

**Diastereoselective synthesis of α -dicarbonyl cyclopropanes
via a lanthanide amide-catalysed reaction**

Wenxi Sun, Cheng Peng, Zhigang Yao, Fan Xu*

Key Laboratory of Organic Synthesis,
College of Chemistry, Chemical Engineering and Materials Science,
Soochow University, Suzhou 215123, P. R. China

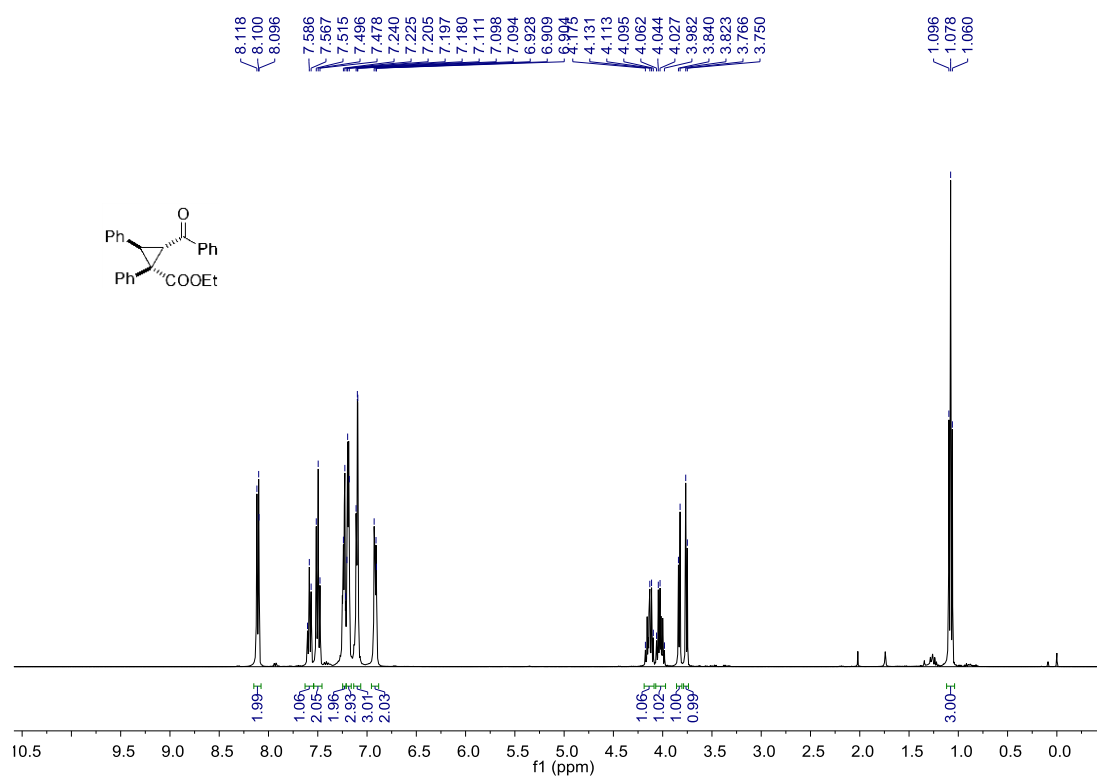
xufan@suda.edu.cn

SUPPLEMENTARY INFORMATION

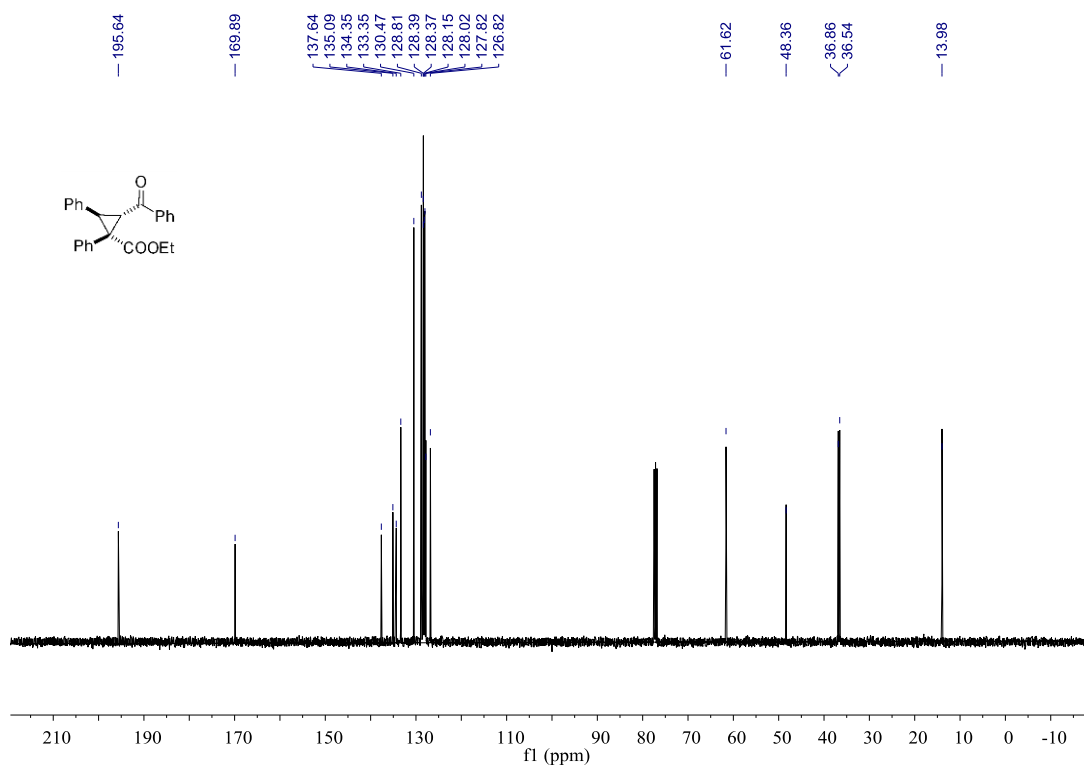
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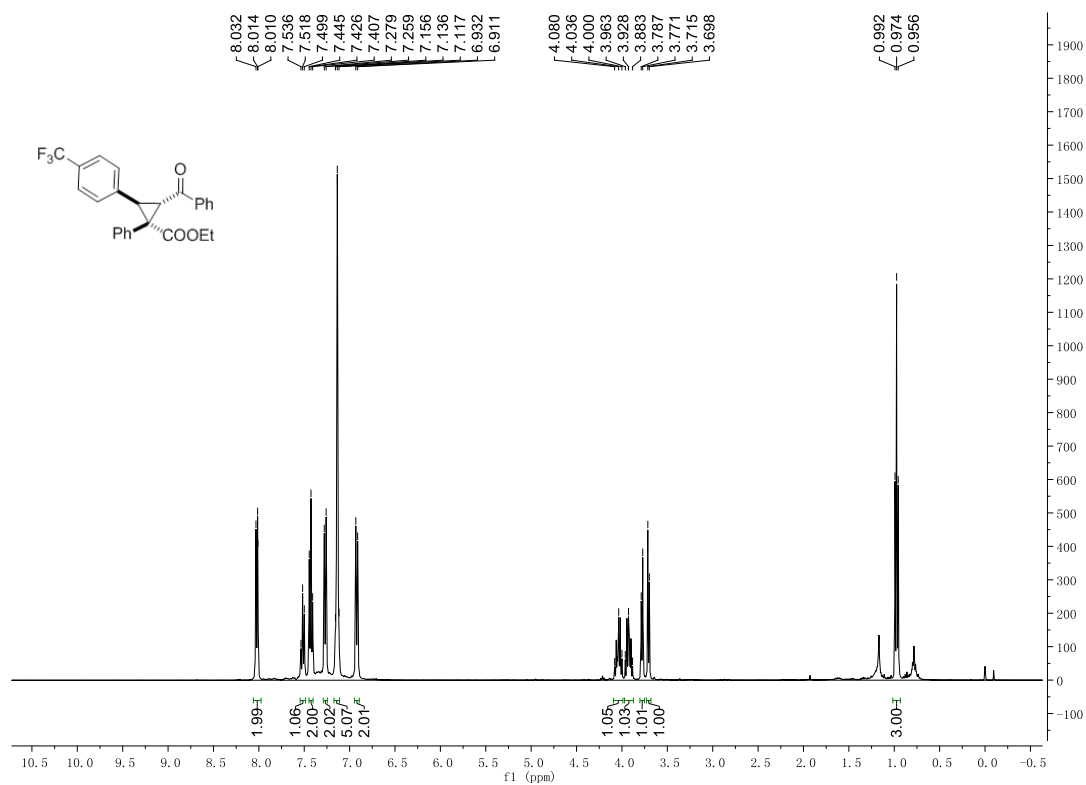
Copies of ^1H NMR, ^{13}C NMR, and ^{19}F NMR Spectra



