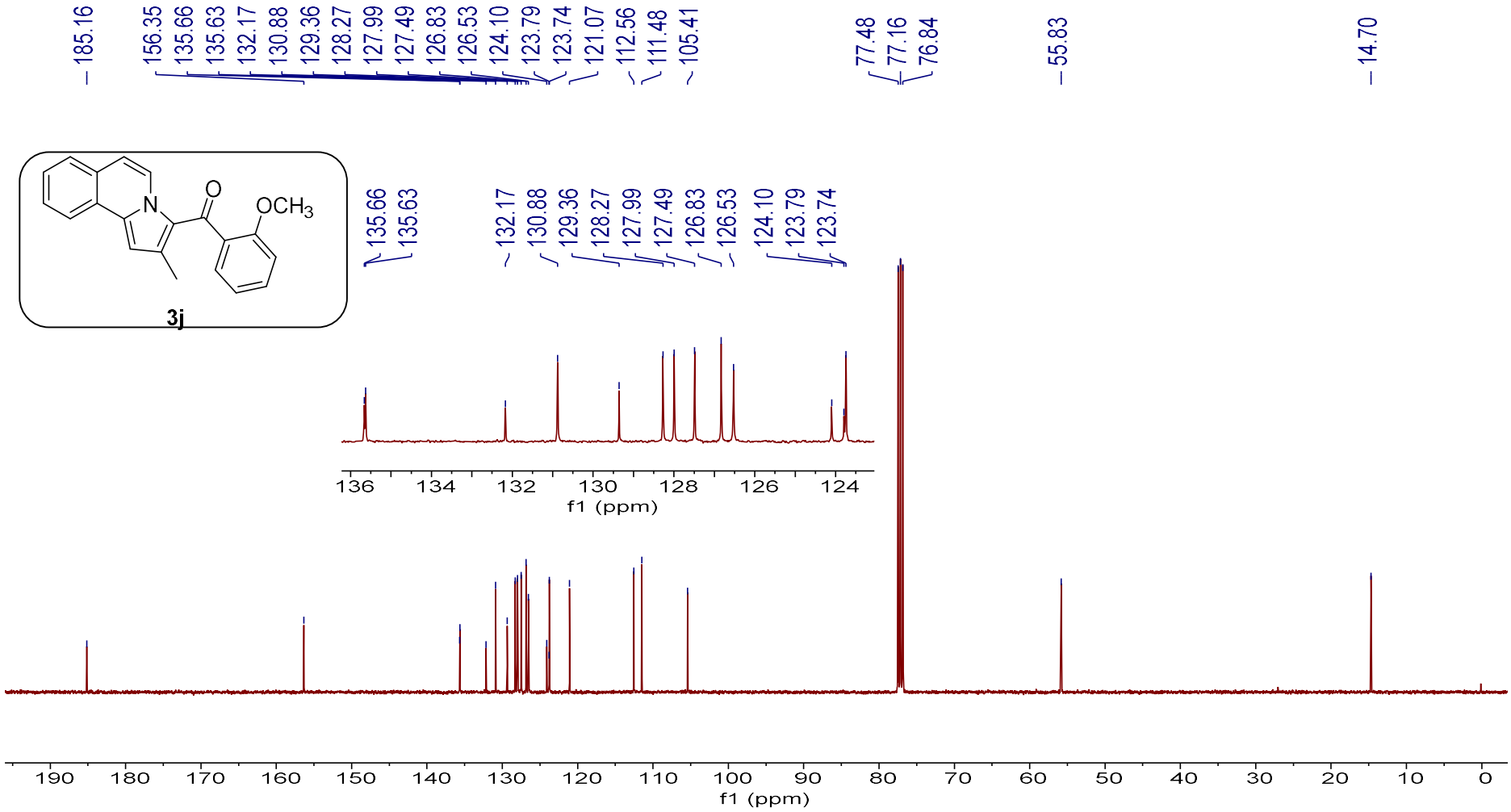


3i

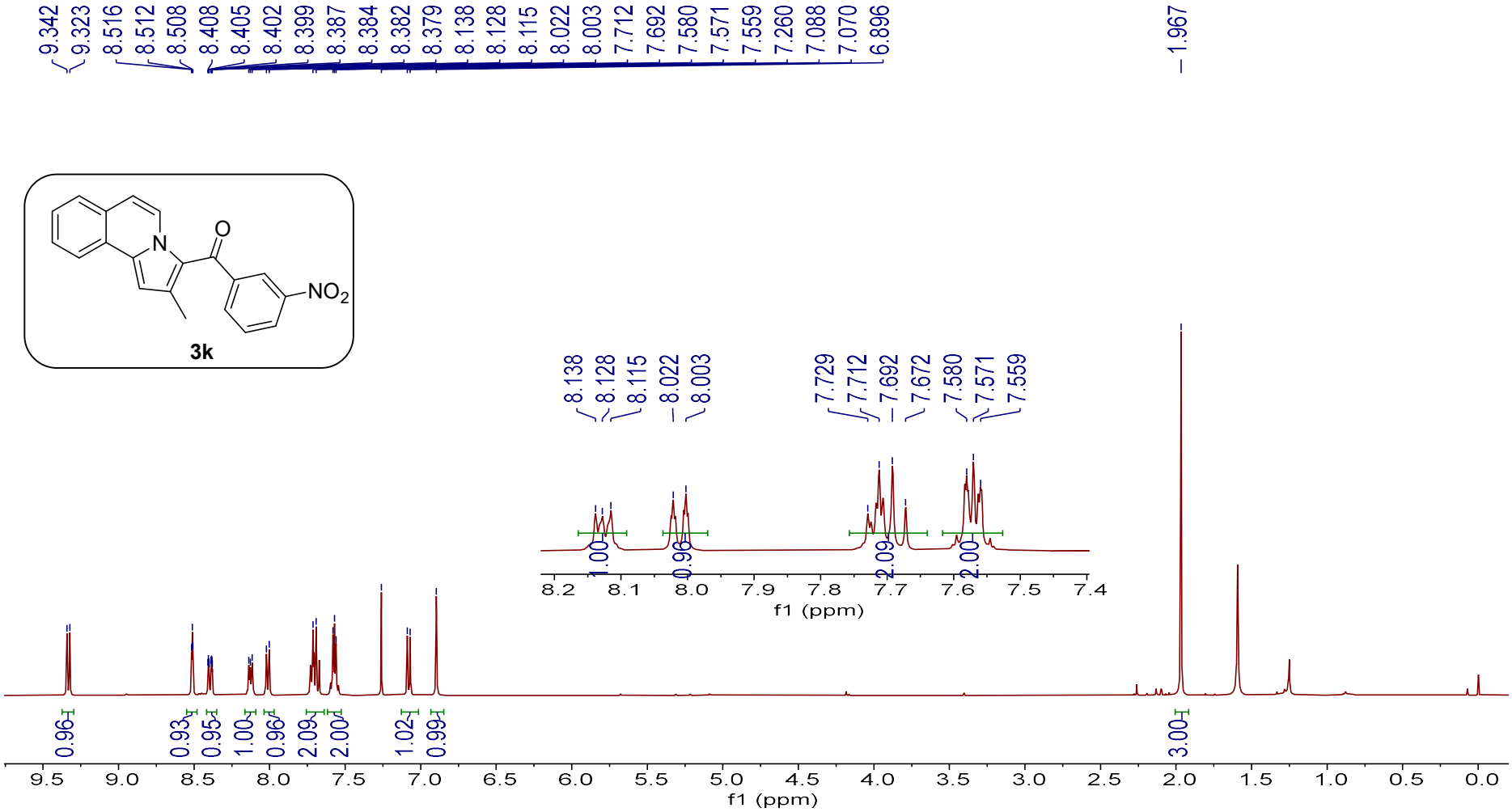
3i (^{19}F NMR, 101 MHz, $CDCl_3$)



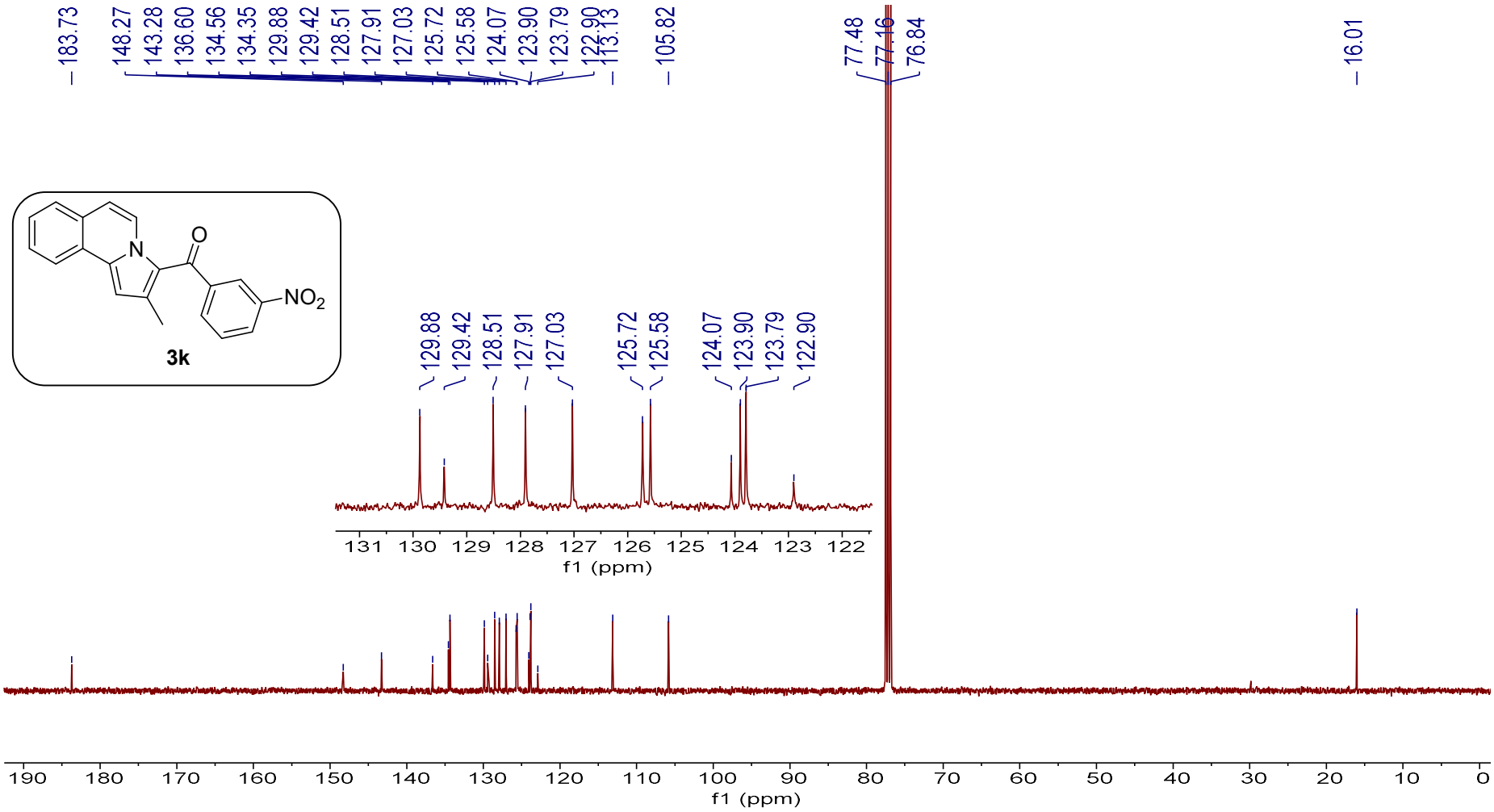
3j (^{1}H NMR, 400 MHz, $CDCl_3$)



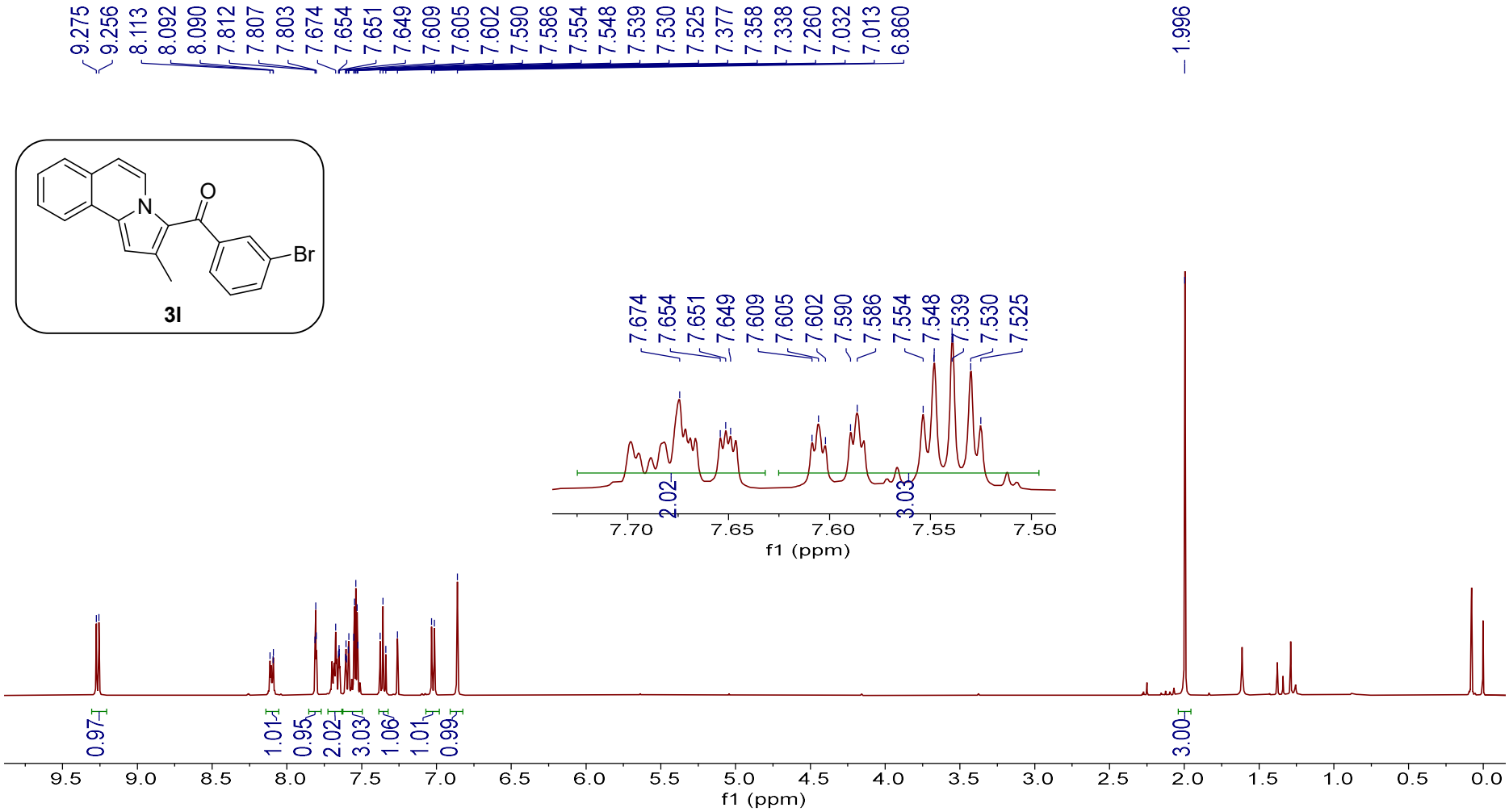
3j (^{13}C NMR, 101 MHz, $CDCl_3$)



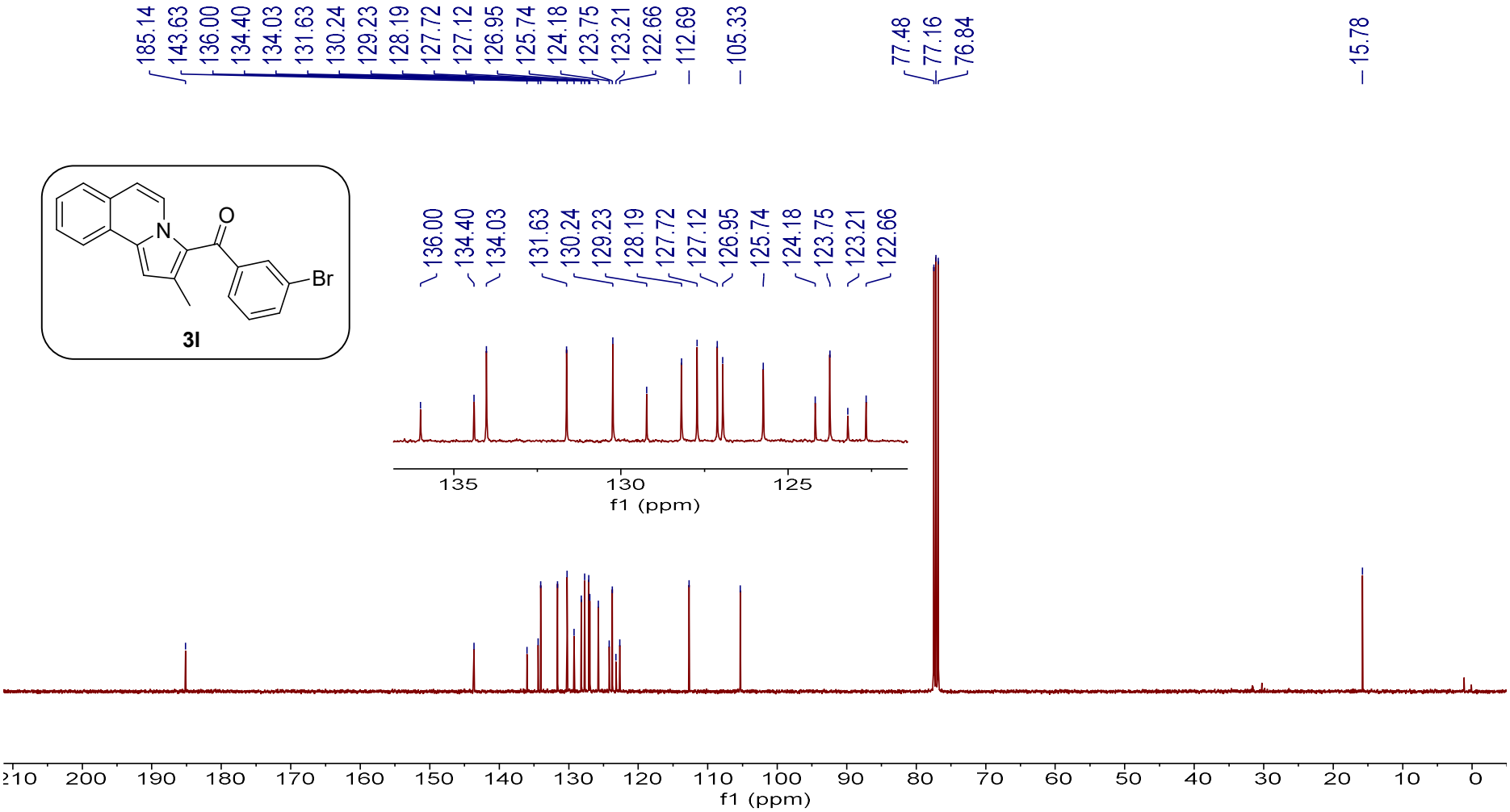
3k (^{1}H NMR, 400 MHz, $CDCl_3$)



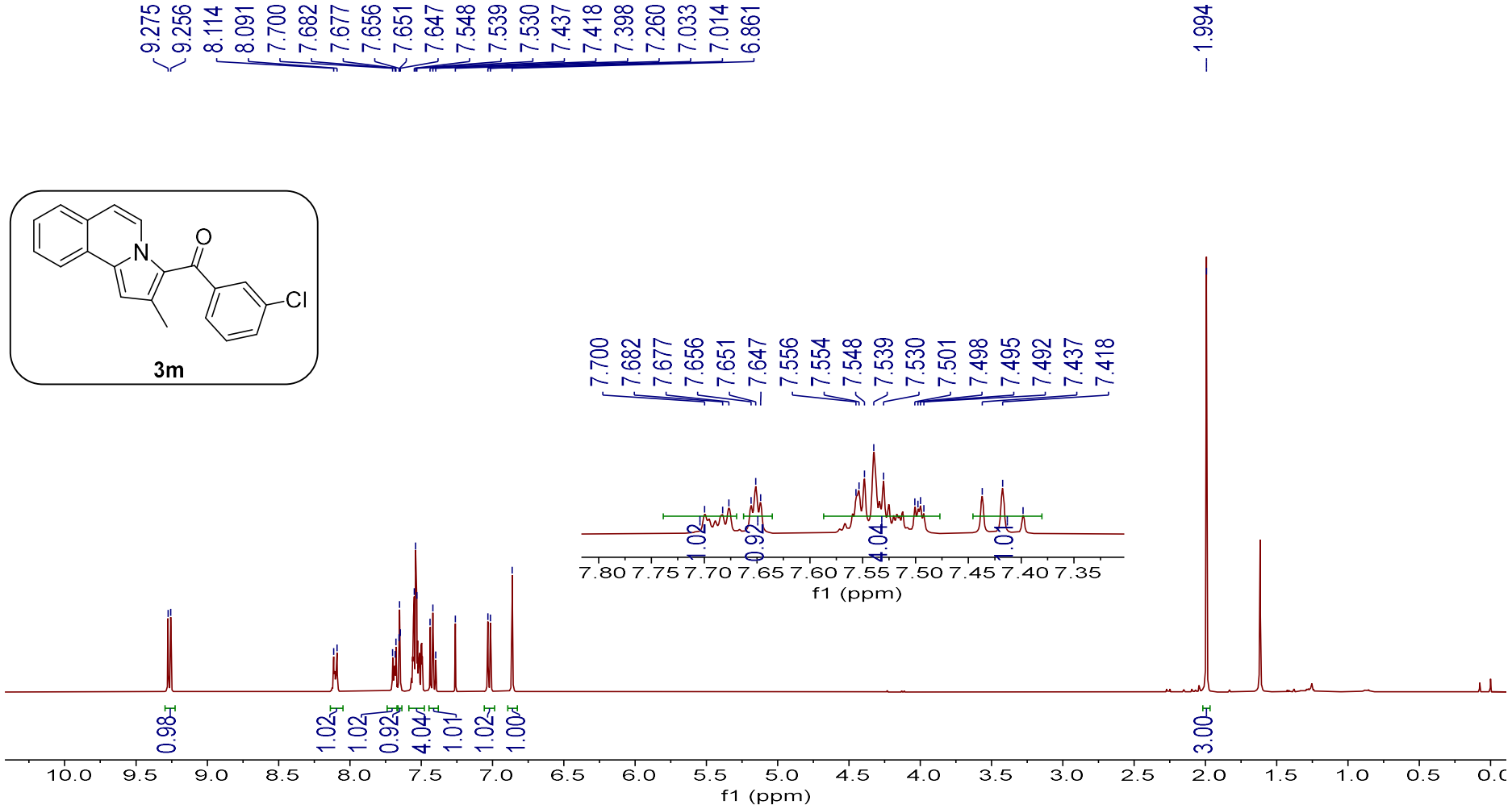
3k (^{13}C NMR, 101 MHz, $CDCl_3$)