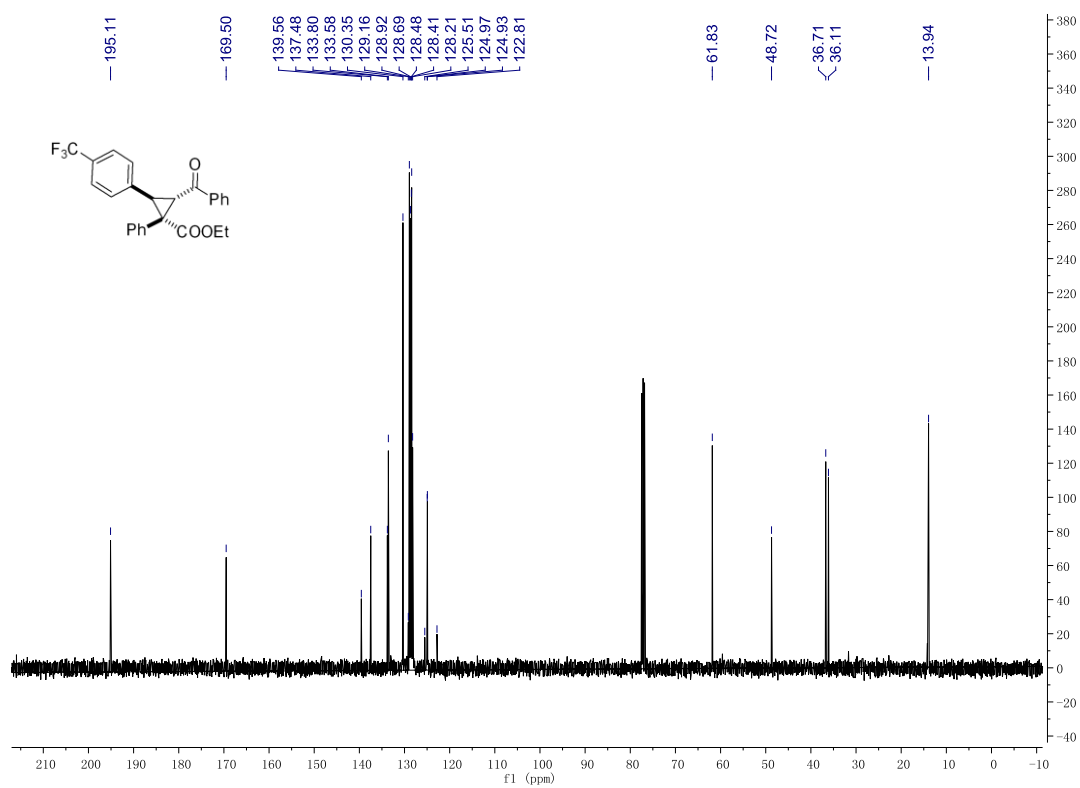
^1H NMR spectrum of **6aa** (400 MHz, CDCl_3)