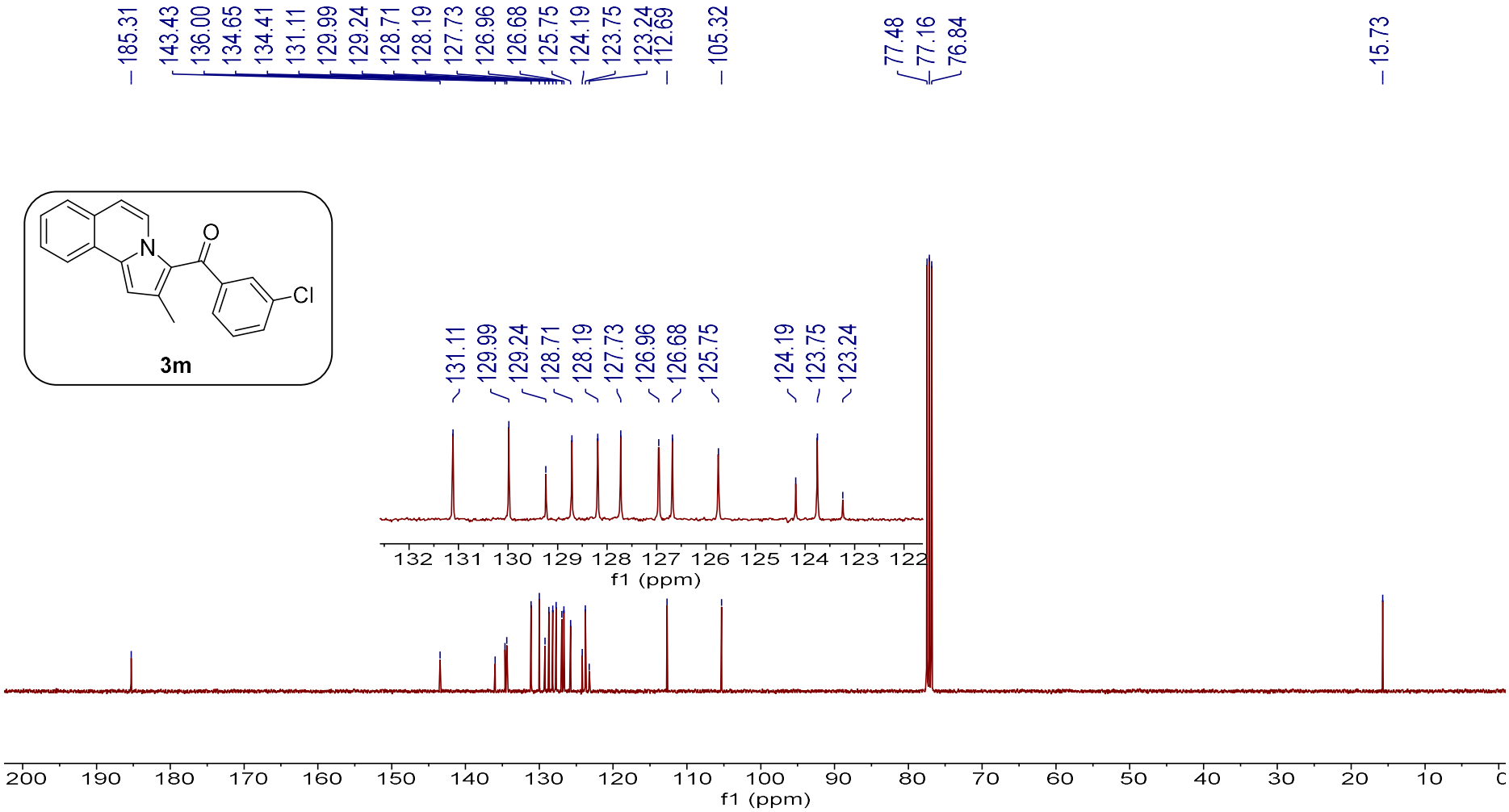
3l (^{1}H NMR, 400 MHz, $CDCl_3$)



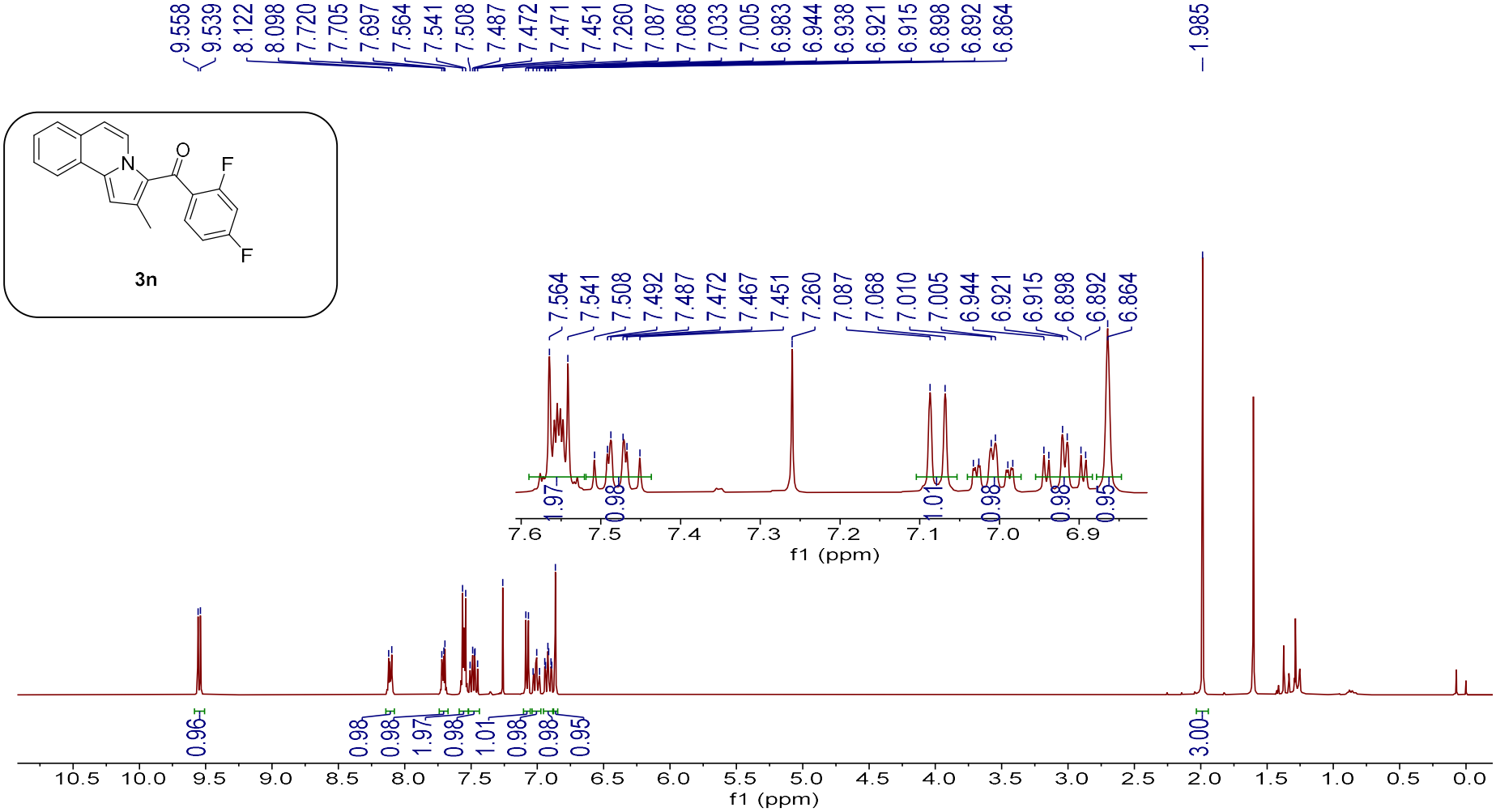
3l (^{13}C NMR, 101 MHz, $CDCl_3$)



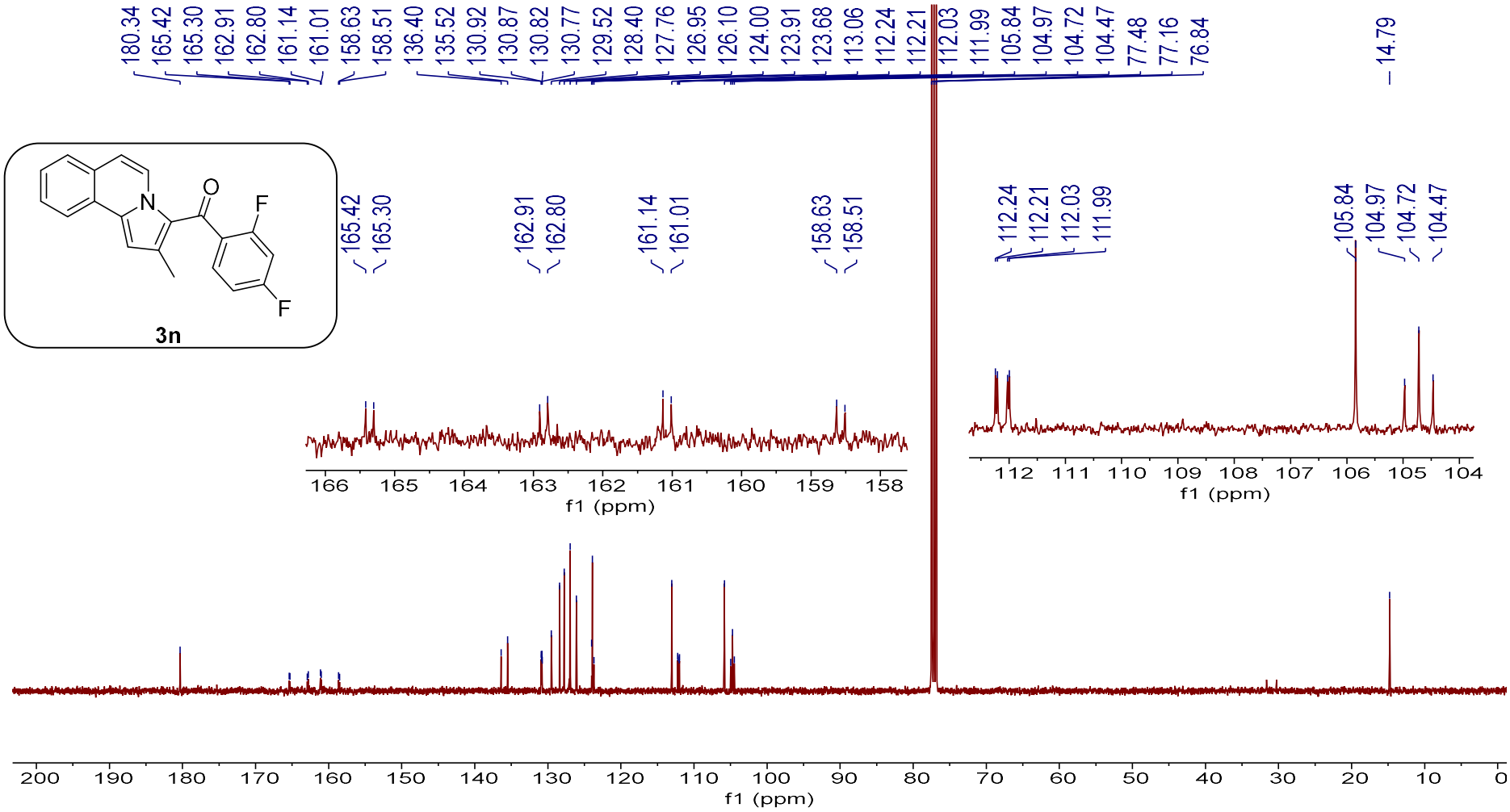
3m (^{1}H NMR, 400 MHz, $CDCl_3$)



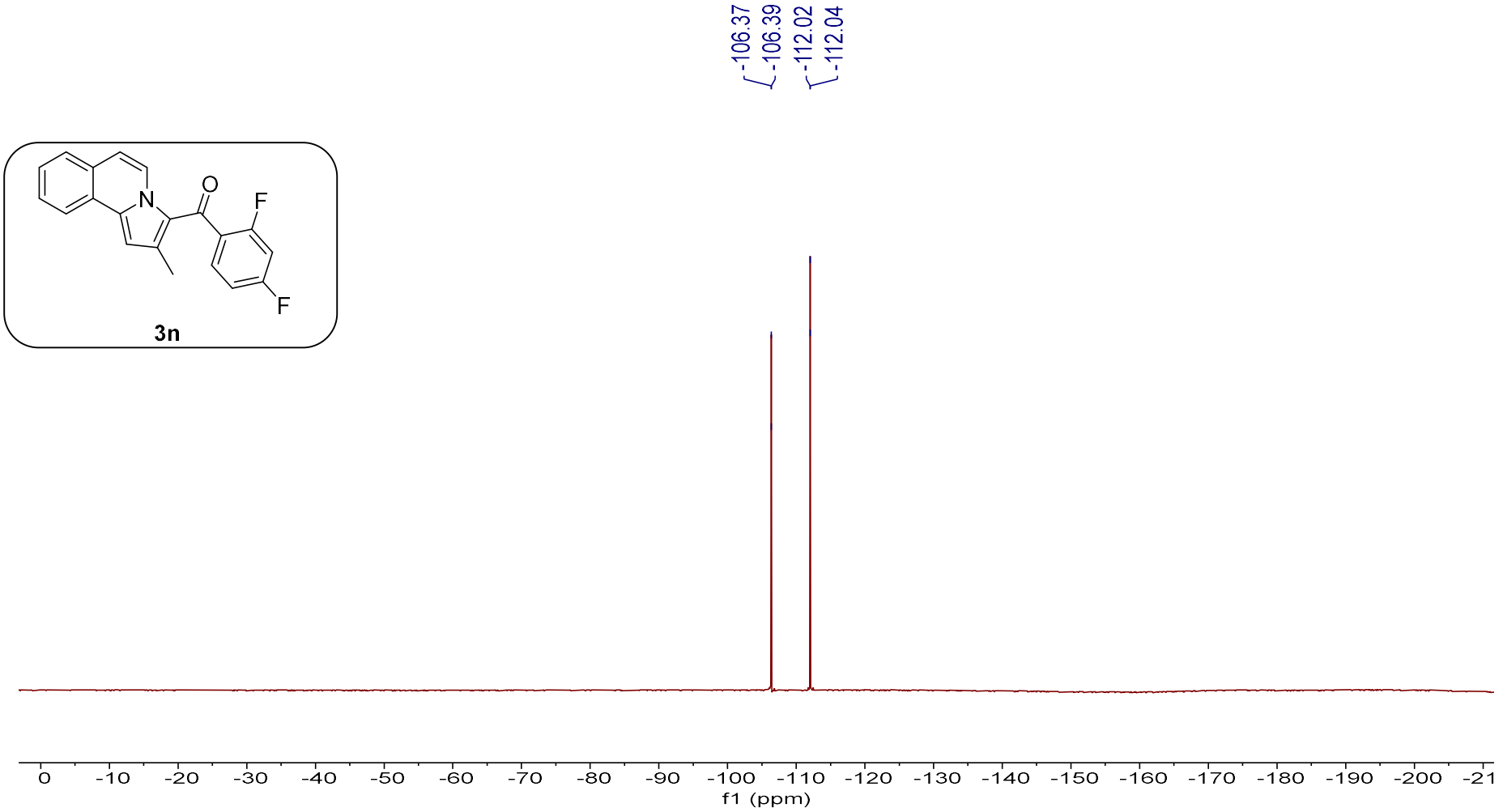
3m (^{13}C NMR, 101 MHz, $CDCl_3$)



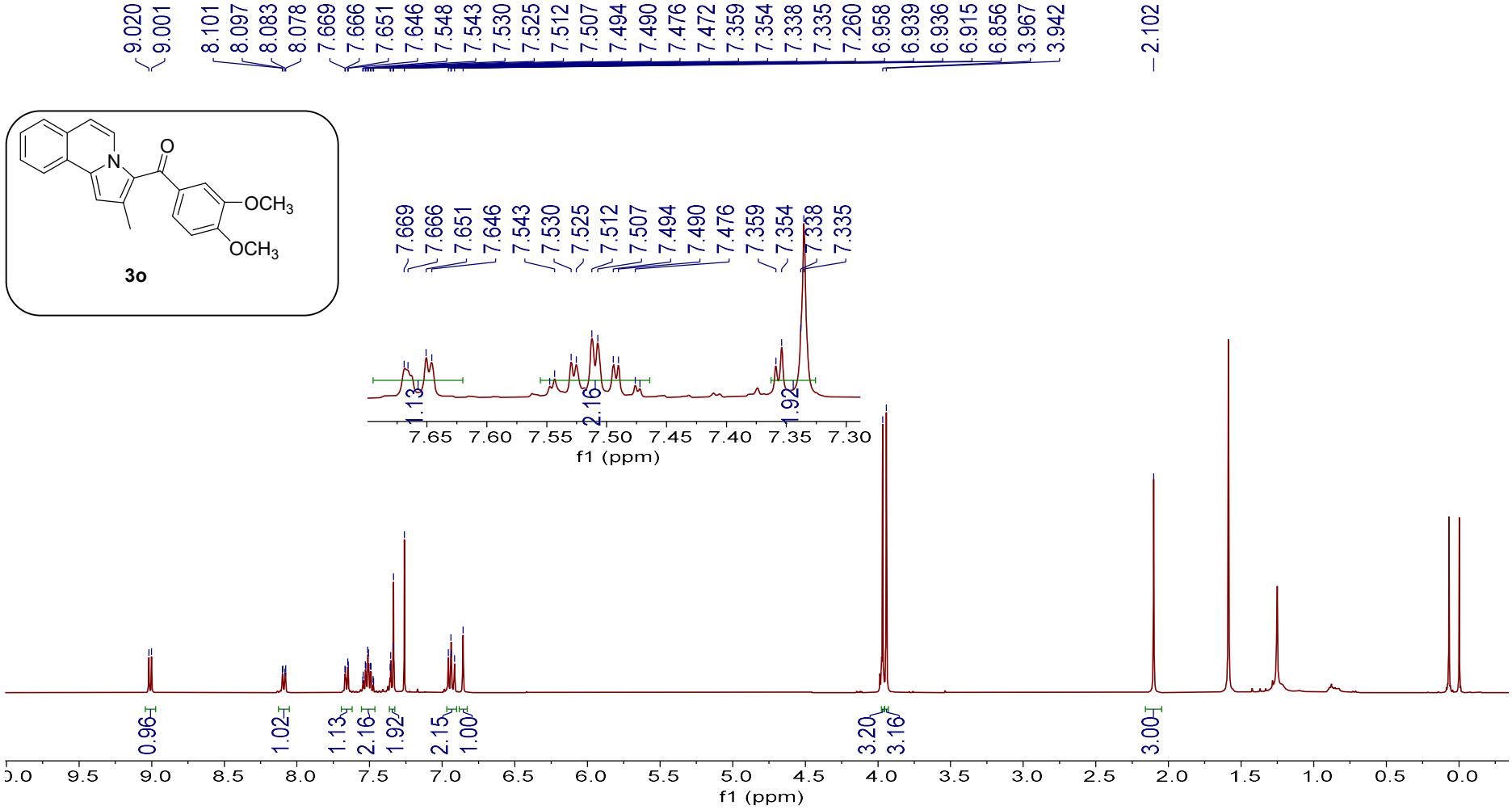
3n (^{1}H NMR, 400 MHz, $CDCl_3$)



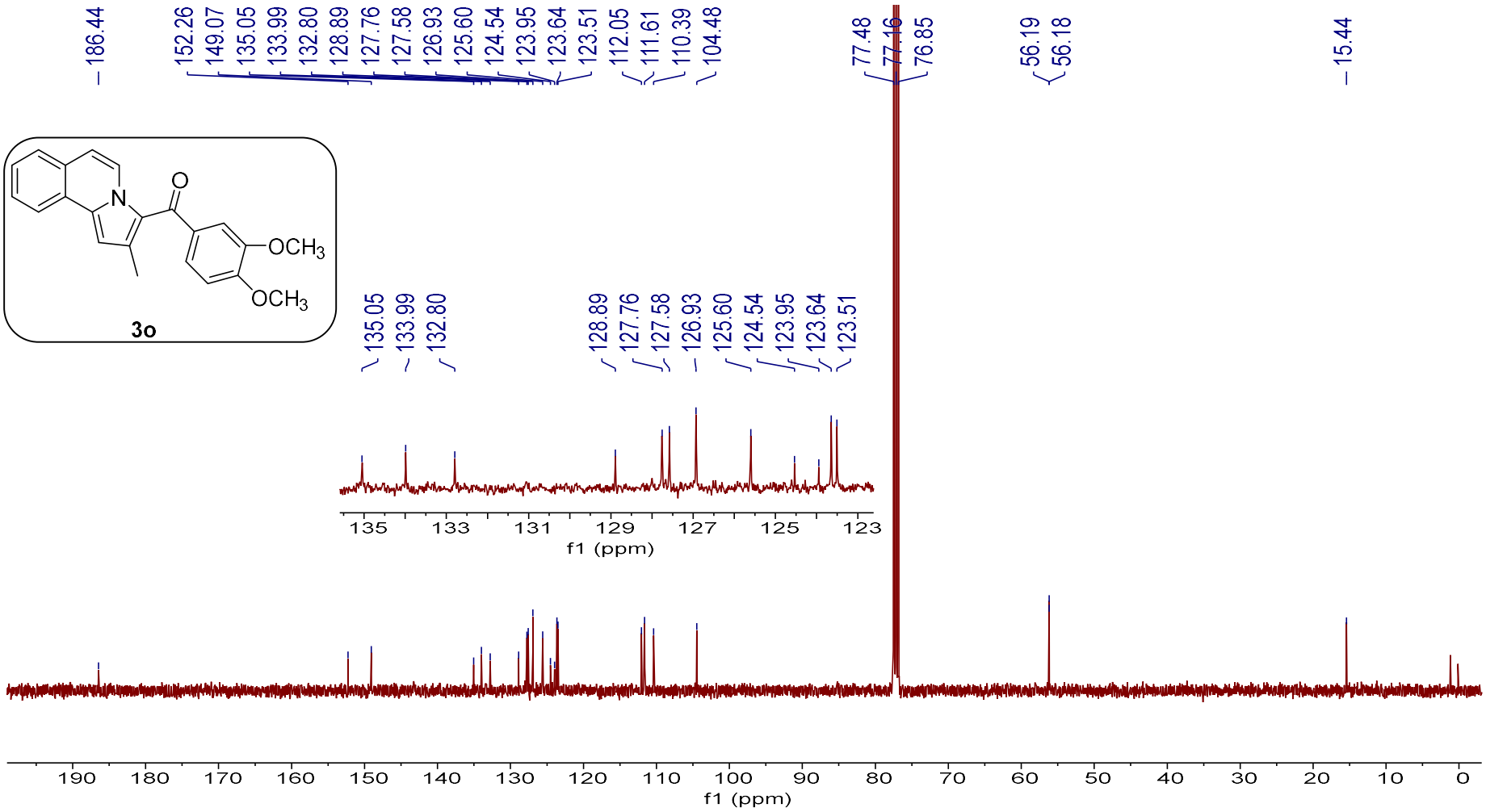
3n (^{13}C NMR, 101 MHz, $CDCl_3$)