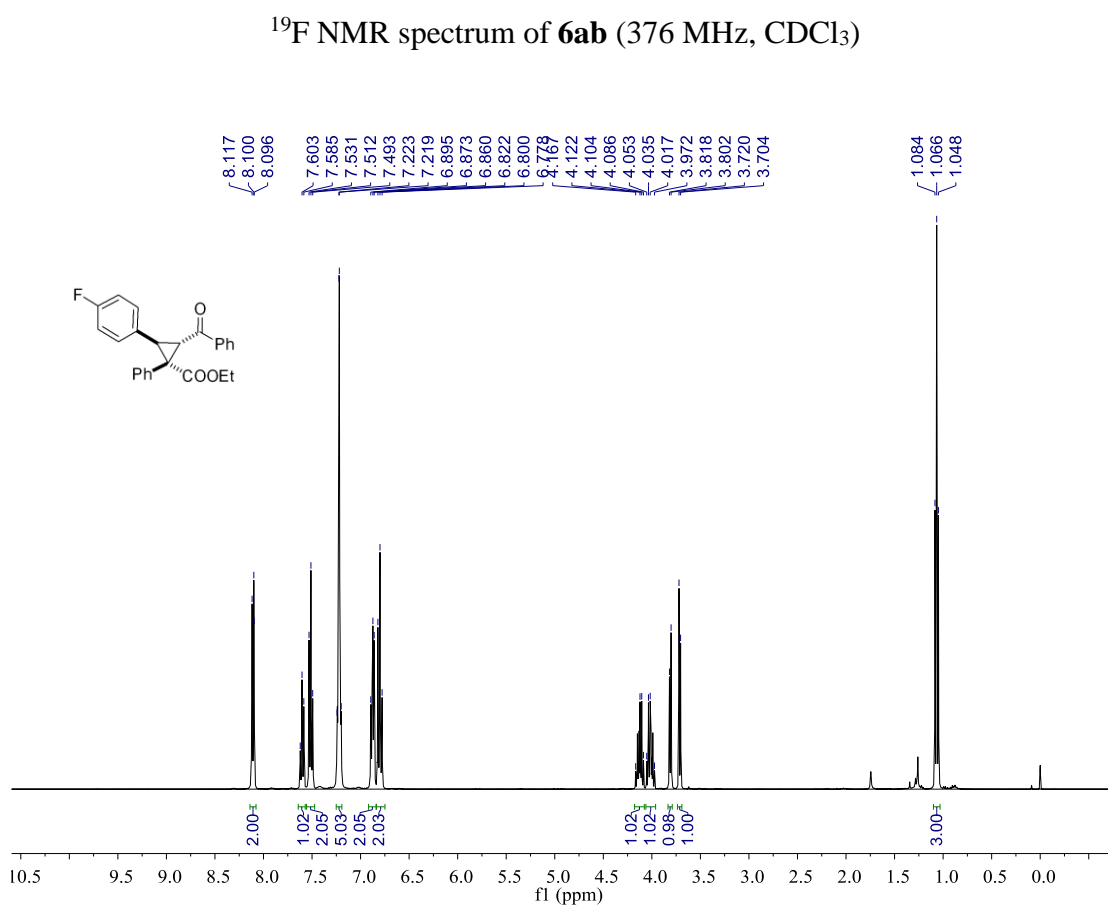
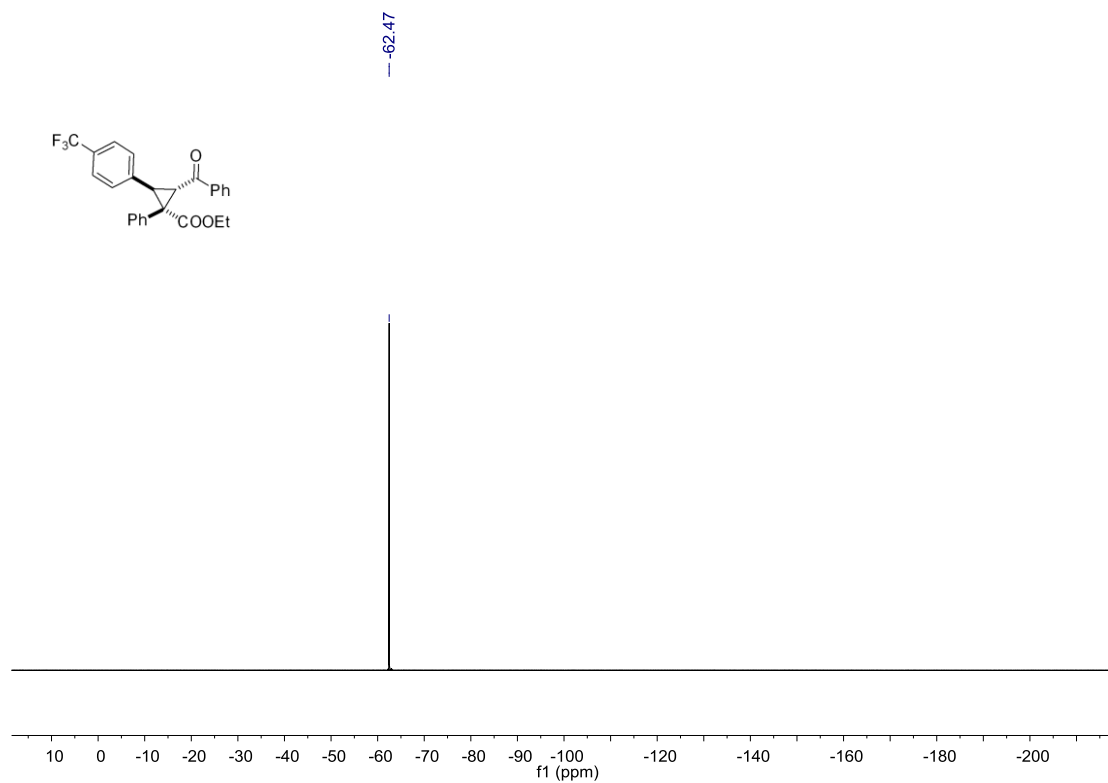
^{13}C NMR spectrum of **6aa** (100 MHz, CDCl_3)