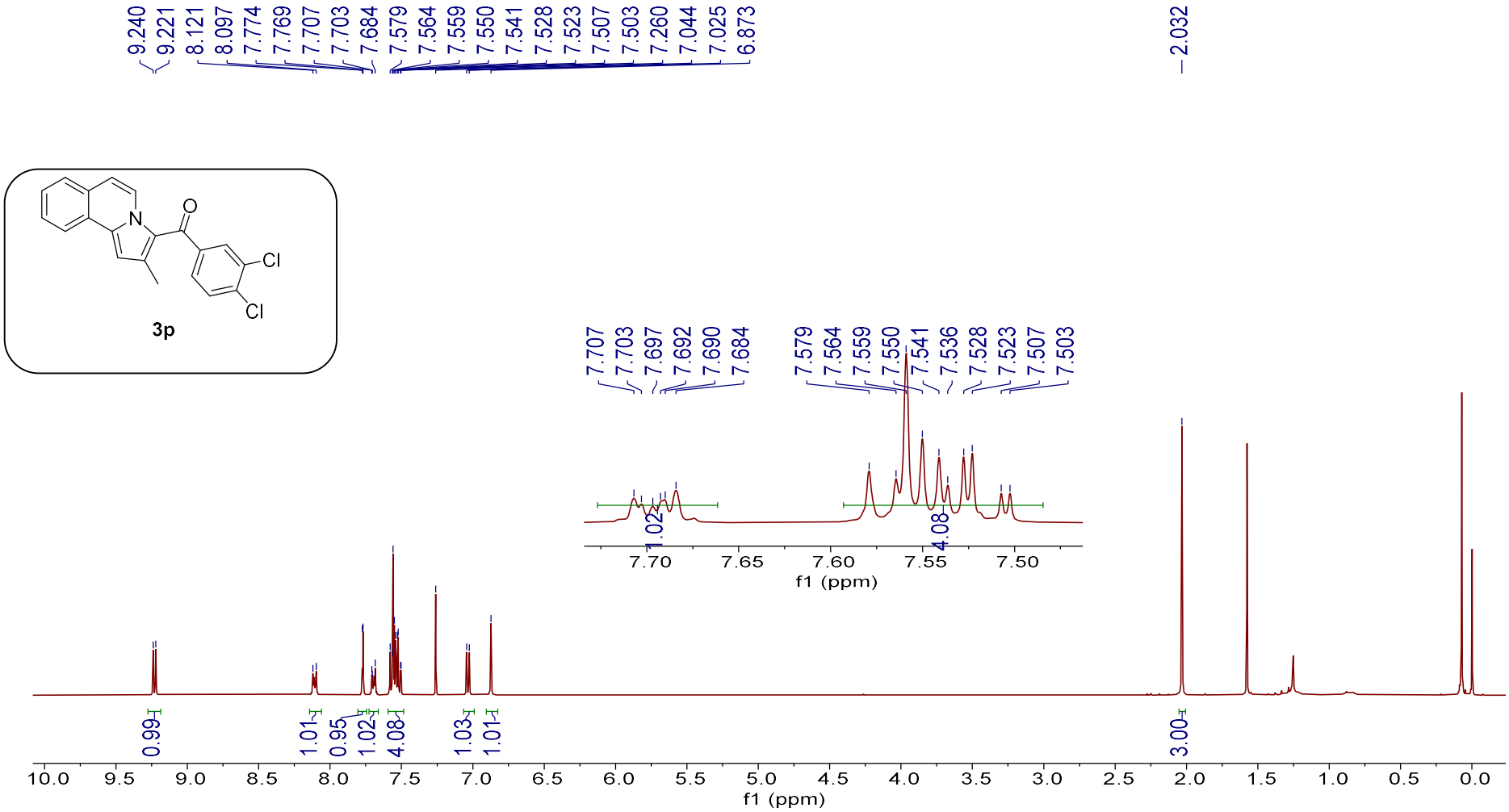
3n (^{19}F NMR, 101 MHz, $CDCl_3$)



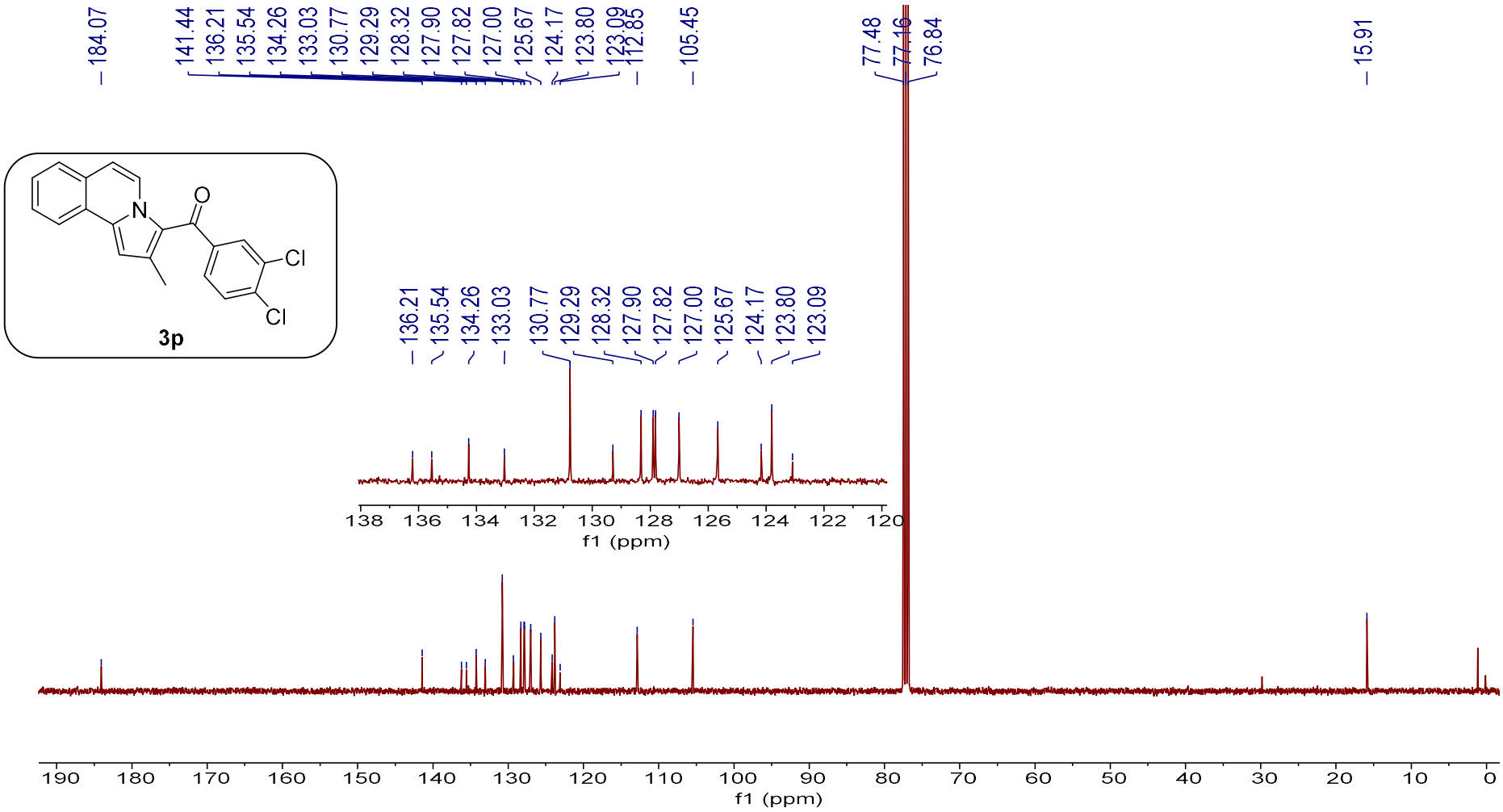
3o (^{1}H NMR, 400 MHz, $CDCl_3$)



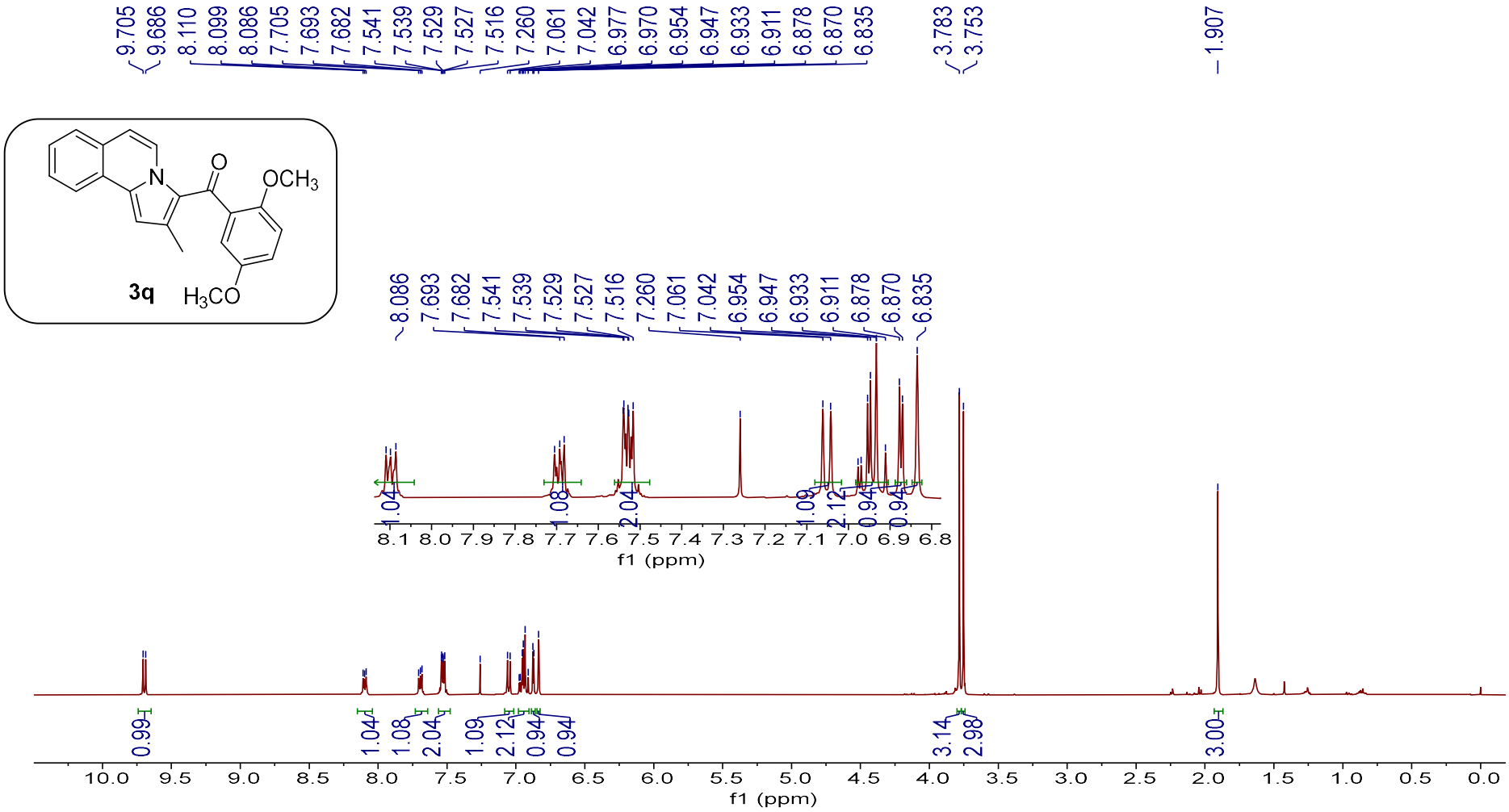
3o (^{13}C NMR, 101 MHz, $CDCl_3$)



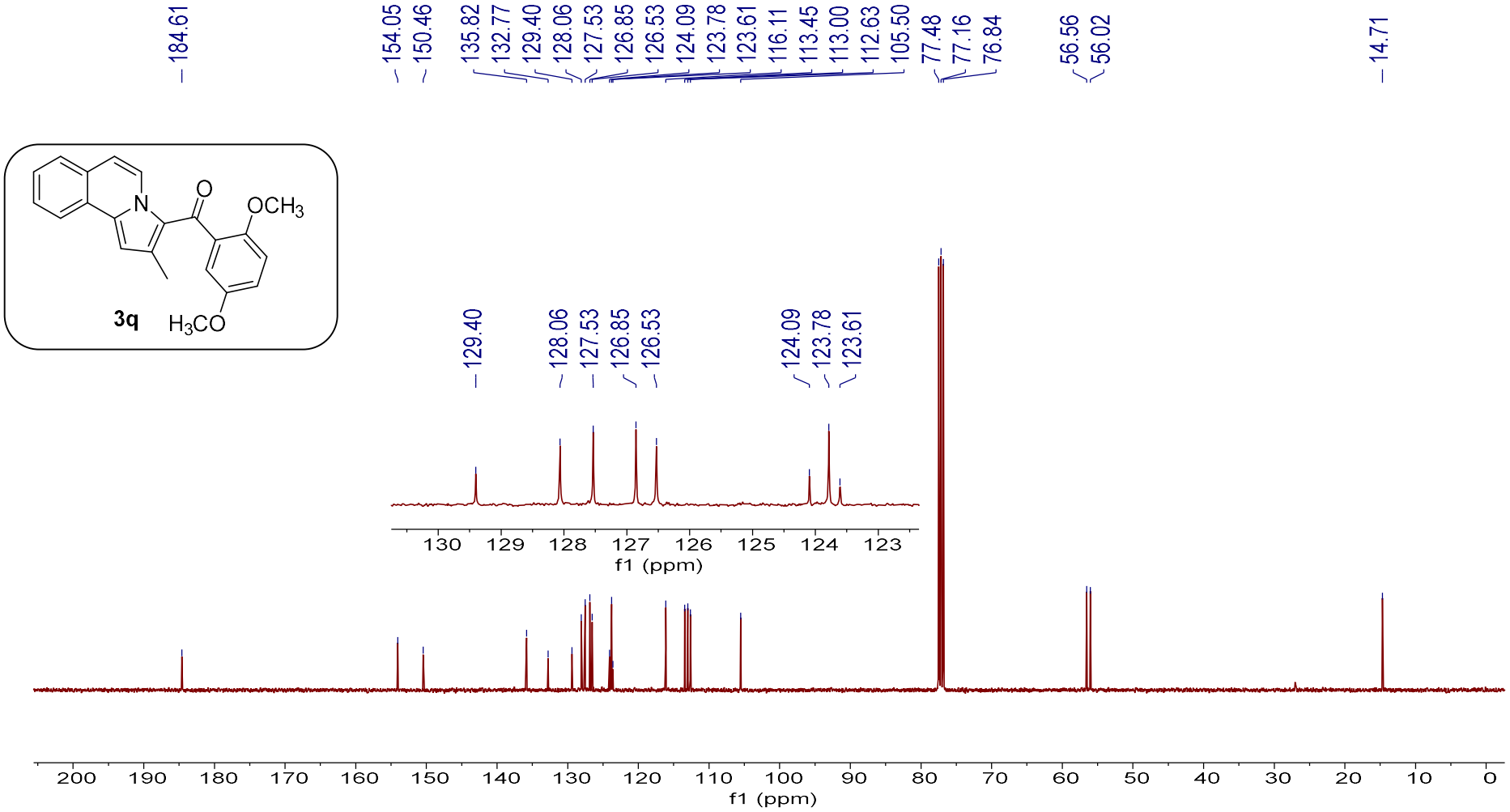
3p (^{1}H NMR, 400 MHz, $CDCl_3$)



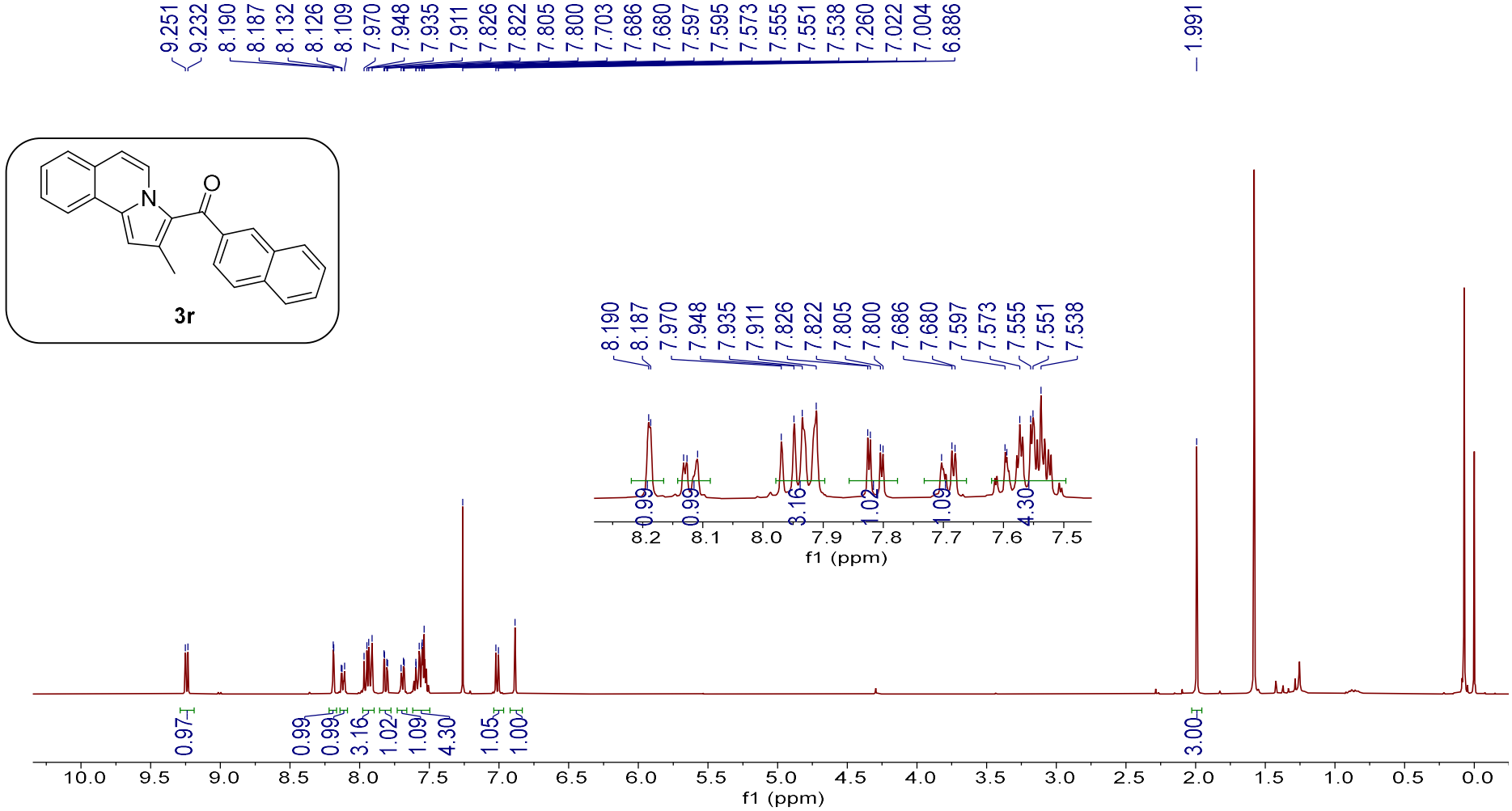
3p (^{13}C NMR, 101 MHz, $CDCl_3$)