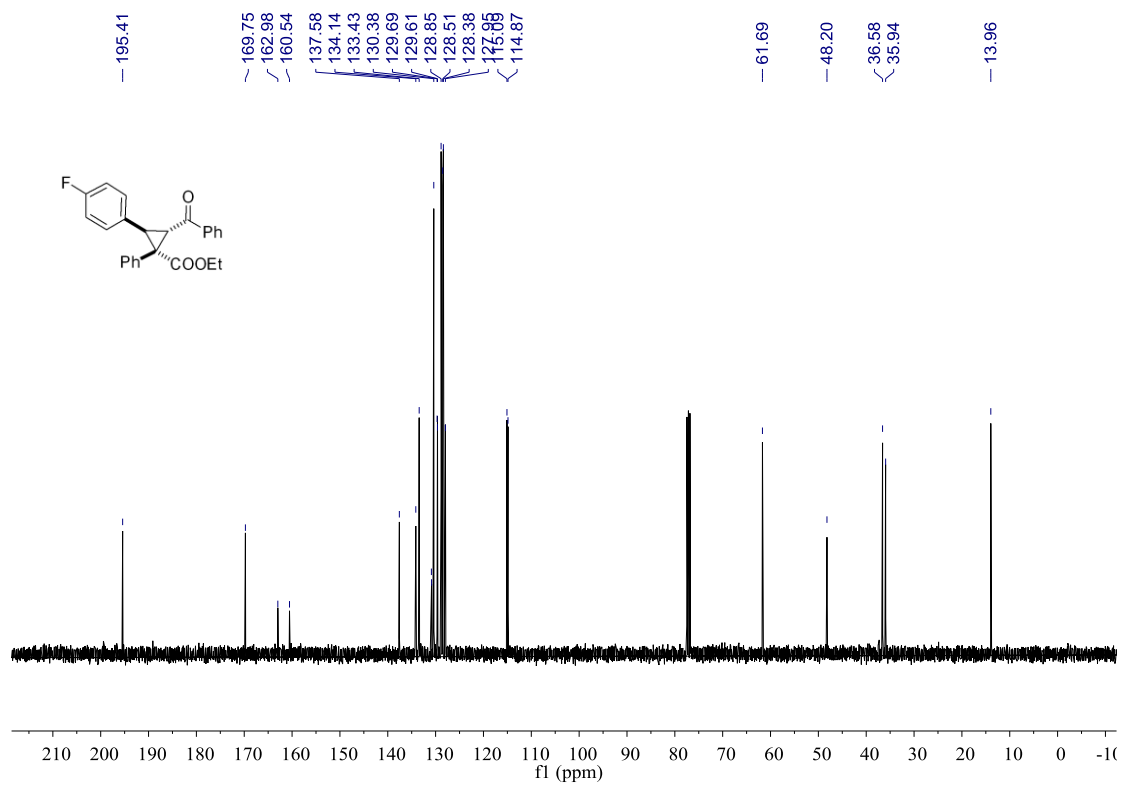


¹H NMR spectrum of **6ab (400 MHz, CDCl₃)**

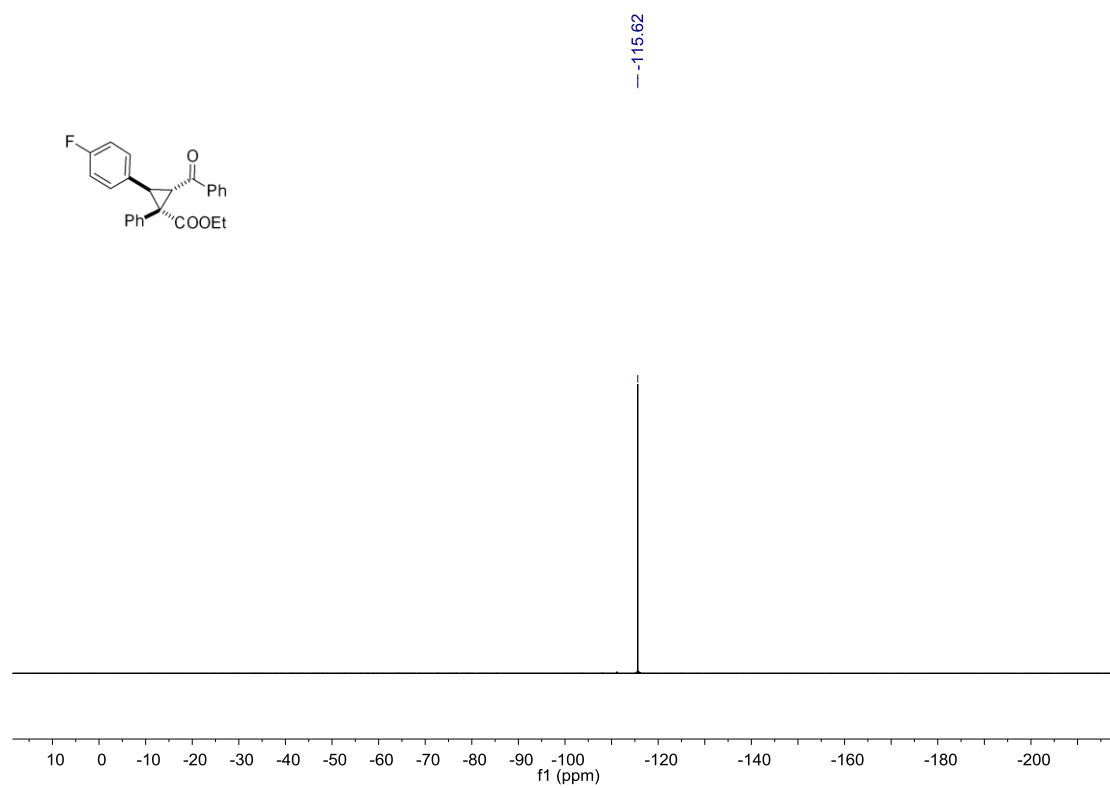


¹³C NMR spectrum of **6ab (100 MHz, CDCl₃)**

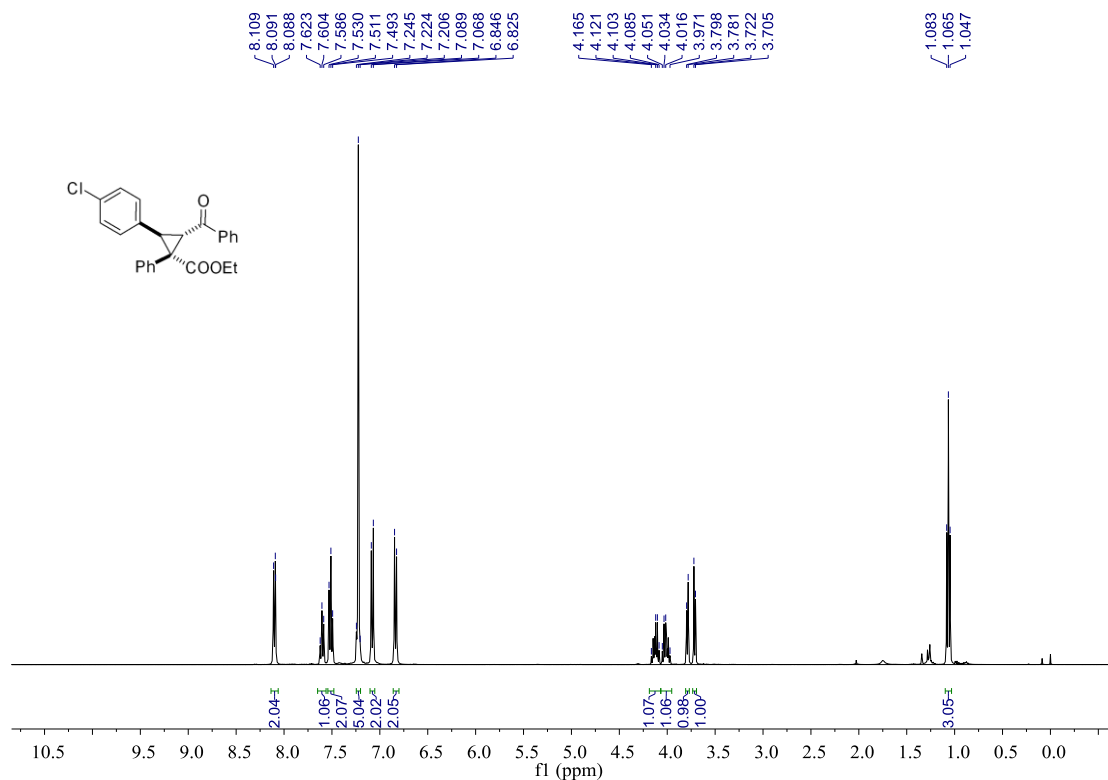




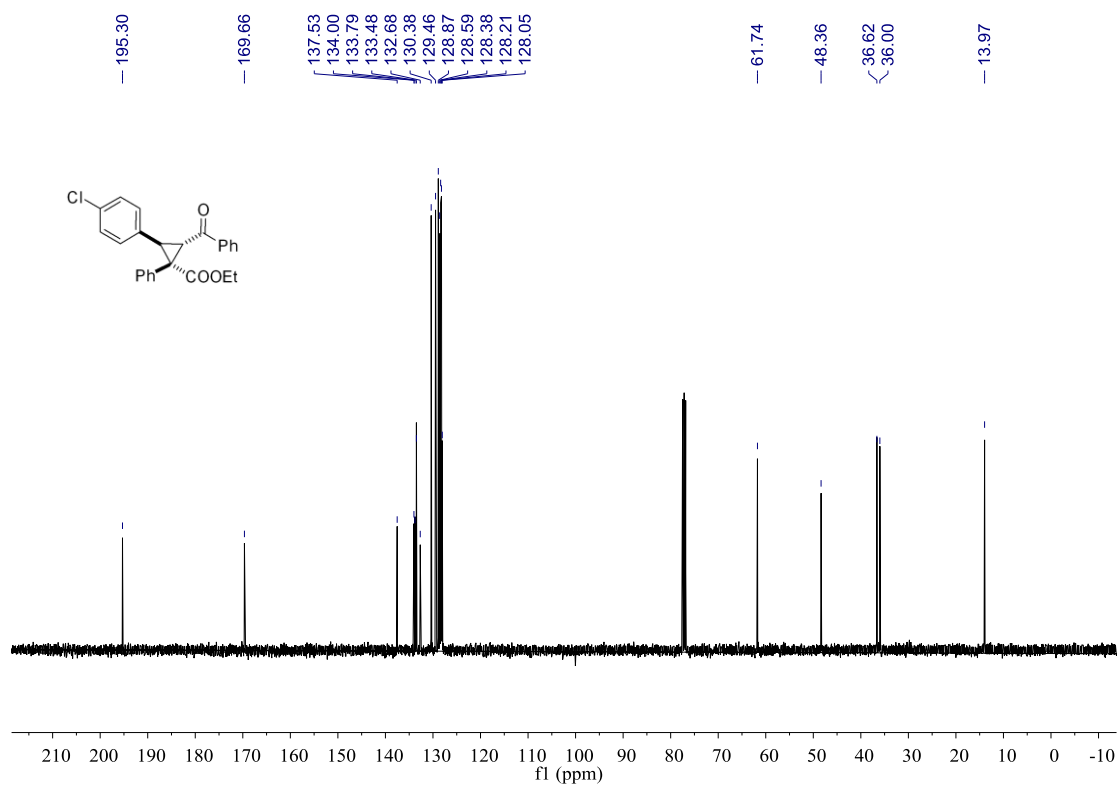
^{13}C NMR spectrum of **6ac** (100 MHz, CDCl_3)



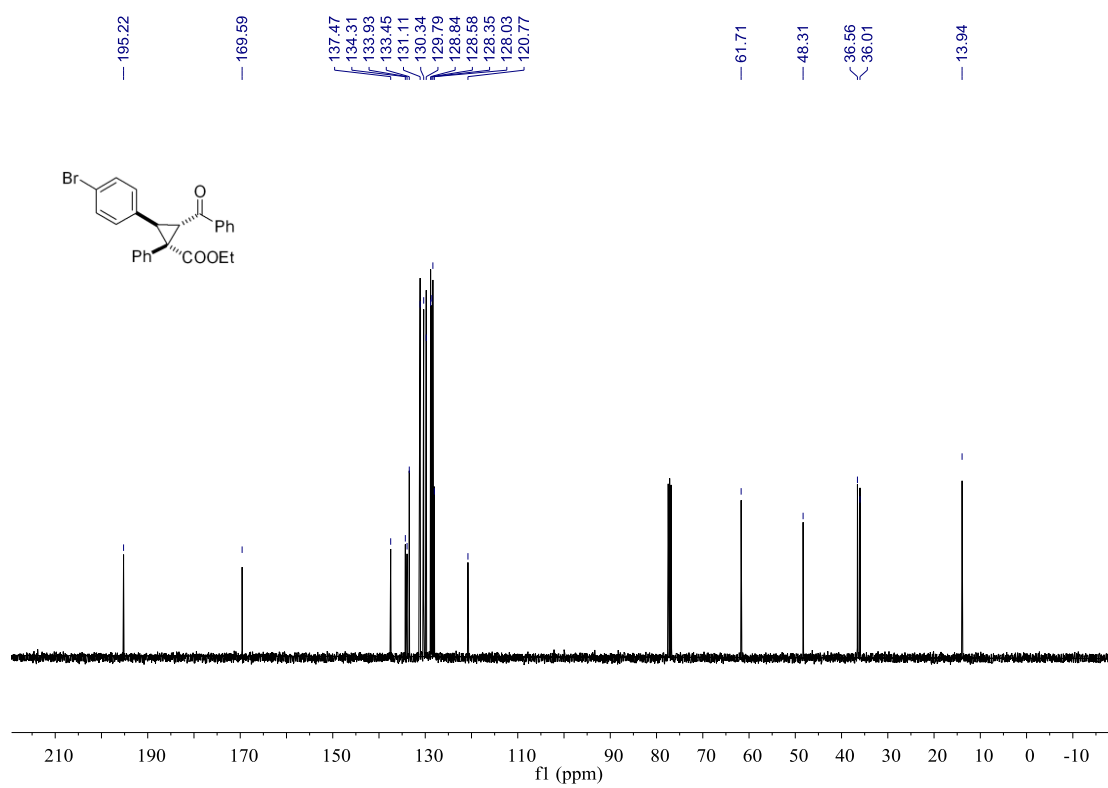
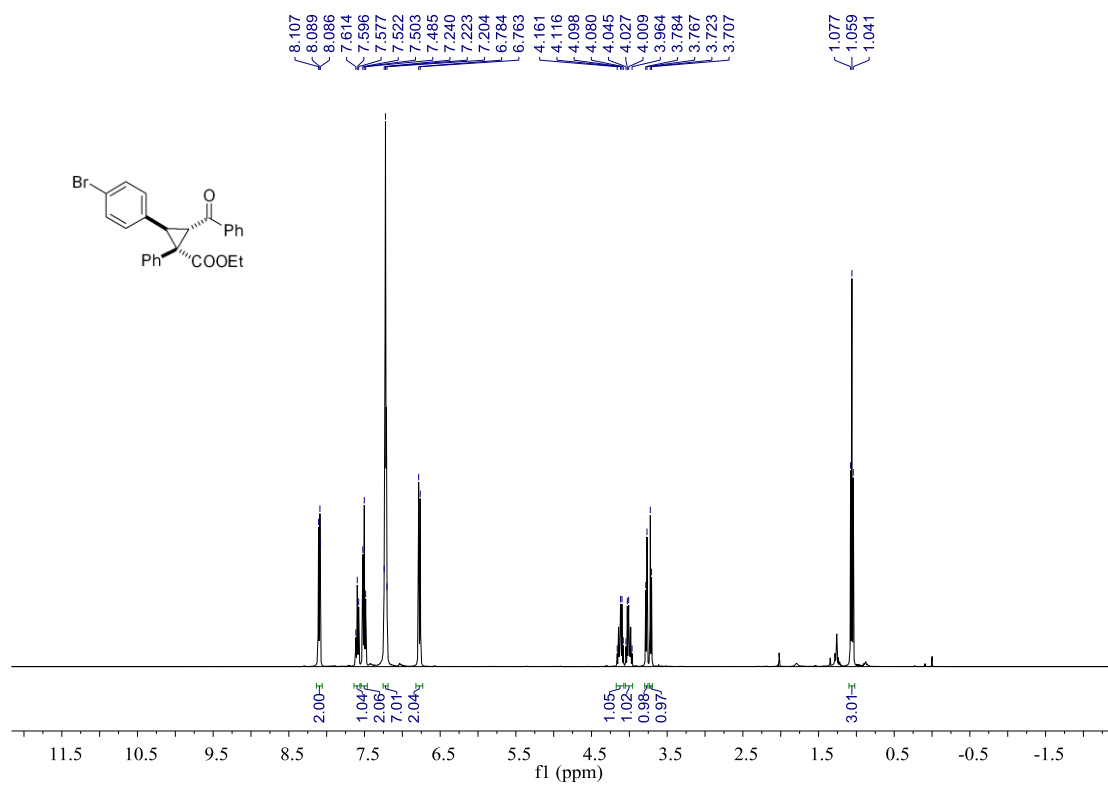
^{19}F NMR spectrum of **6ac** (376 MHz, CDCl_3)