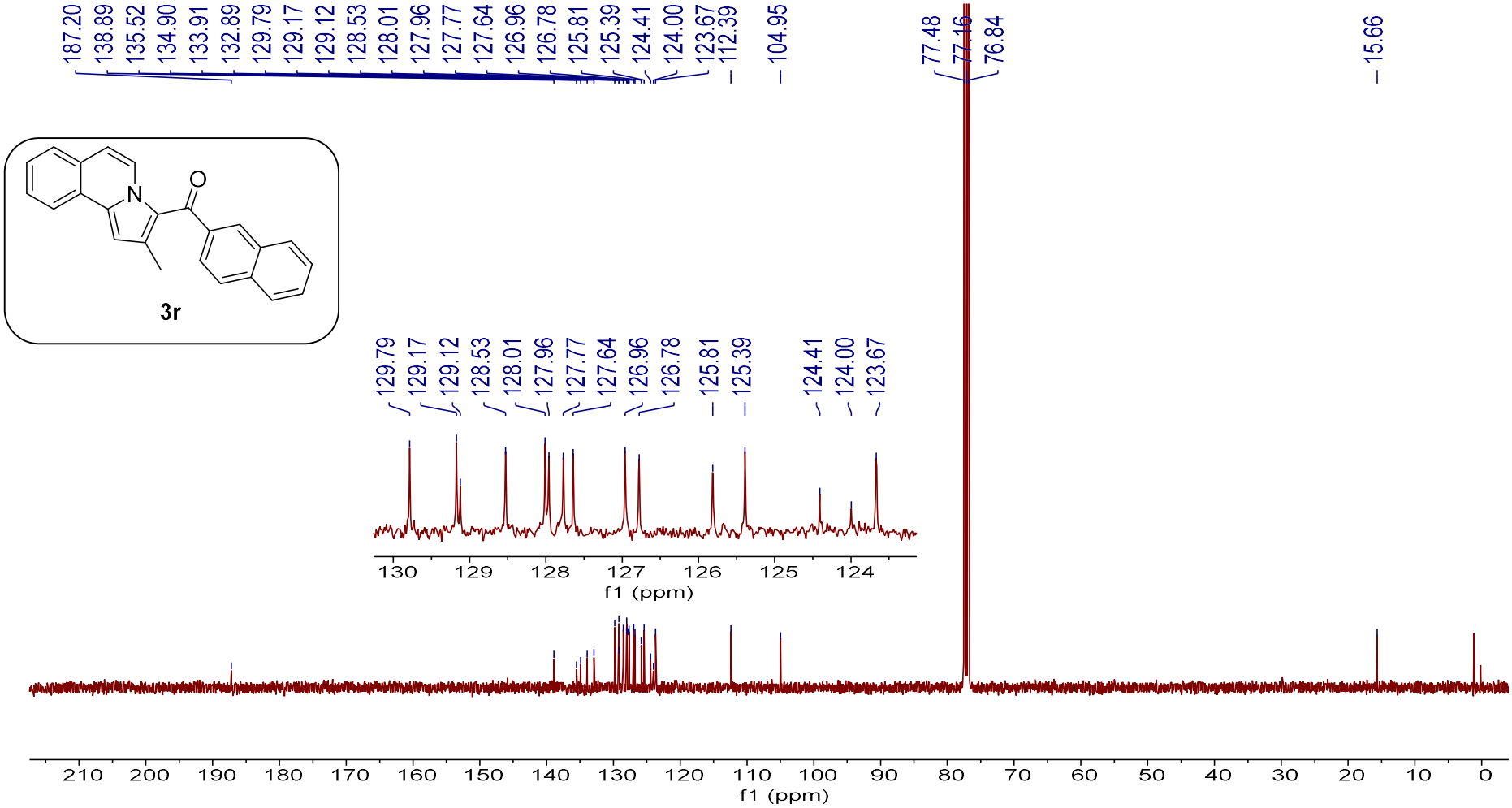
3q (^{1}H NMR, 400 MHz, $CDCl_3$)



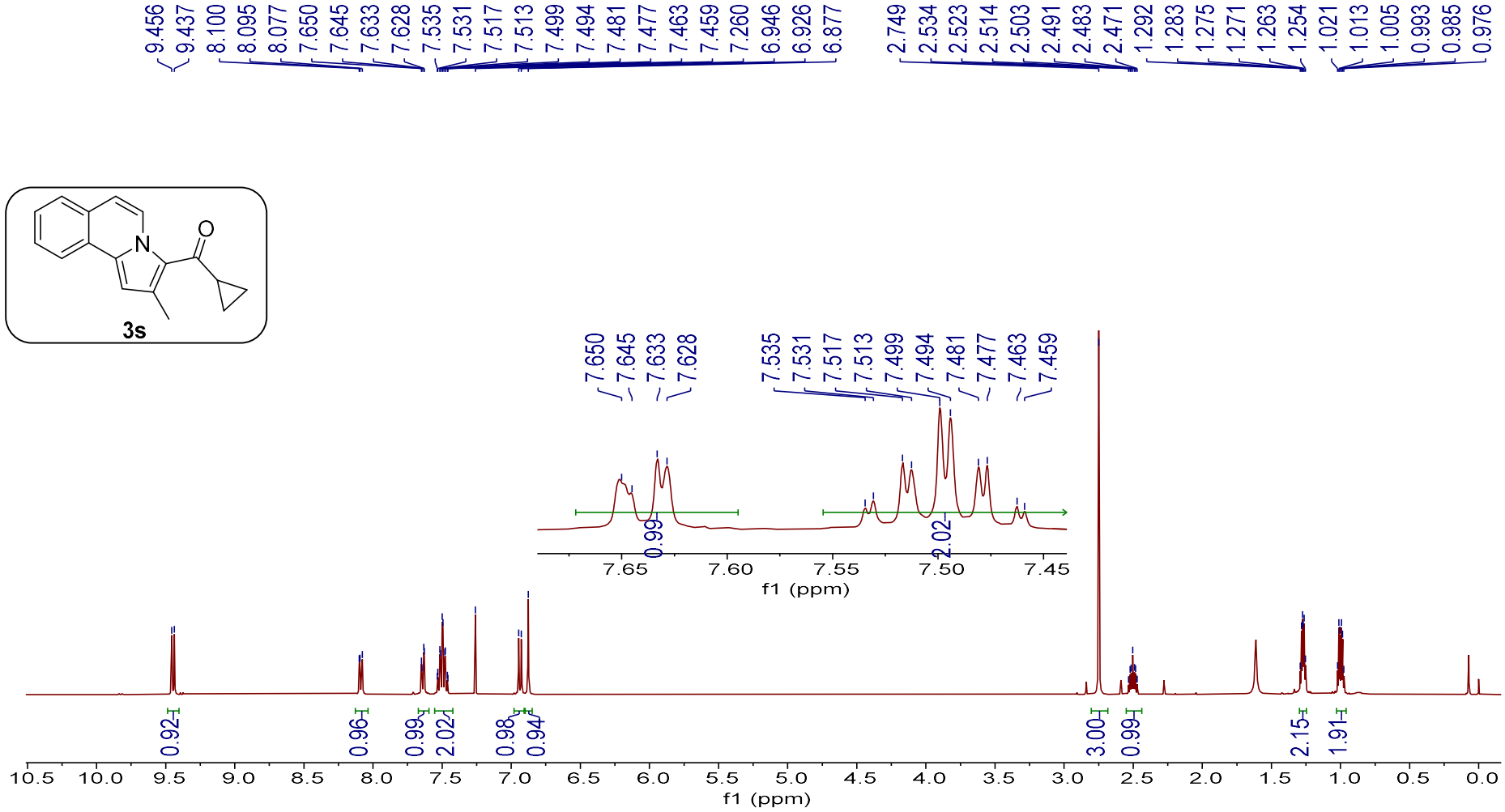
3q (^{13}C NMR, 101 MHz, $CDCl_3$)



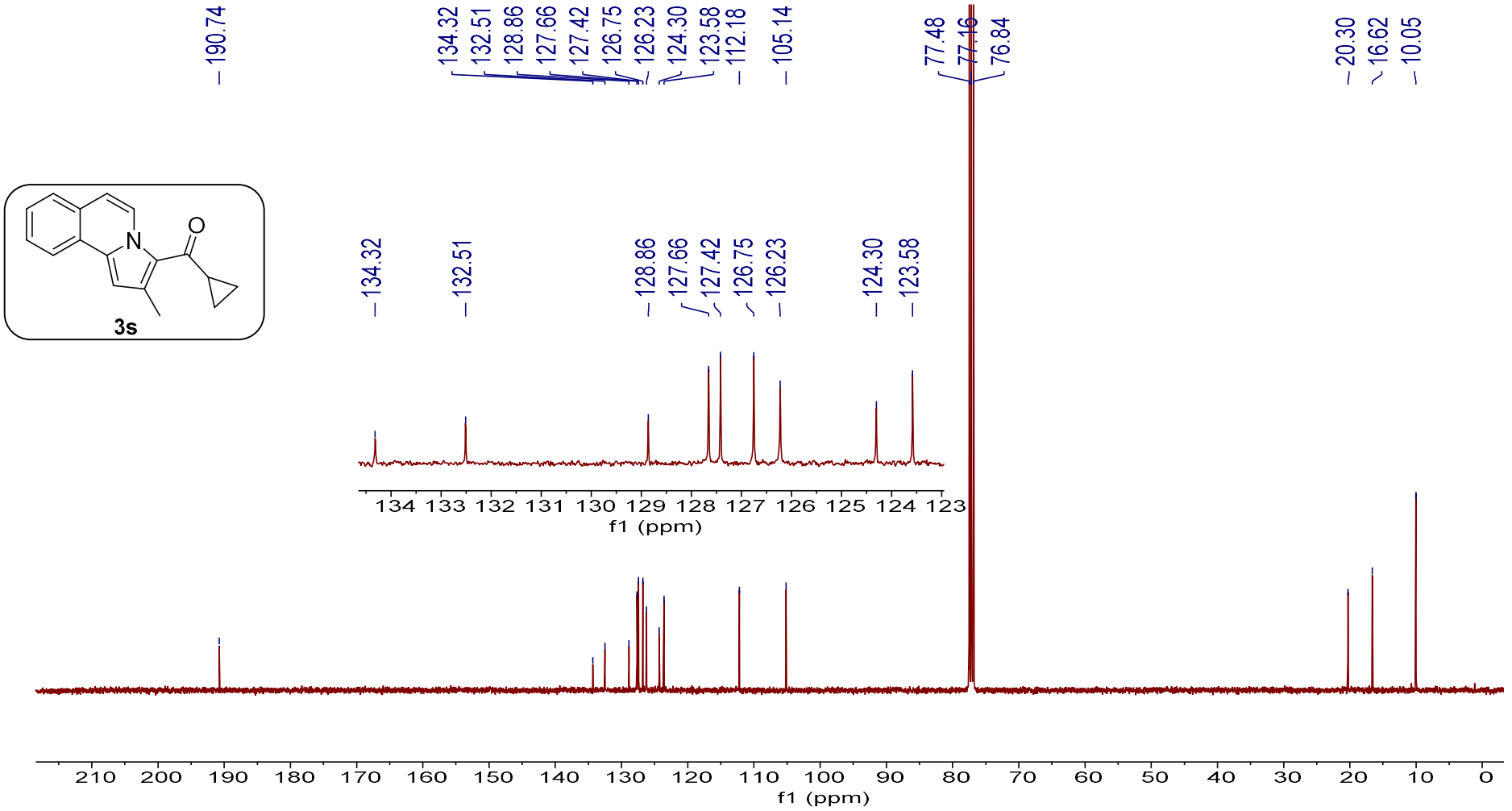
3r (^{1}H NMR, 400 MHz, $CDCl_3$)



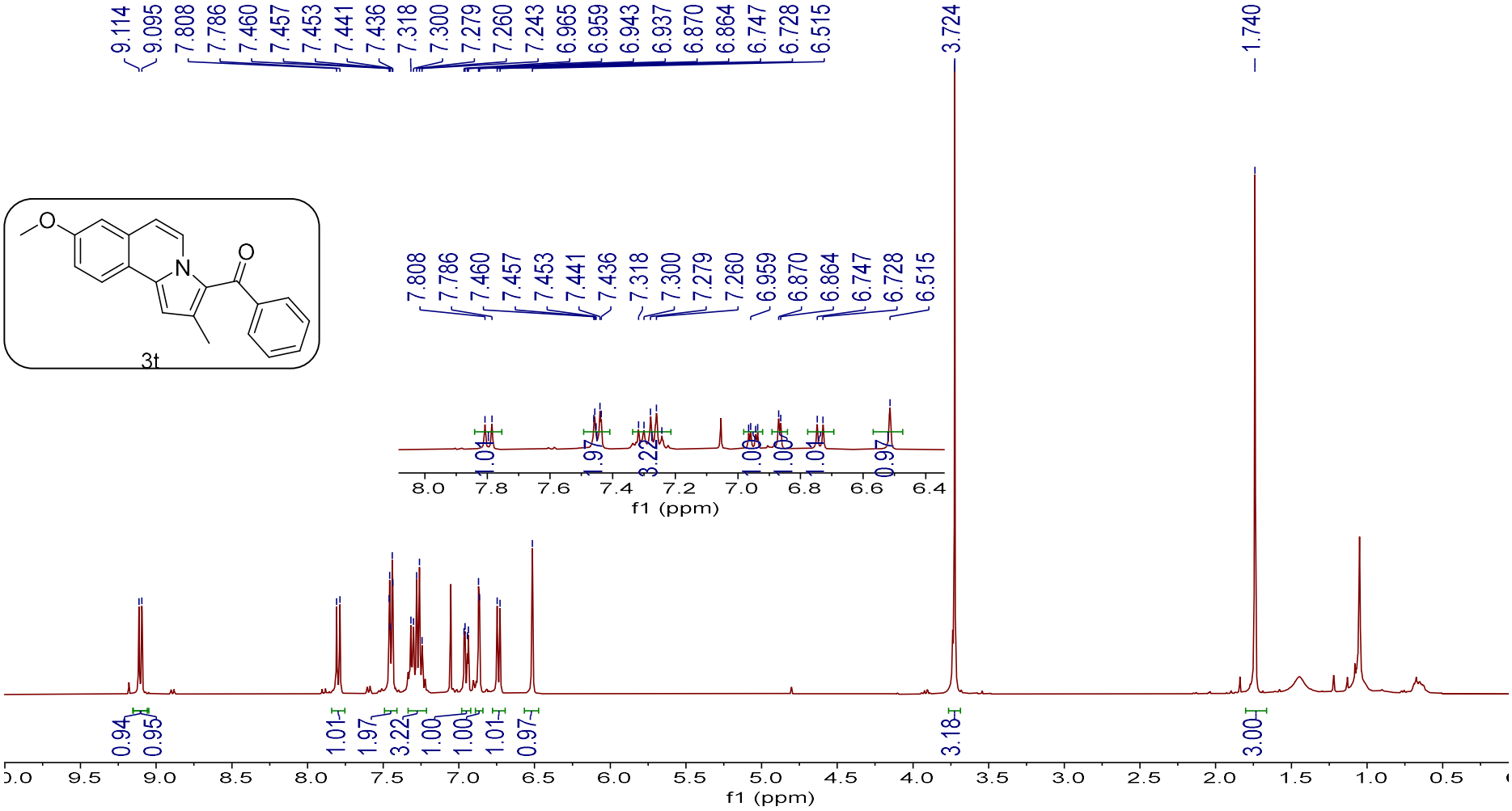
3r (^{13}C NMR, 101 MHz, $CDCl_3$)



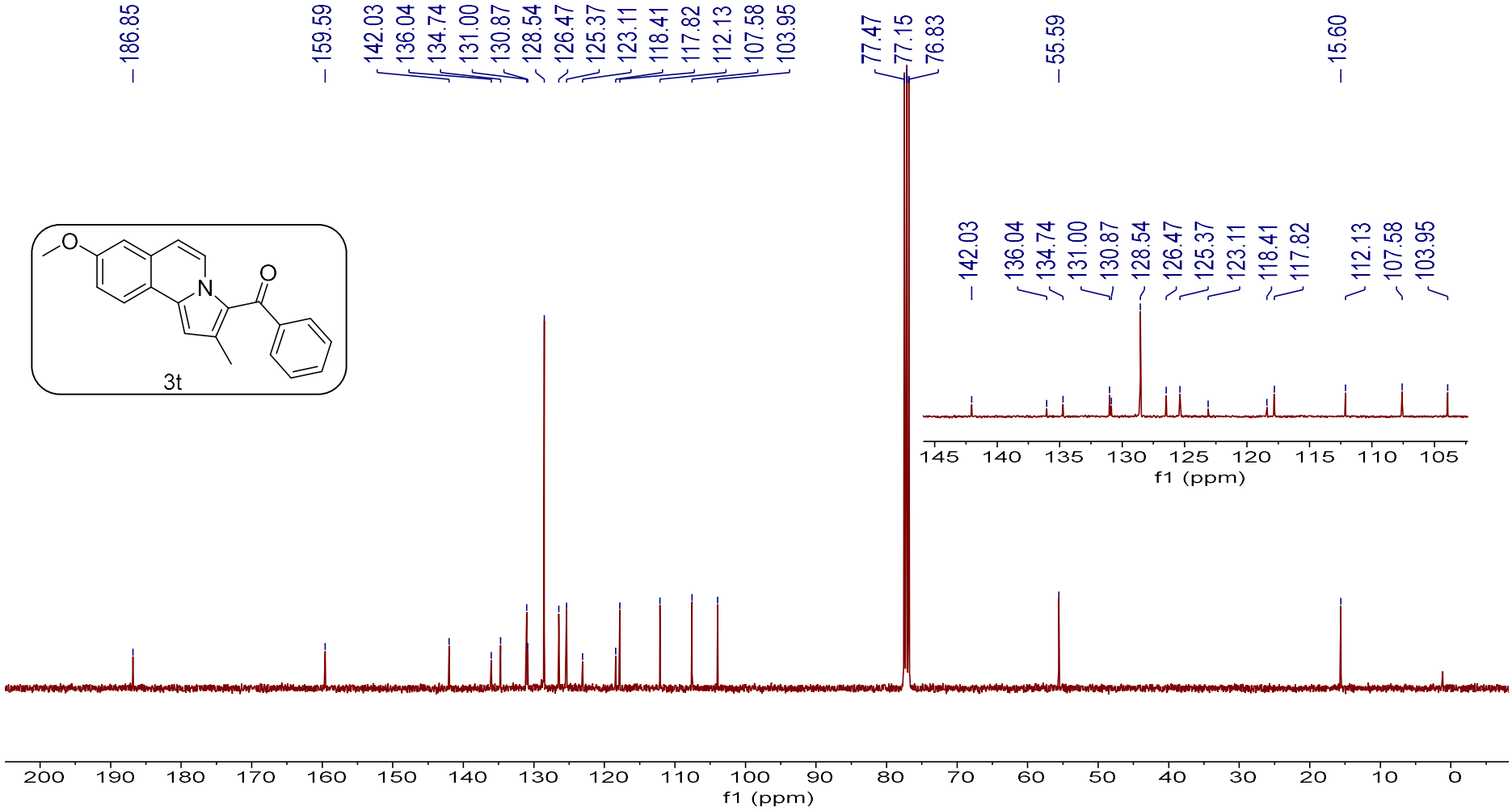
3s (^{1}H NMR, 400 MHz, $CDCl_3$)



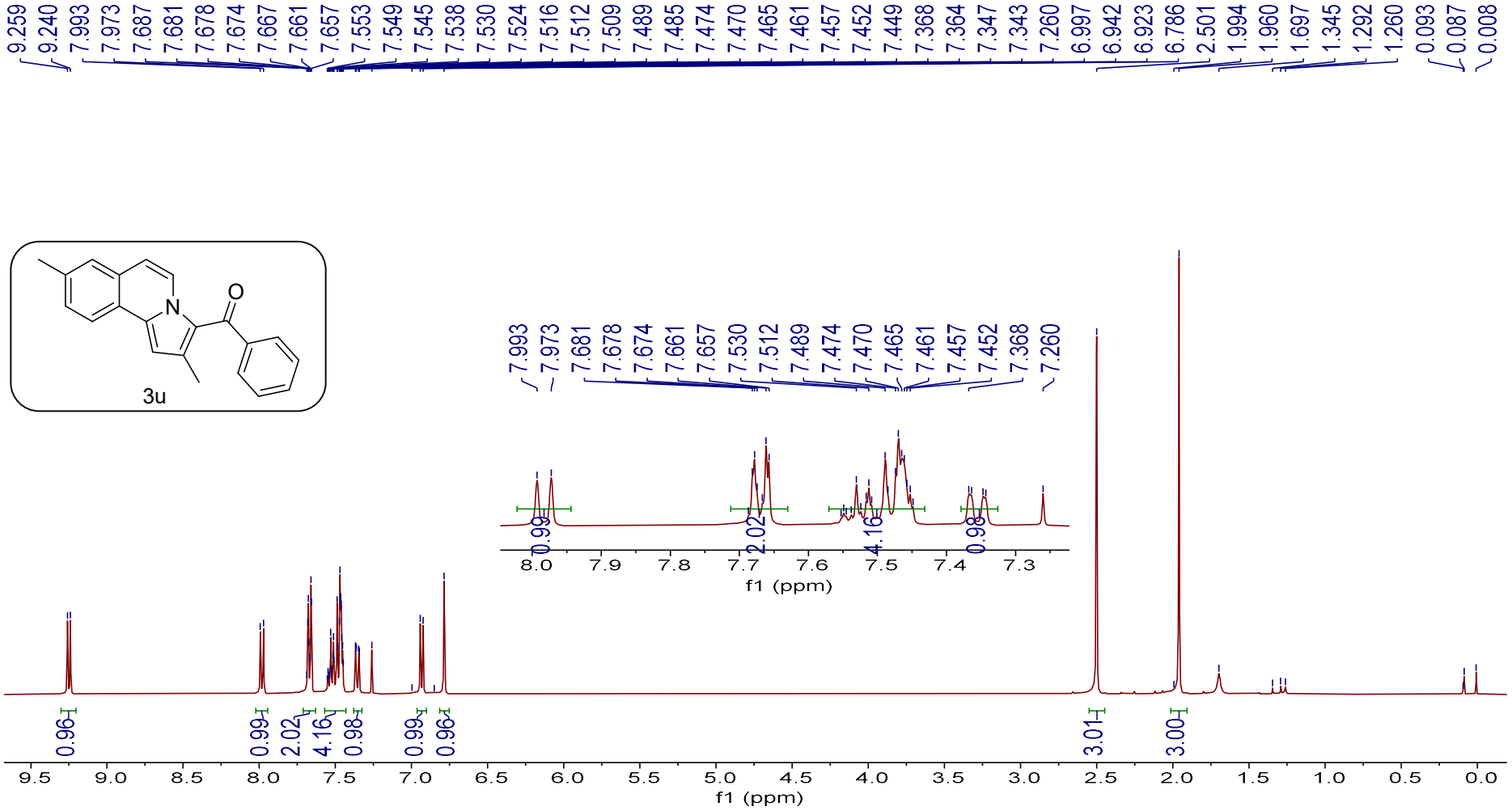
3s (^{13}C NMR, 101 MHz, $CDCl_3$)