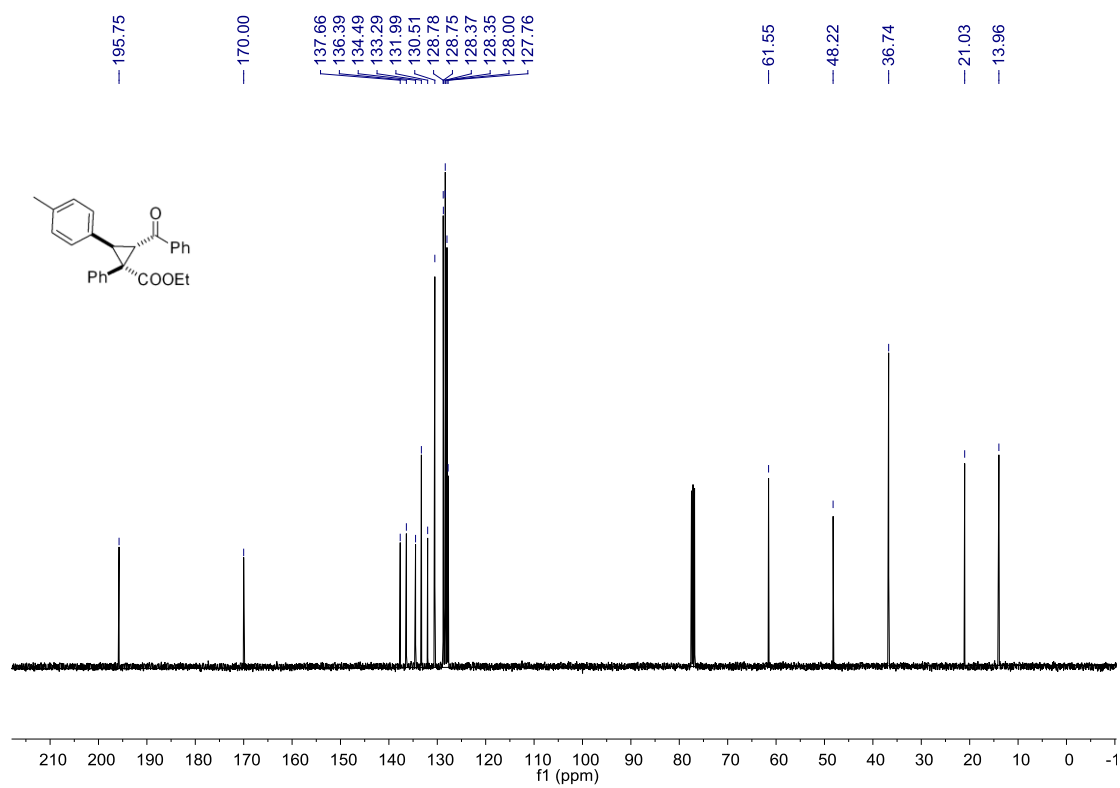
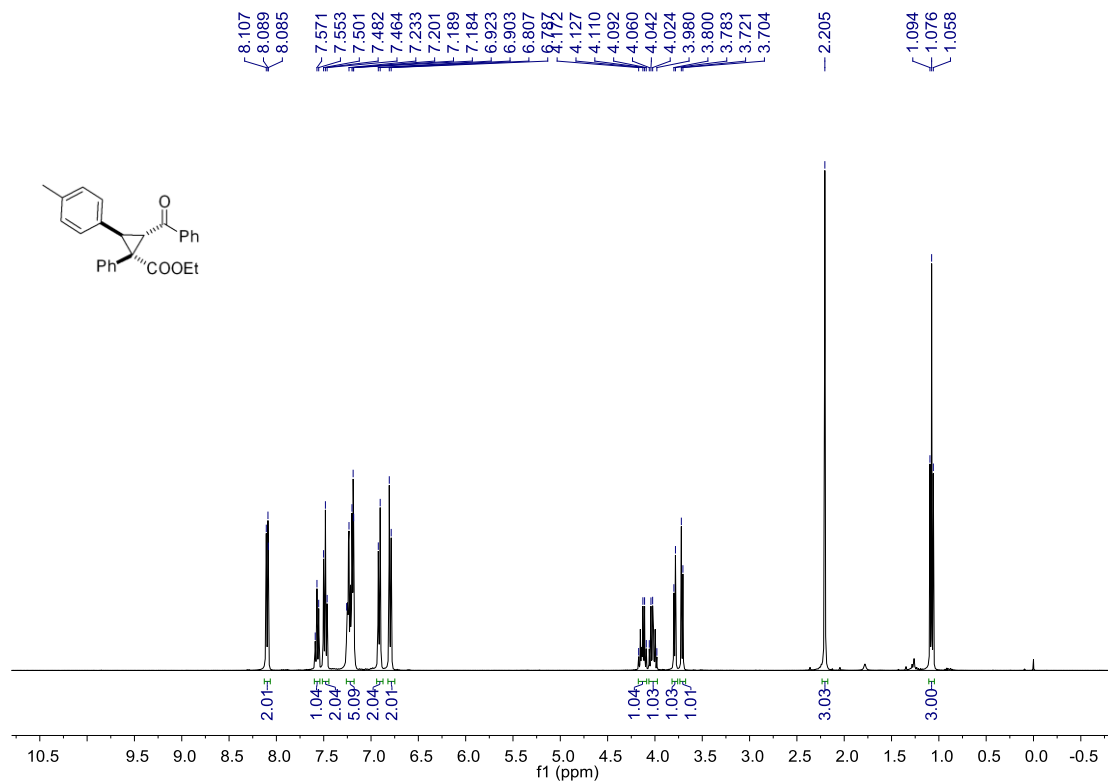


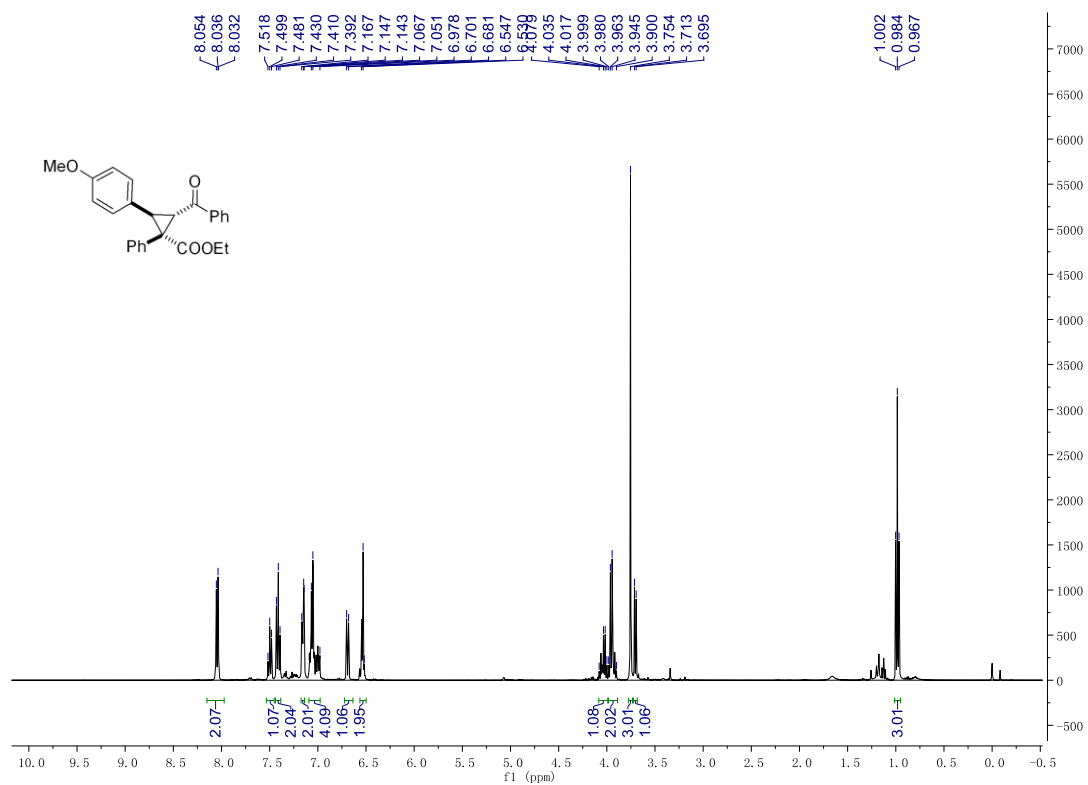
¹H NMR spectrum of **6ad** (400 MHz, CDCl₃)



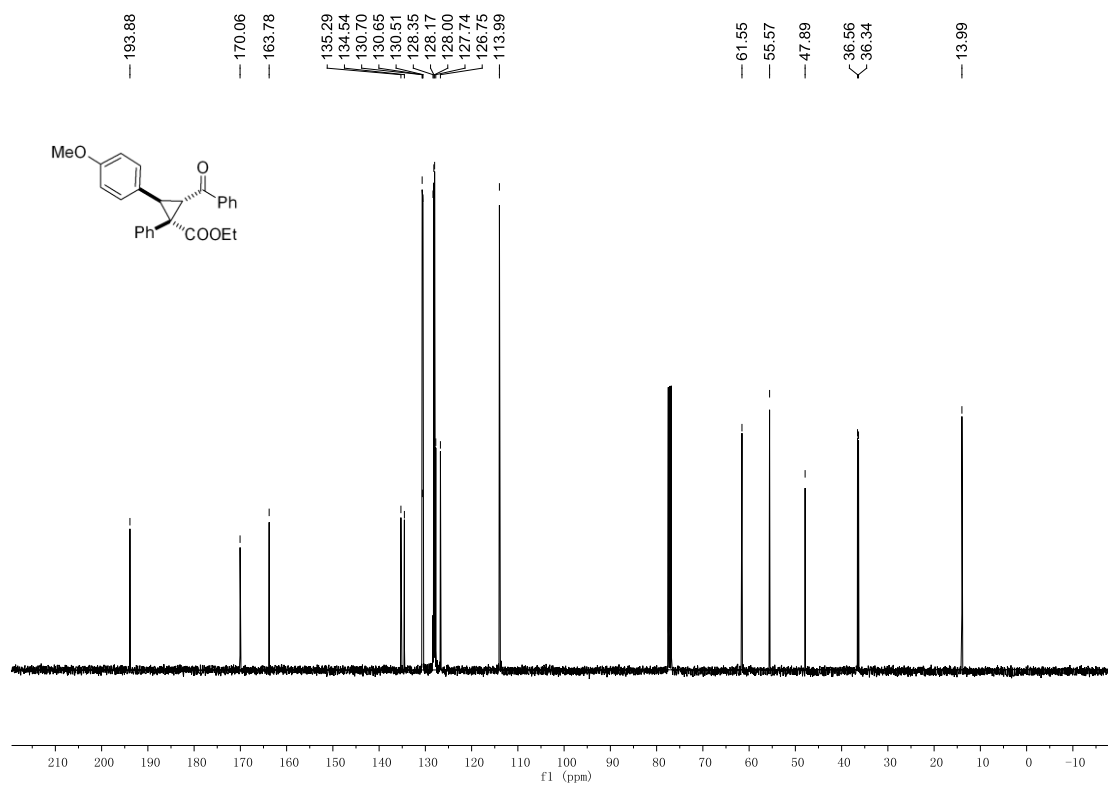
¹³C NMR spectrum of **6ad** (100 MHz, CDCl₃)