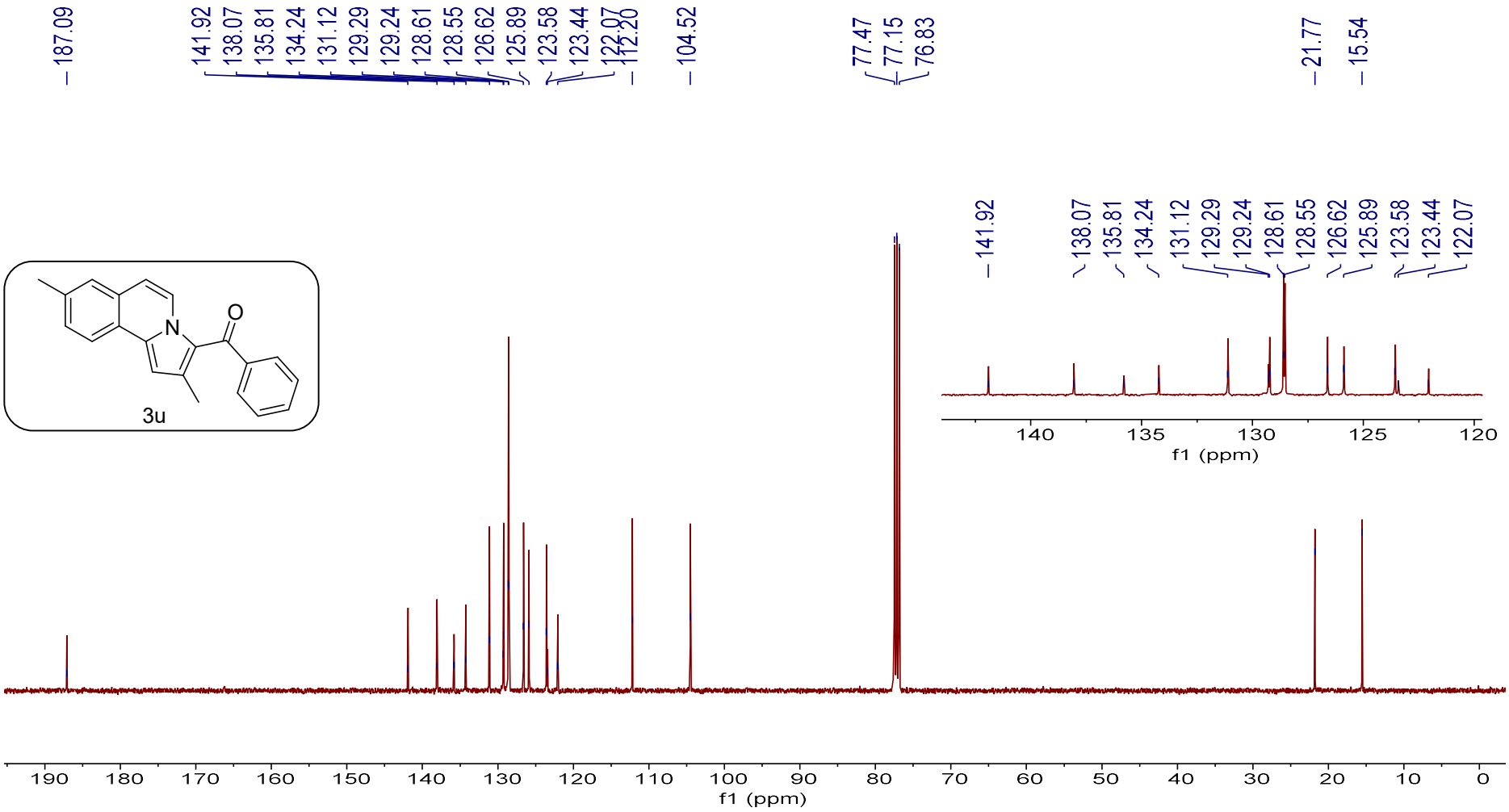
3t (^{1}H NMR, 400 MHz, $CDCl_3$)



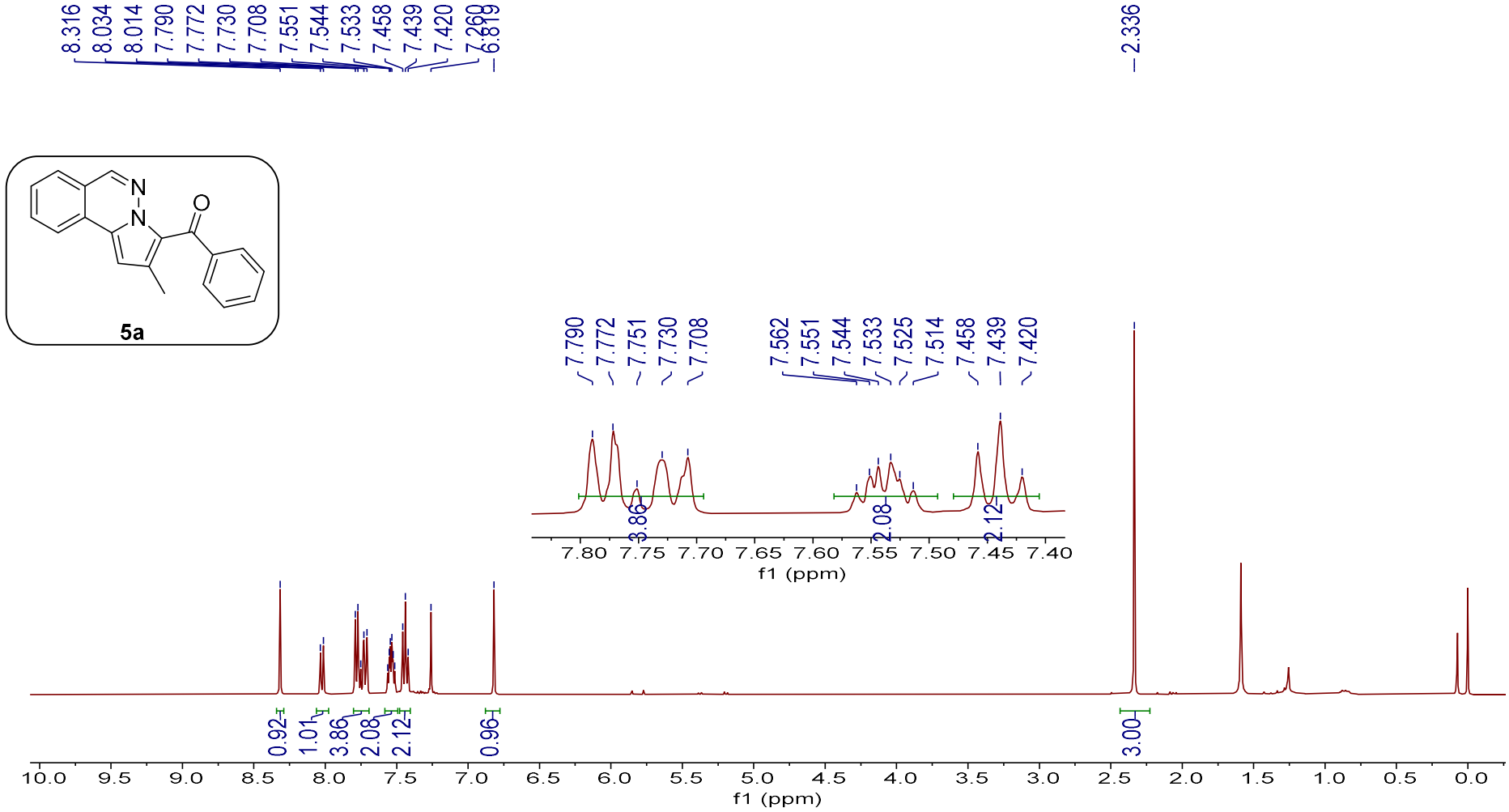
3t (^{13}C NMR, 101 MHz, $CDCl_3$)



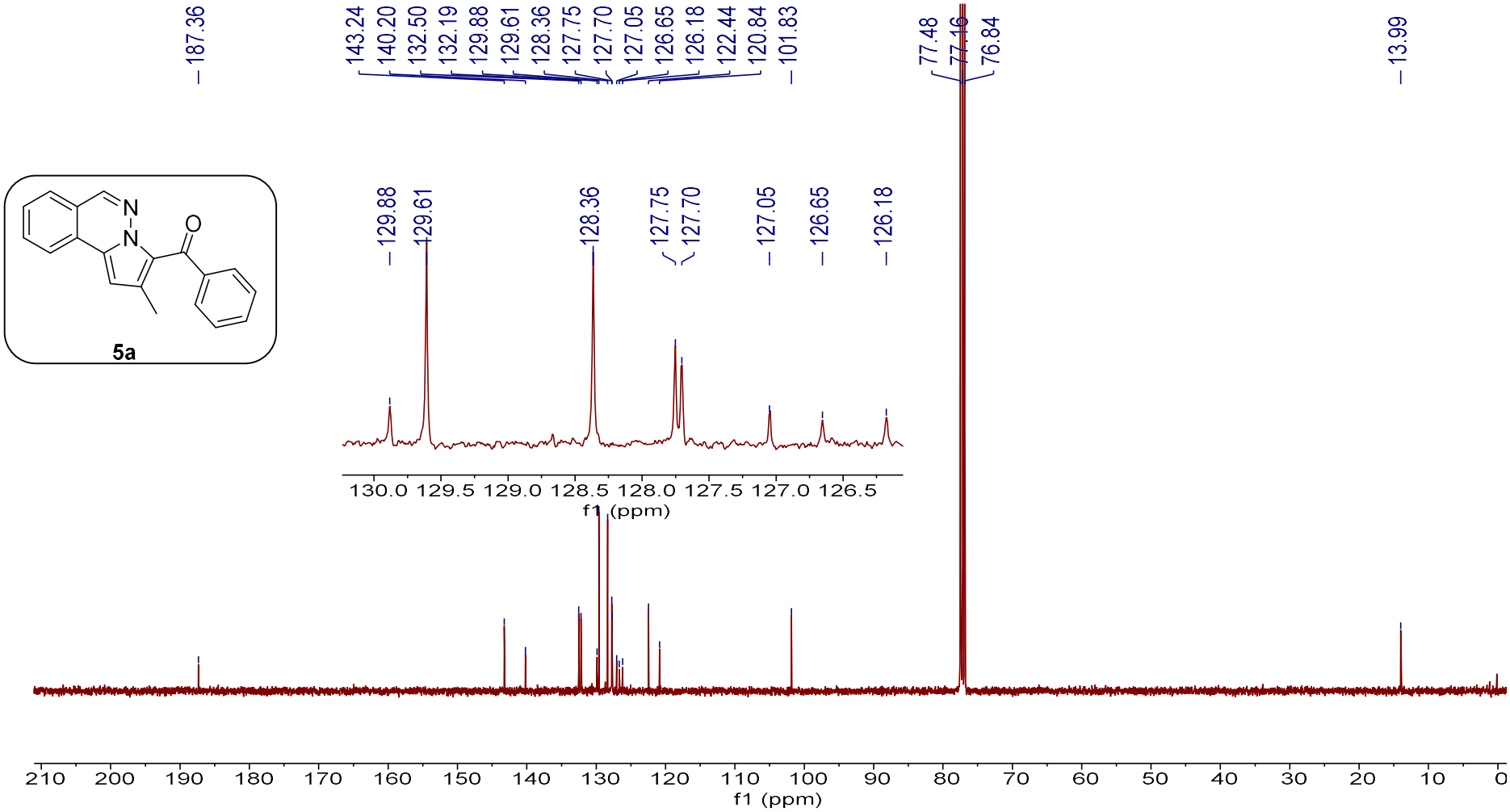
3u (^{1}H NMR, 400 MHz, $CDCl_3$)



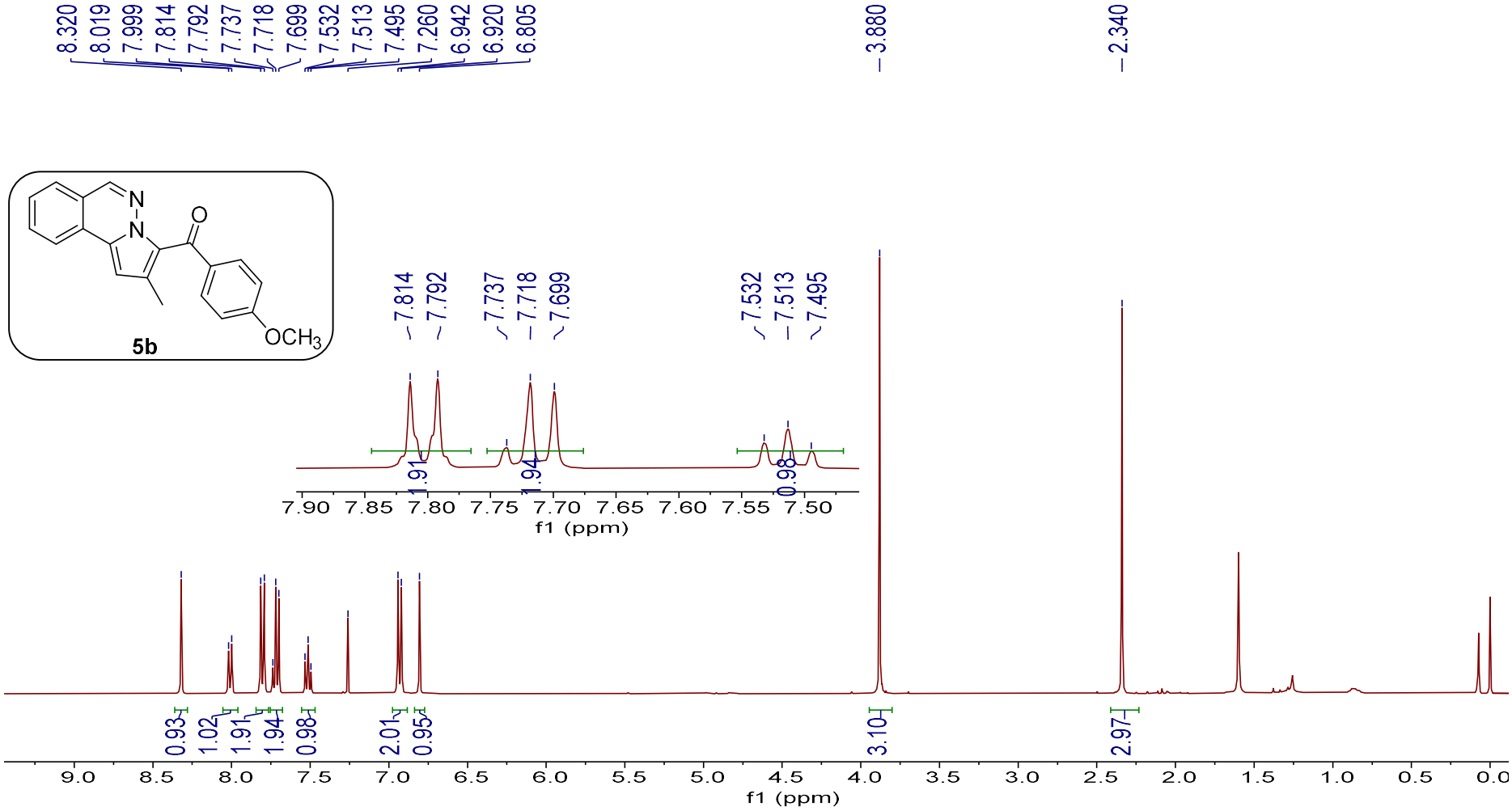
3u (^{13}C NMR, 101 MHz, $CDCl_3$)



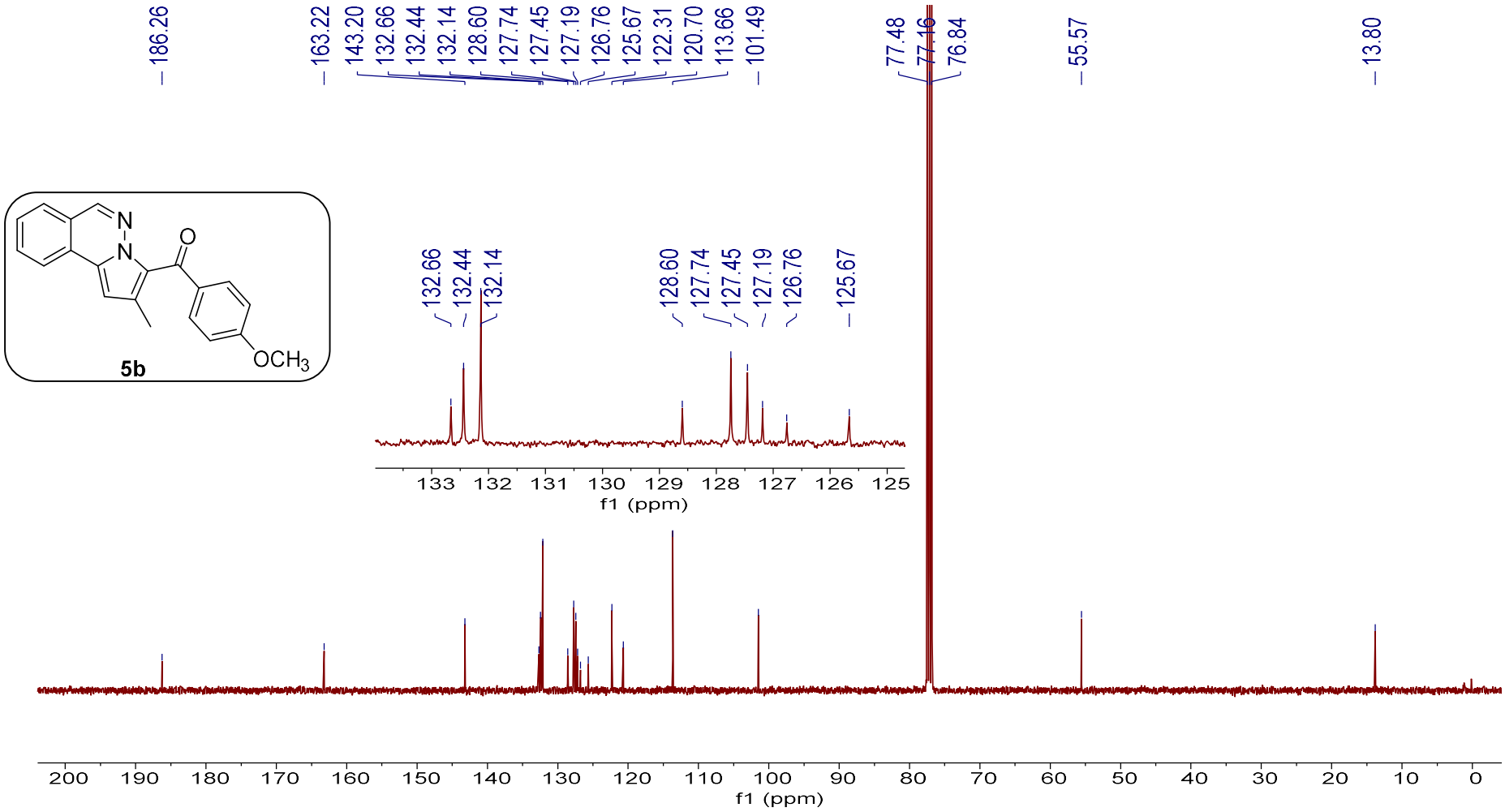
5a (^{1}H NMR, 400 MHz, $CDCl_3$)



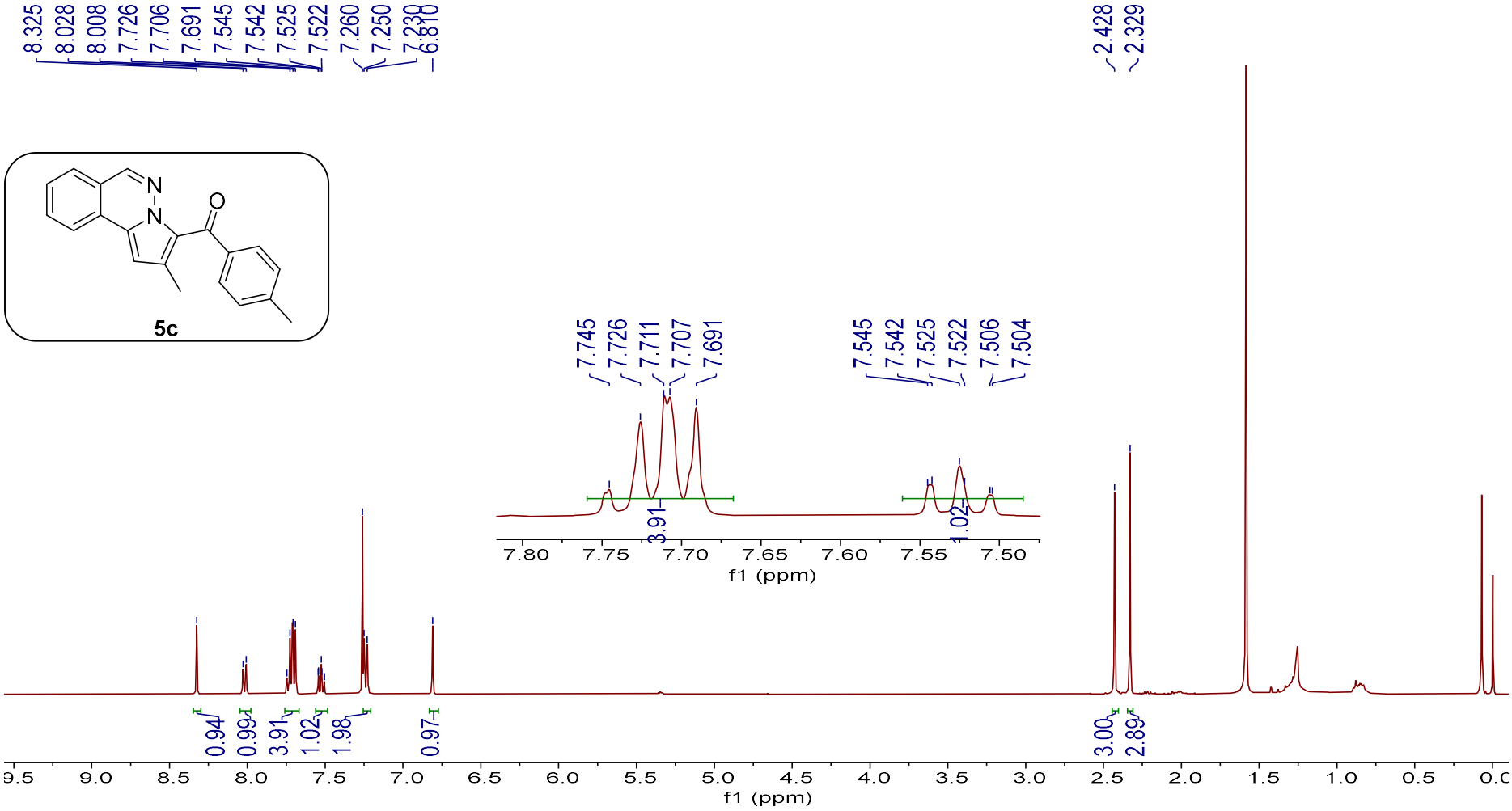
5a (^{13}C NMR, 101 MHz, $CDCl_3$)



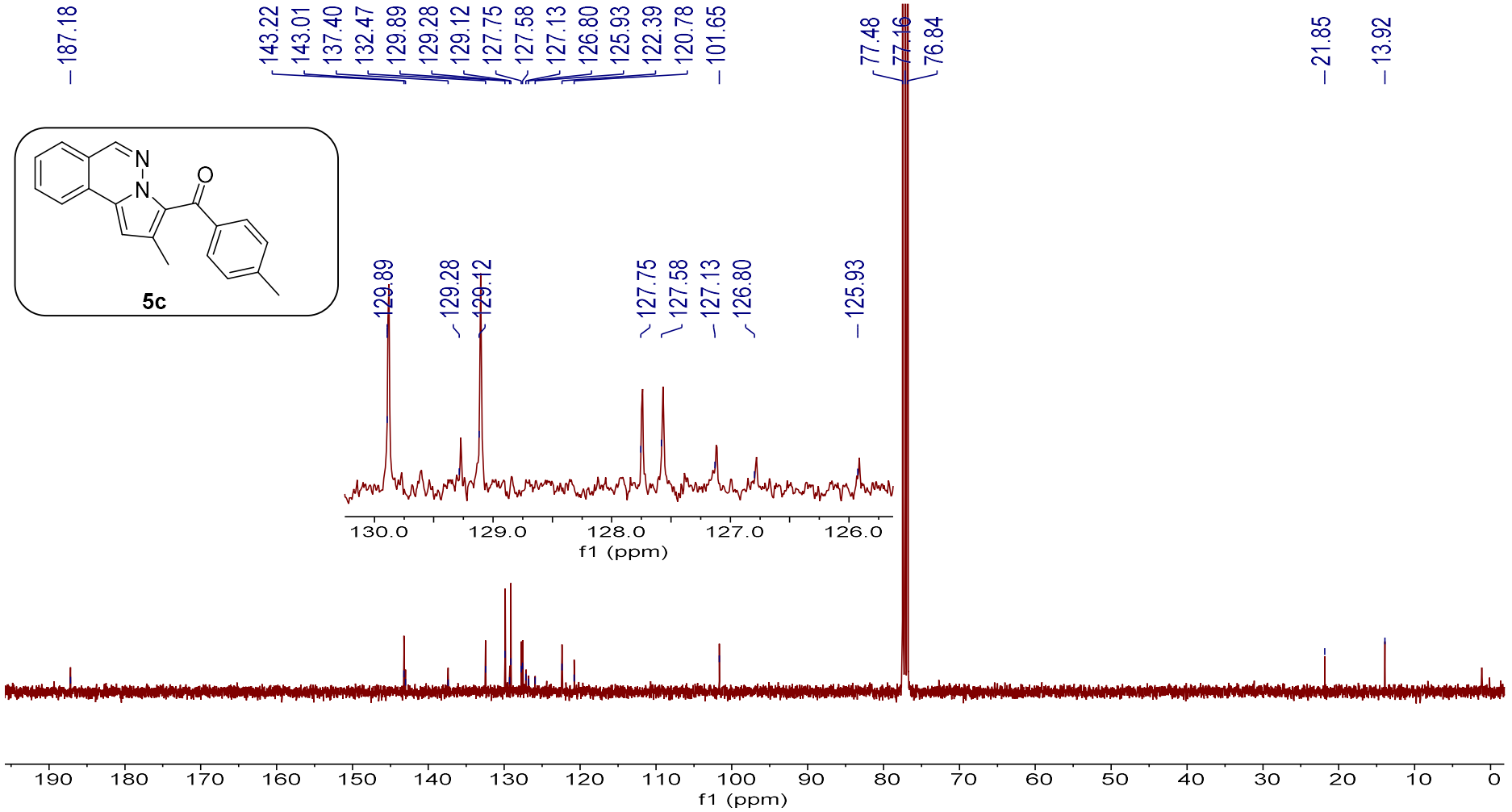
5b (^{1}H NMR, 400 MHz, $CDCl_3$)



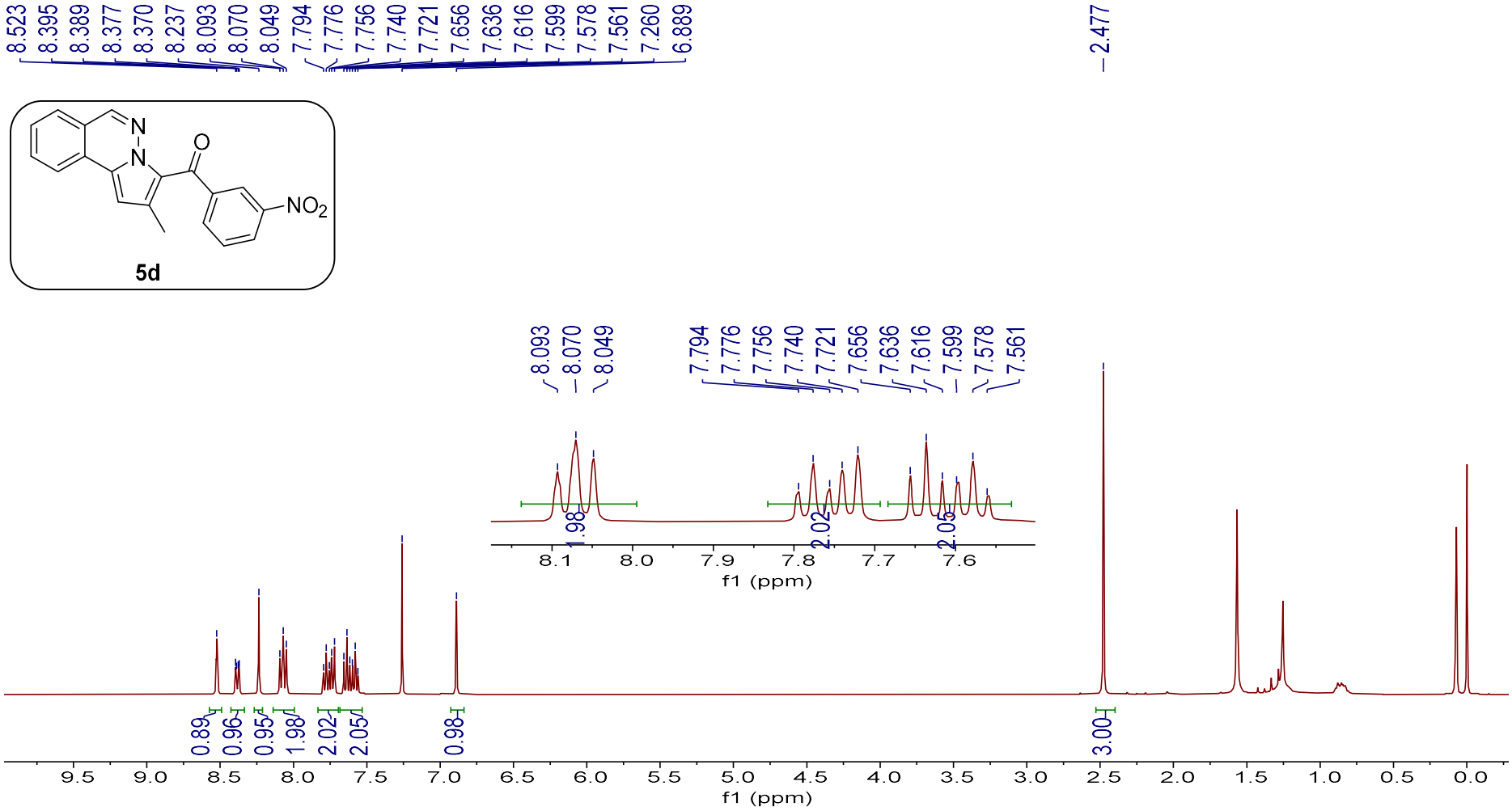
5b (^{13}C NMR, 101 MHz, $CDCl_3$)



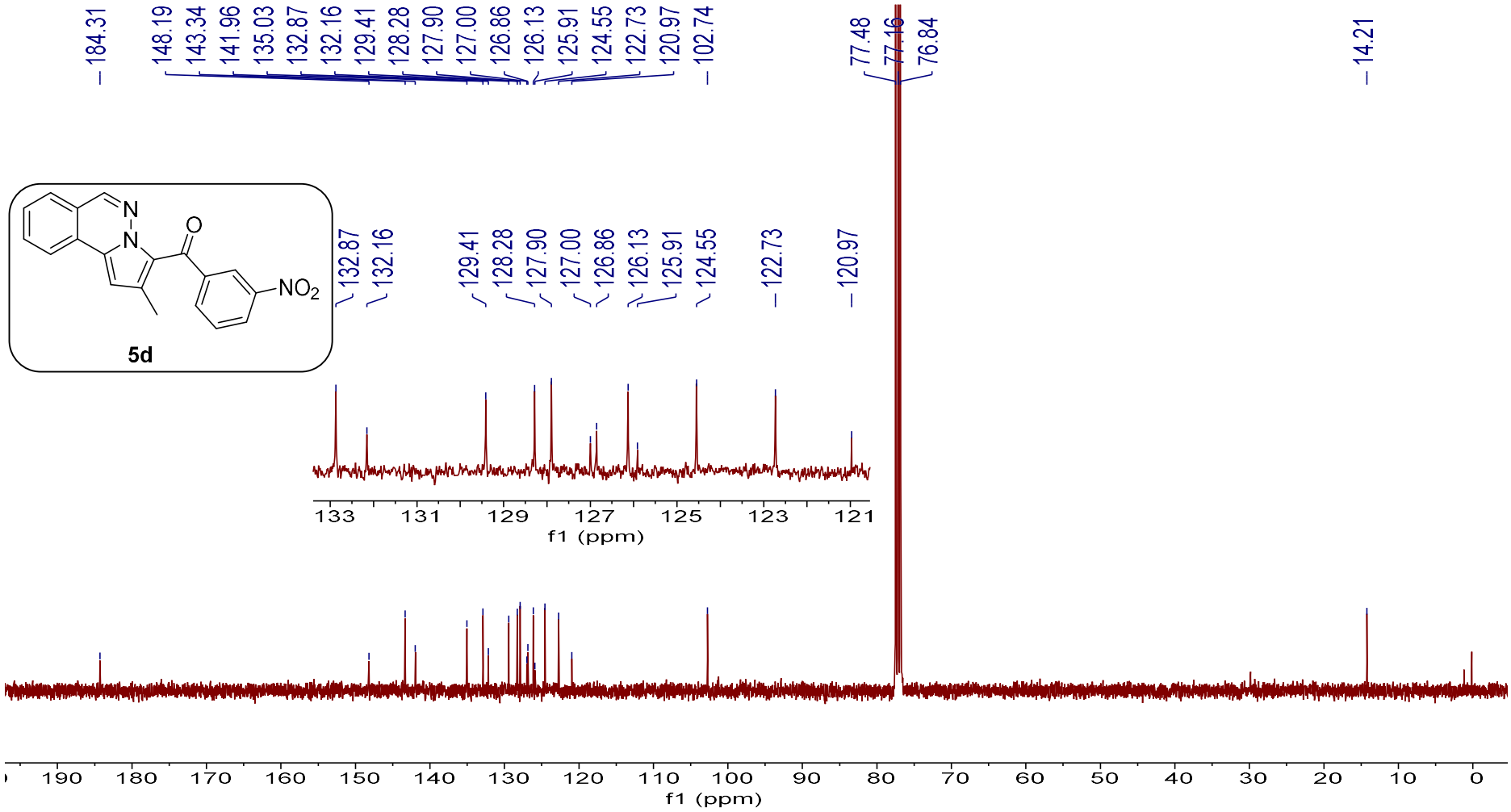
5c (^{1}H NMR, 400 MHz, $CDCl_3$)



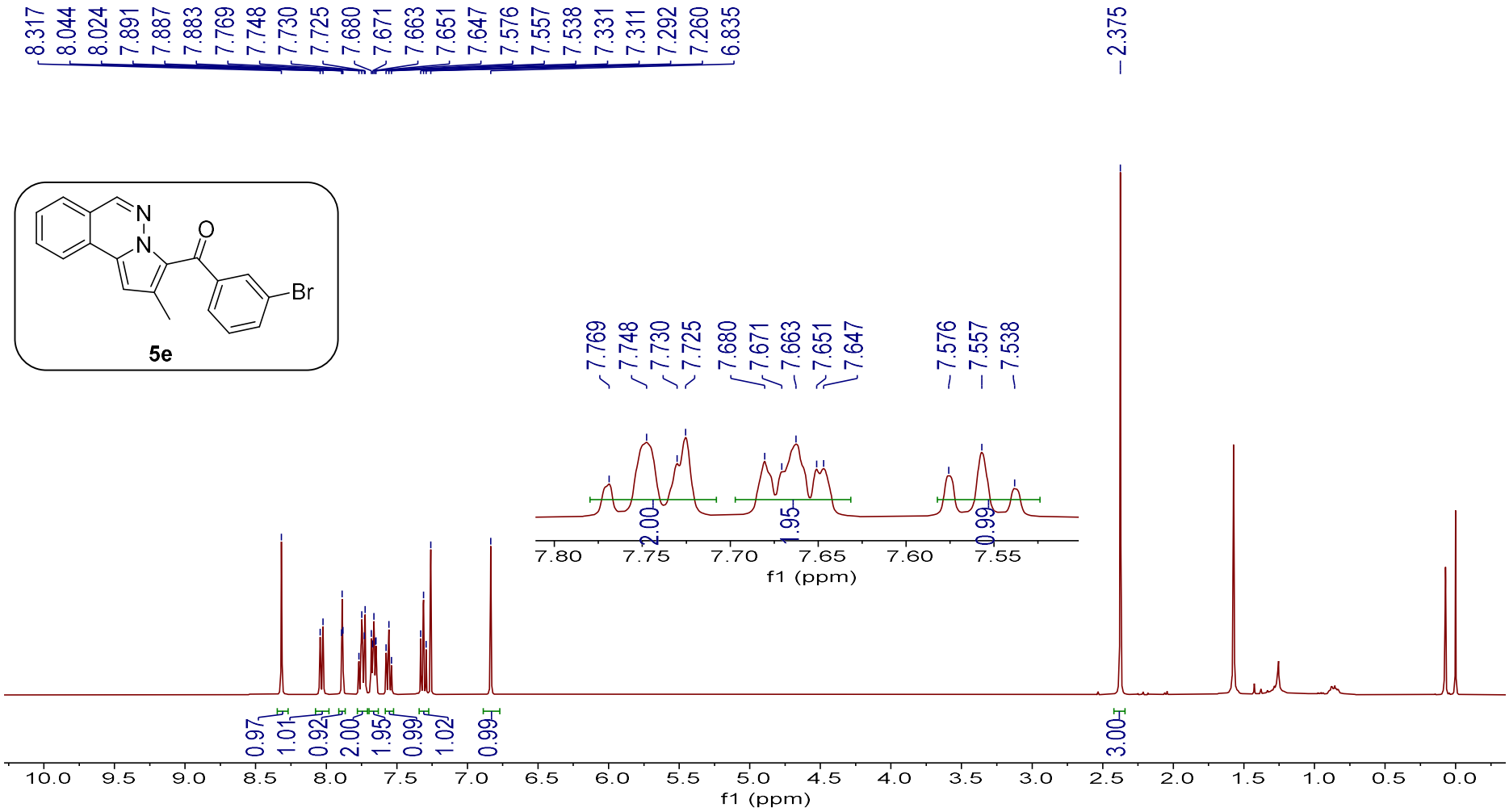
5c (^{13}C NMR, 101 MHz, $CDCl_3$)



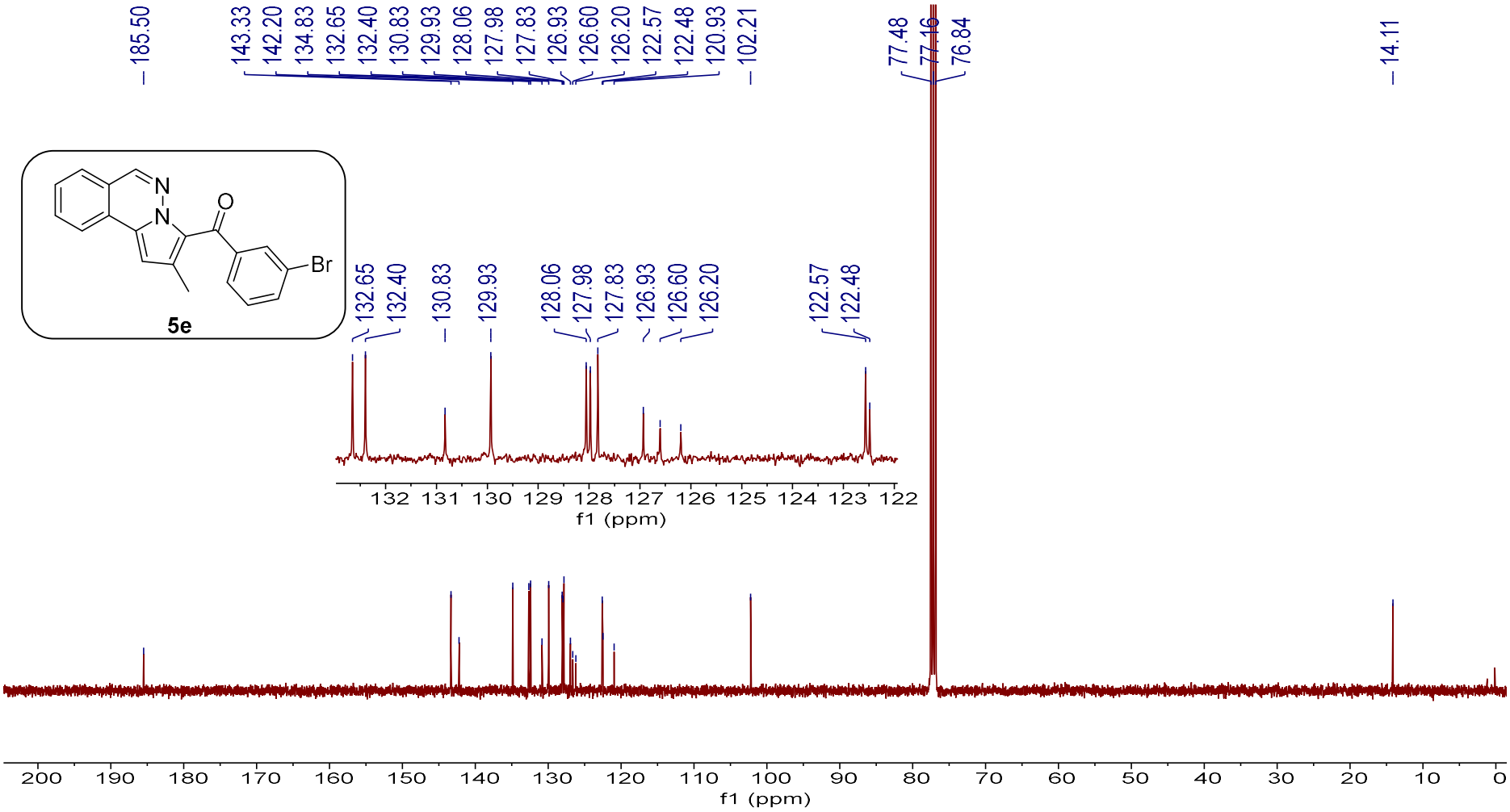
5d (^{1}H NMR, 400 MHz, $CDCl_3$)



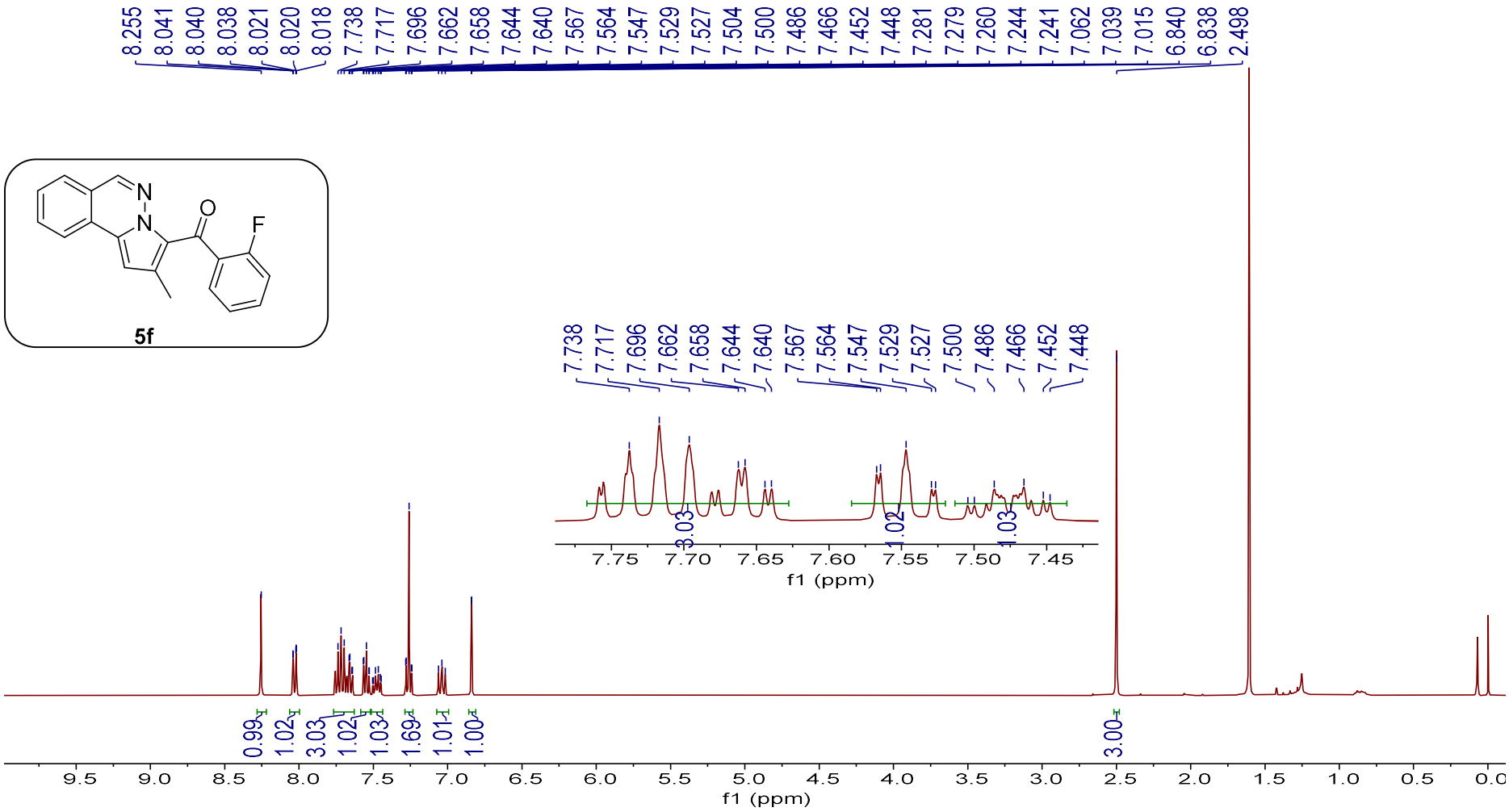
5d (^{13}C NMR, 101 MHz, $CDCl_3$)



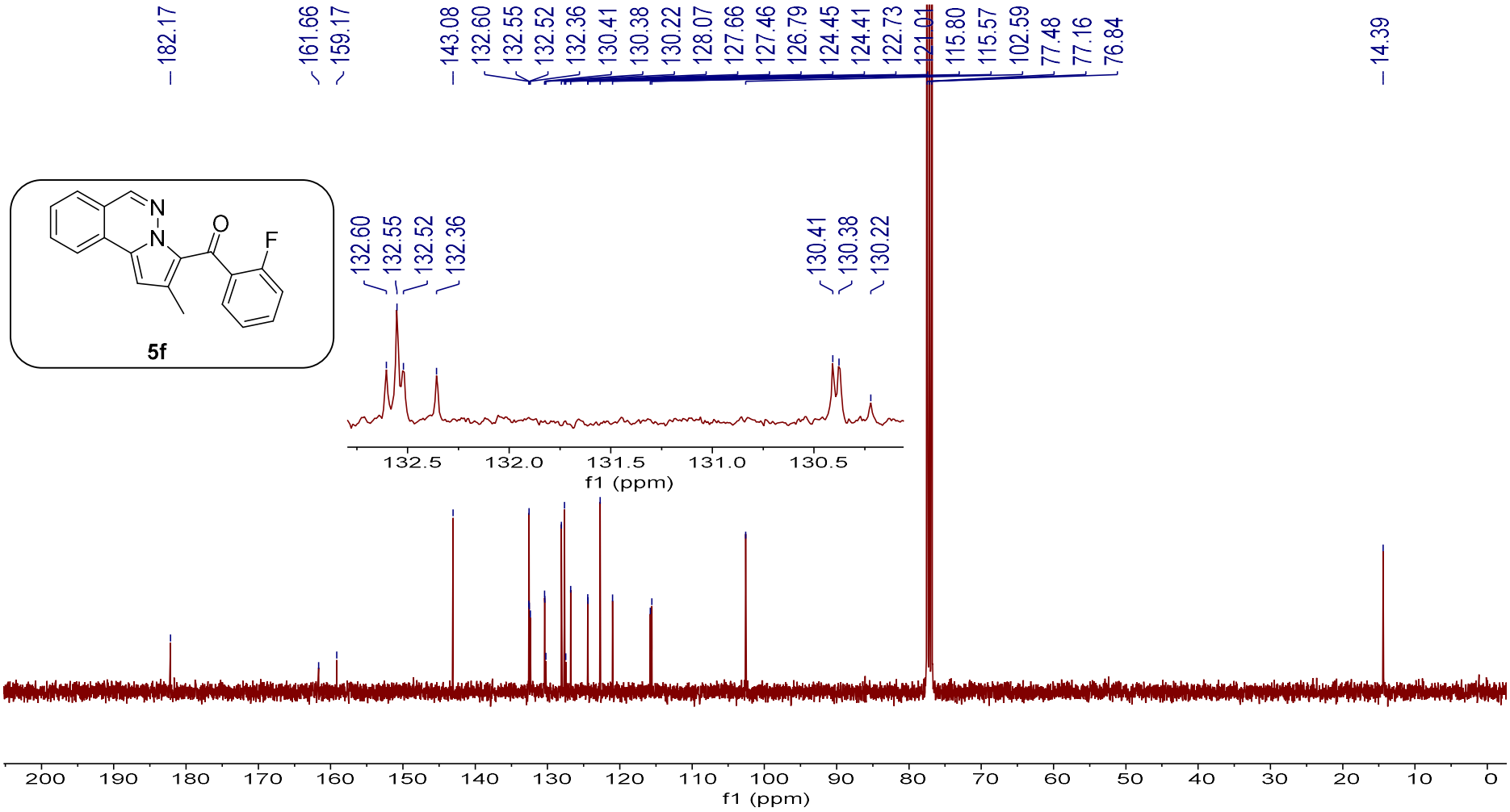
5e (^{1}H NMR, 400 MHz, $CDCl_3$)



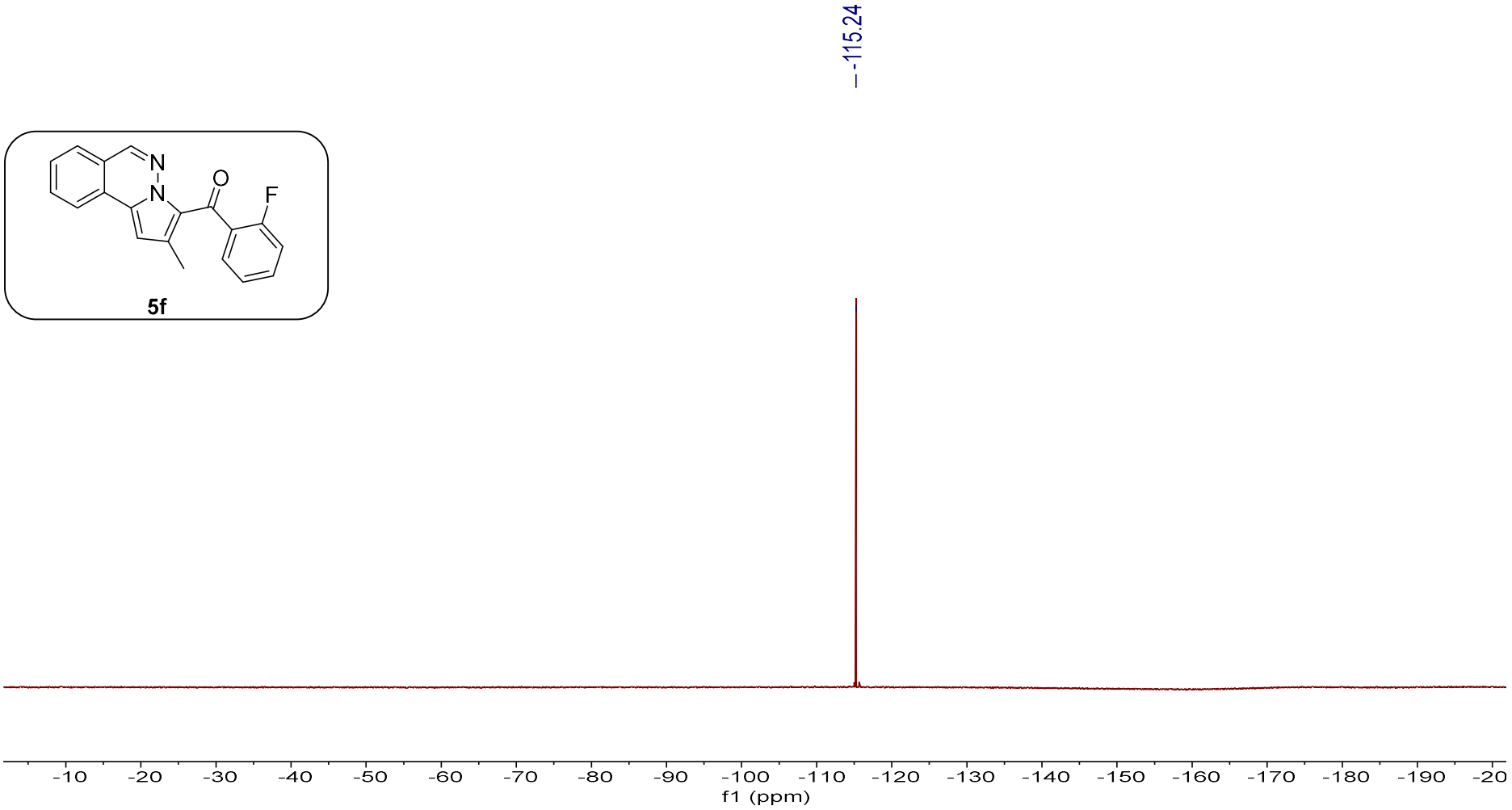
5e (^{13}C NMR, 101 MHz, $CDCl_3$)



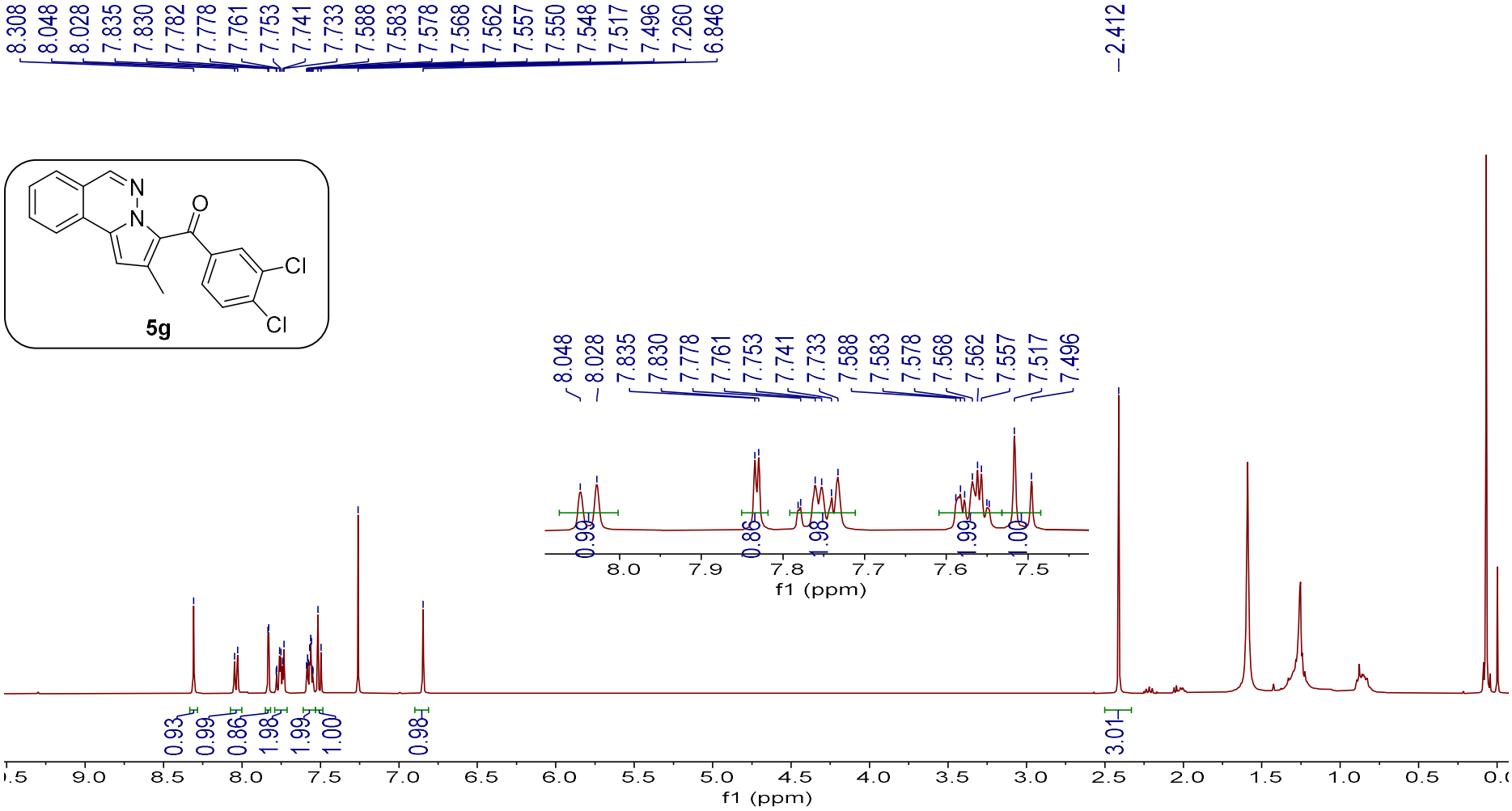
5f (^{1}H NMR, 400 MHz,$CDCl_3$)



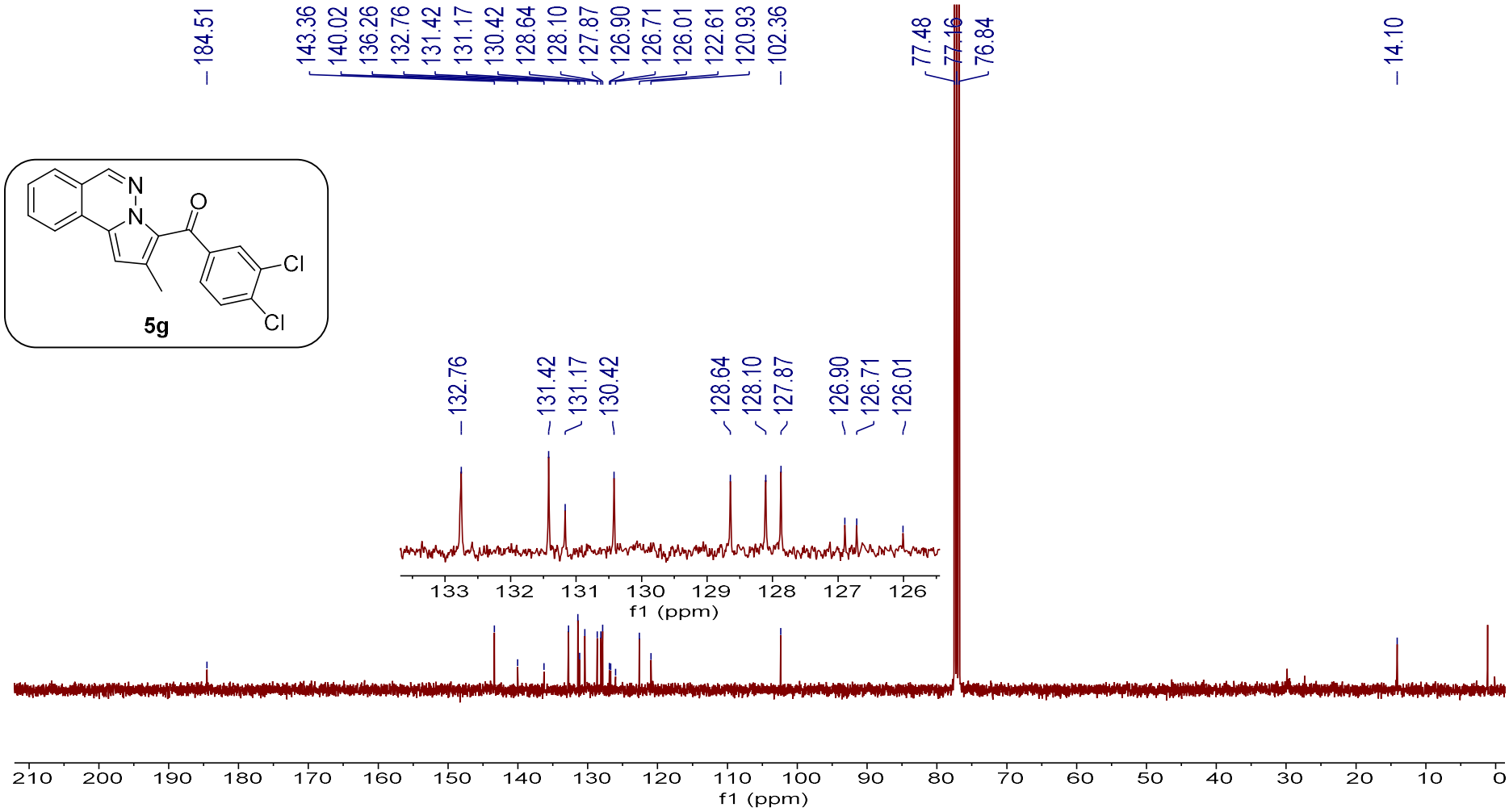
5f (^{13}C NMR, 101 MHz, $CDCl_3$)



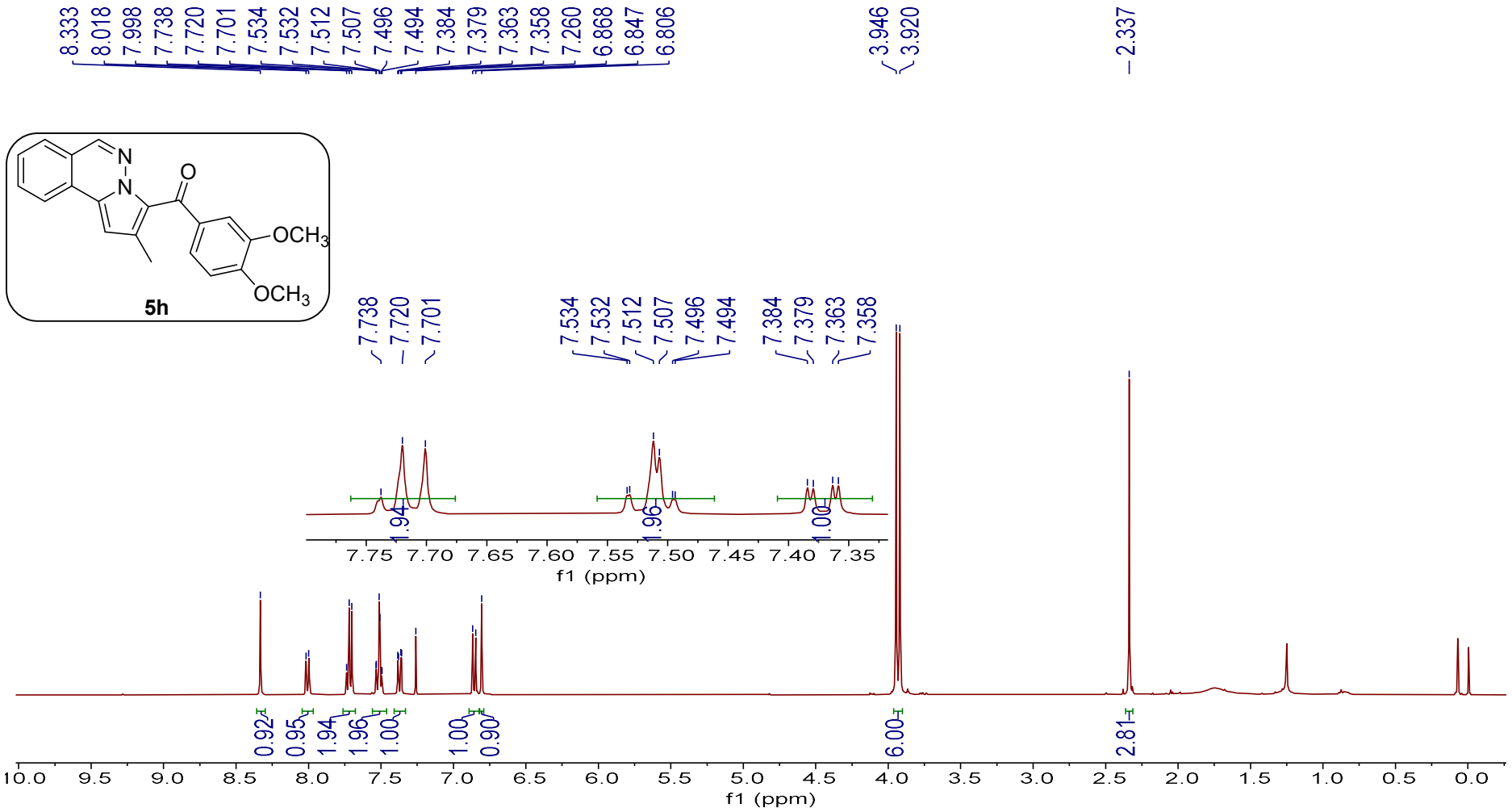
5f (^{19}F NMR, 400 MHz, $CDCl_3$)



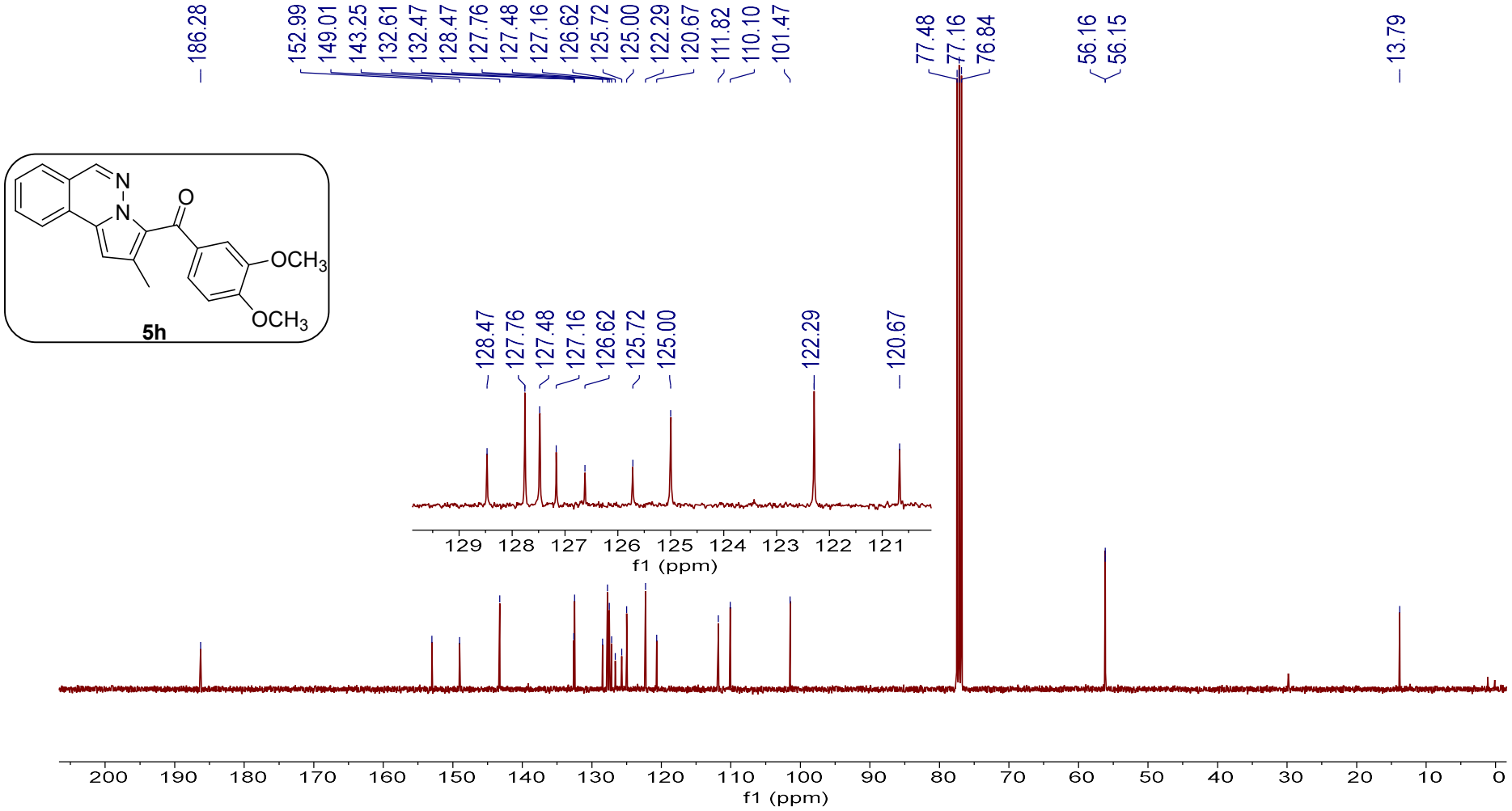
5g (^{1}H NMR, 400 MHz, $CDCl_3$)



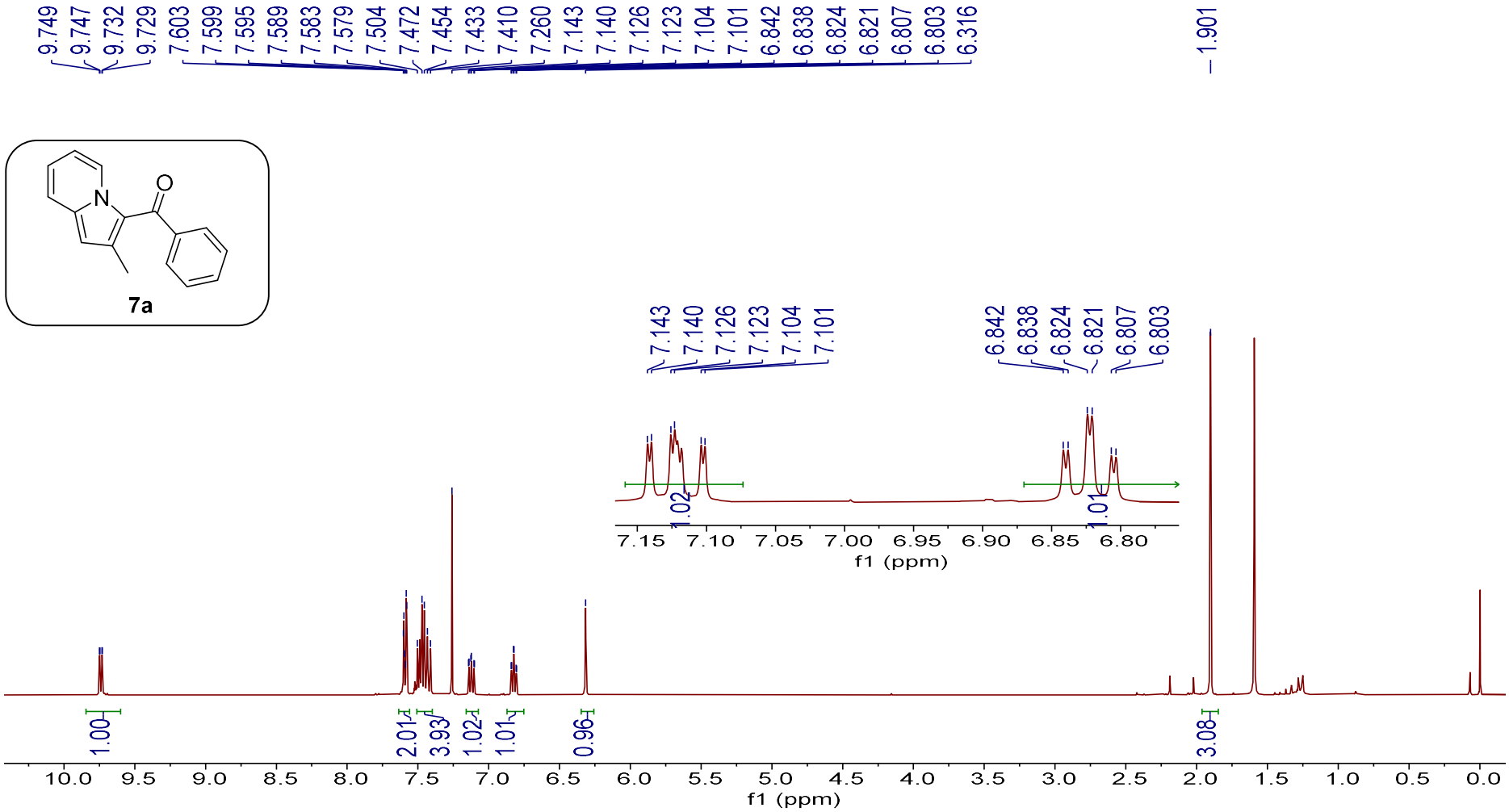
5g (^{13}C NMR, 101 MHz, $CDCl_3$)



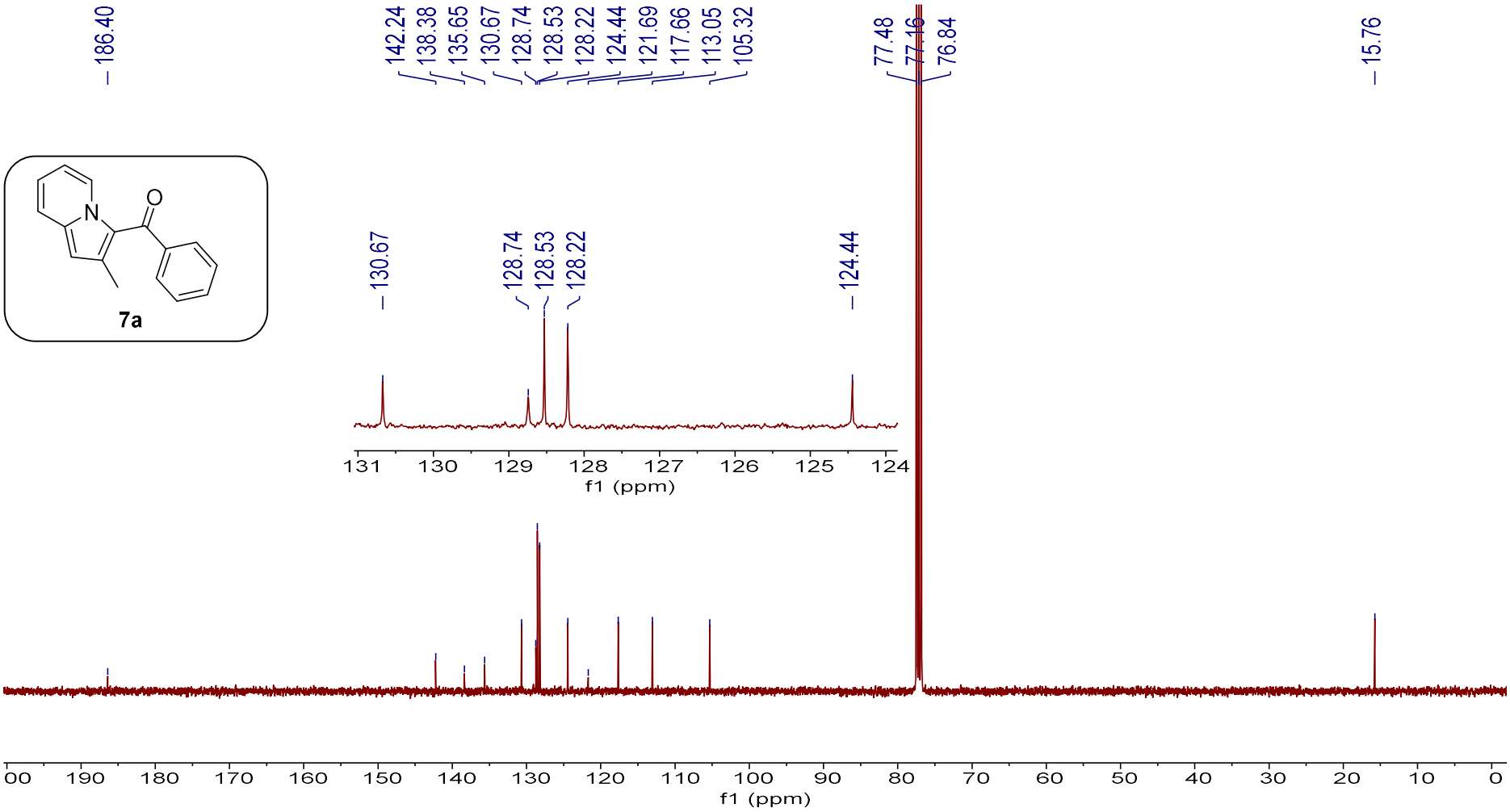
5h (^{1}H NMR, 400 MHz, $CDCl_3$)



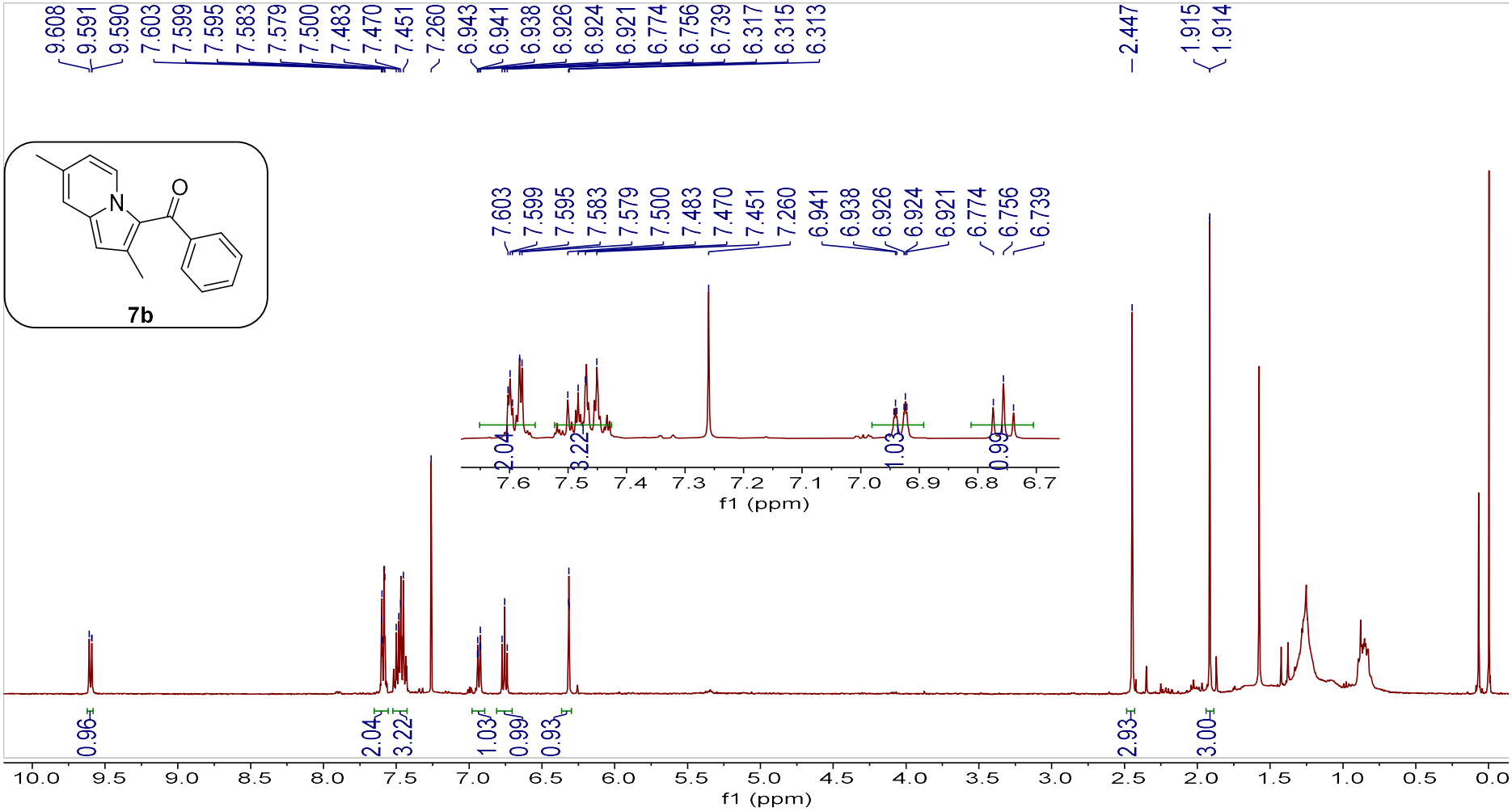
5h (^{13}C NMR, 101 MHz, $CDCl_3$)



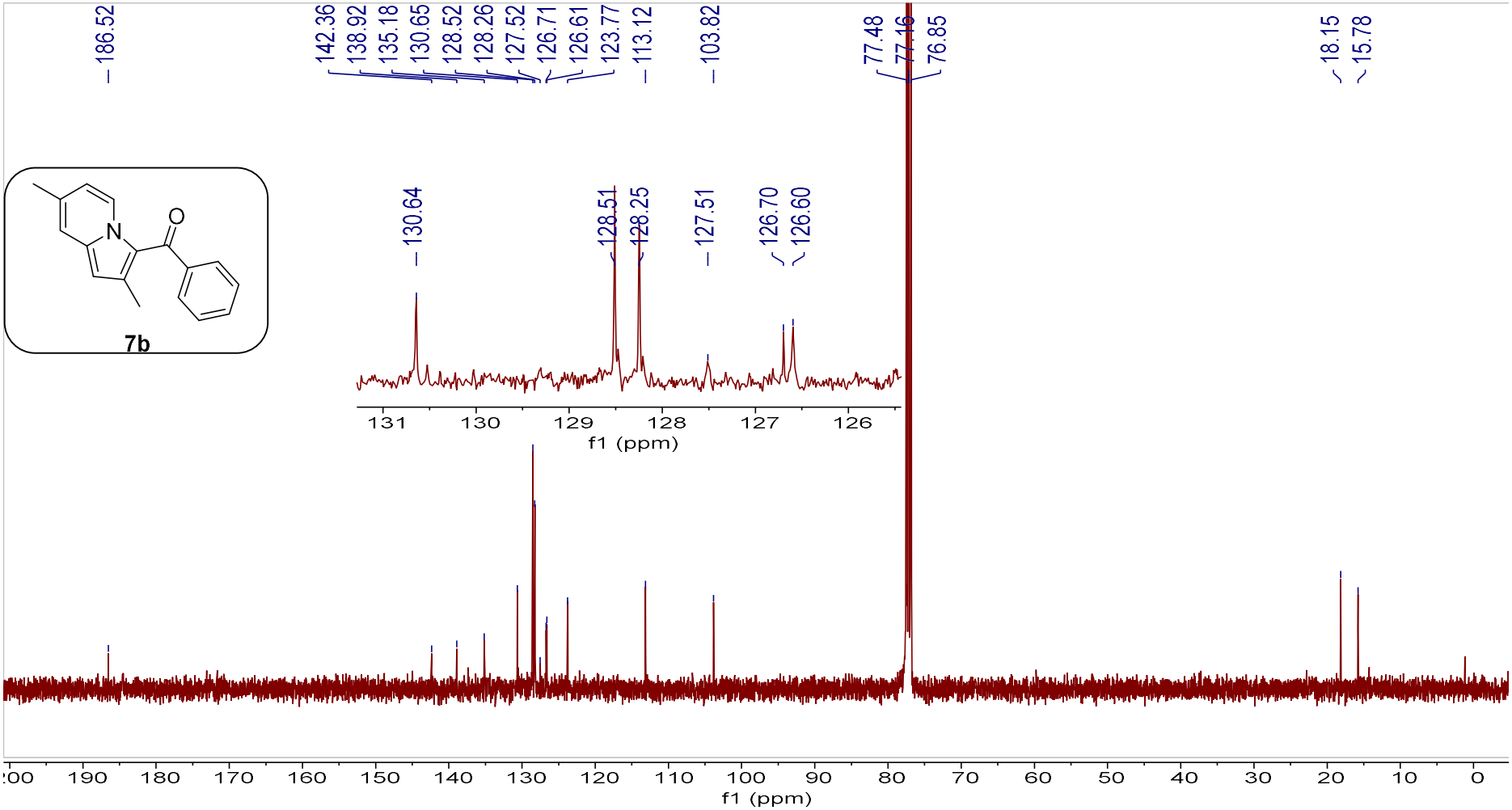
7a (^{1}H NMR, 400 MHz, $CDCl_3$)



7a (^{13}C NMR, 101 MHz, $CDCl_3$)

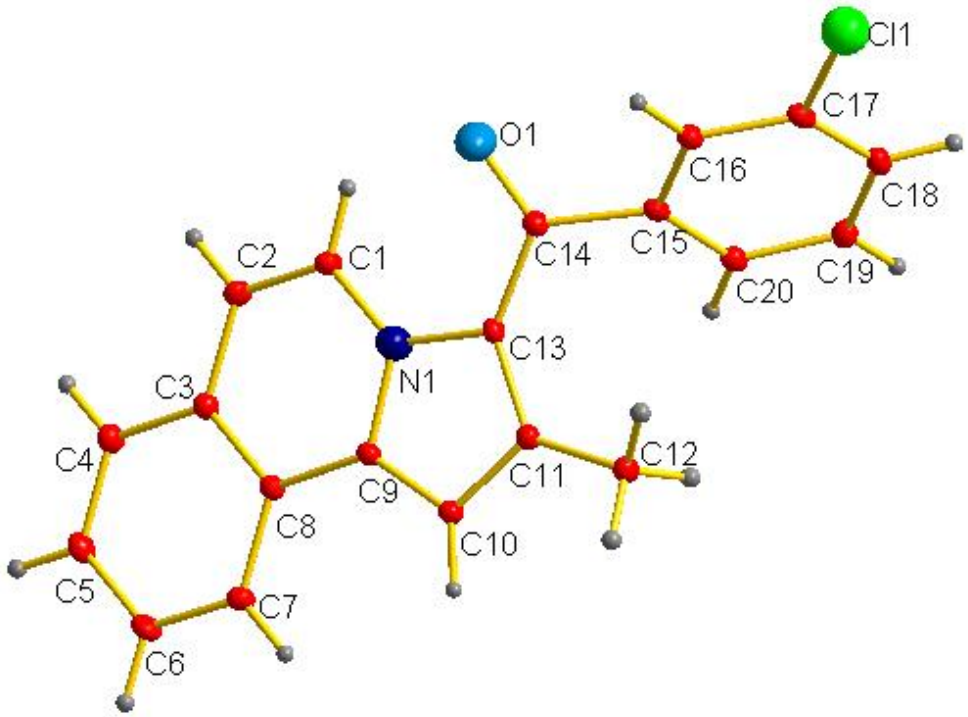


7b (^{1}H NMR, 400 MHz, $CDCl_3$)



7b (^{13}C NMR, 101 MHz, $CDCl_3$)

2. X-raycrystal structure of 3m



Single crystals of **3m** were grown in ethyl acetate and petroleum ether. petroleum ether (2.0 mL) was added to **3m** (15 mg in a 4 mL vial) followed by 3 drops of ethyl acetate. The 4 mL vial was capped and placed at room temperature in the experimental cabinet for 7 days, whereupon crystals formed. A yellow block shaped crystal of **3m** was used for the X-ray crystallographic analysis. The X-ray intensity data were measured at 293(2) K, on a Rigaku AFC7R diffractometer. The crystal data of **3m** have been deposited in CCDC with number 2022332 and have been displayed at 50% ellipsoid contour probability level.

Table 1. Crystal data and structure refinement for **3m**.

Identification code	20200702LI_ZNZ5223_2_0m_a	
Empirical formula	C20 H14 Cl N O	
Formula weight	319.77	
Temperature	193(2) K	
Wavelength	1.34139 Å	
Crystal system	Triclinic	
Space group	P-1	
Unit cell dimensions	a = 8.0991(3) Å	α= 75.7790(10)°.
	b = 10.0866(3) Å	β= 69.4490(10)°.
	c = 10.5705(3) Å	γ = 67.4610(10)°.
Volume	740.63(4) $Å^3$	
Z	2	
Density (calculated)	1.434 Mg/m^3	
Absorption coefficient	1.517 mm^{-1}	
F(000)	332	
Crystal size	0.120 x 0.110 x 0.080 mm^3	
Theta range for data collection	3.918 to 53.902°.	
Index ranges	-9<=h<=9, -12<=k<=12, -12<=l<=12	
Reflections collected	9190	
Independent reflections	2690 [R(int) = 0.0309]	
Completeness to theta = 53.594°	99.4 %	
Refinement method	Full-matrix least-squares on F^2	
Data / restraints / parameters	2690 / 0 / 209	
Goodness-of-fit on F^2	1.035	
Final R indices [I>2sigma(I)]	R1 = 0.0372, wR2 = 0.0990	
R indices (all data)	R1 = 0.0418, wR2 = 0.1025	
Extinction coefficient	n/a	
Largest diff. peak and hole	0.603 and -0.298 $e.Å^{-3}$	