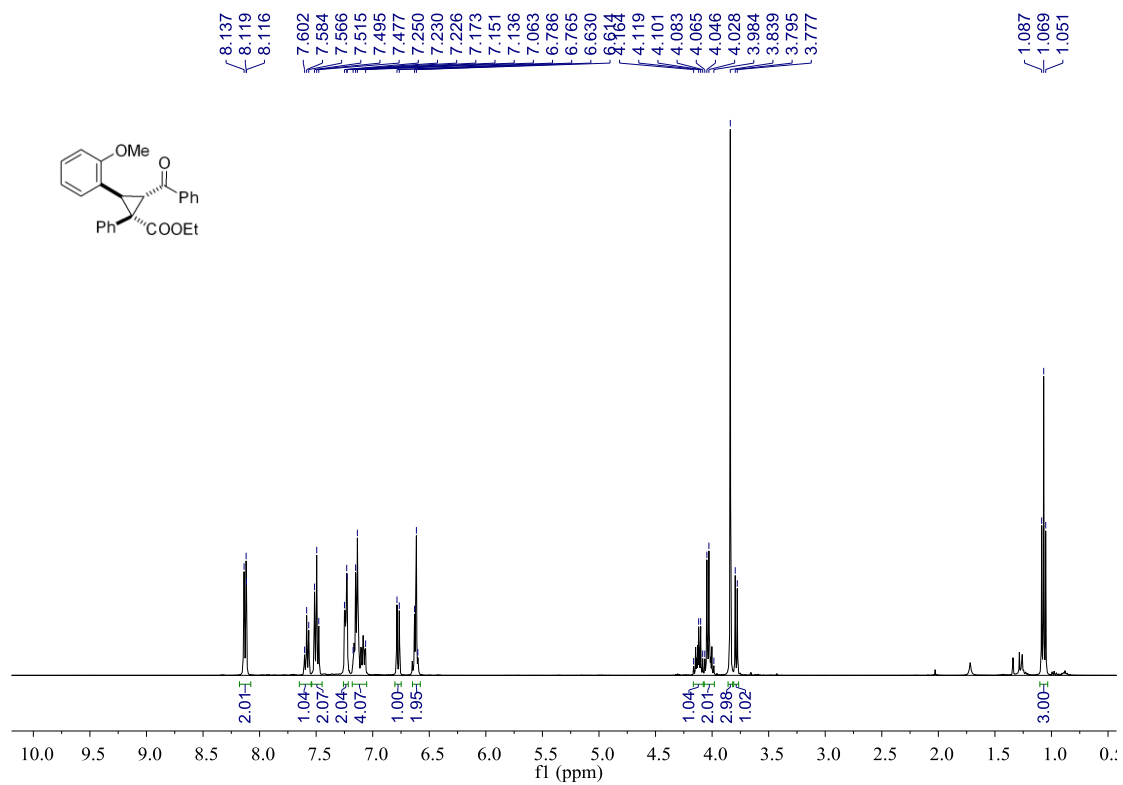




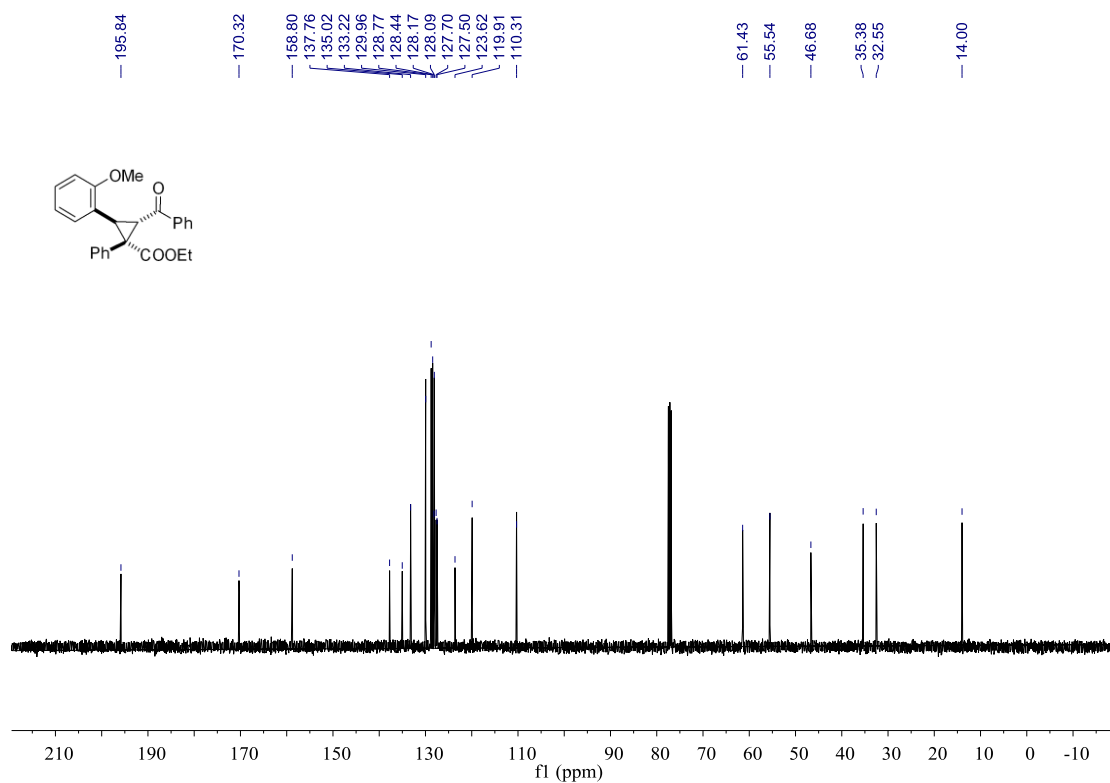
¹H NMR spectrum of **6ag** (400 MHz, CDCl₃)



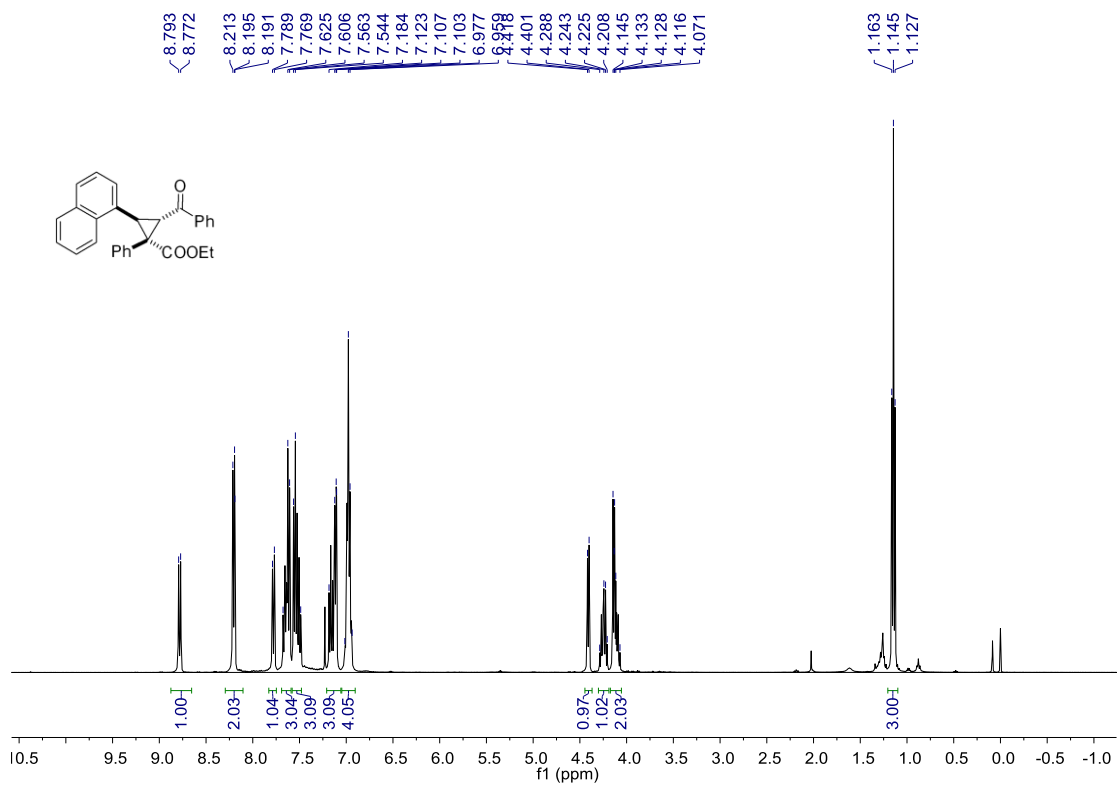
¹³C NMR spectrum of **6ag** (100 MHz, CDCl₃)



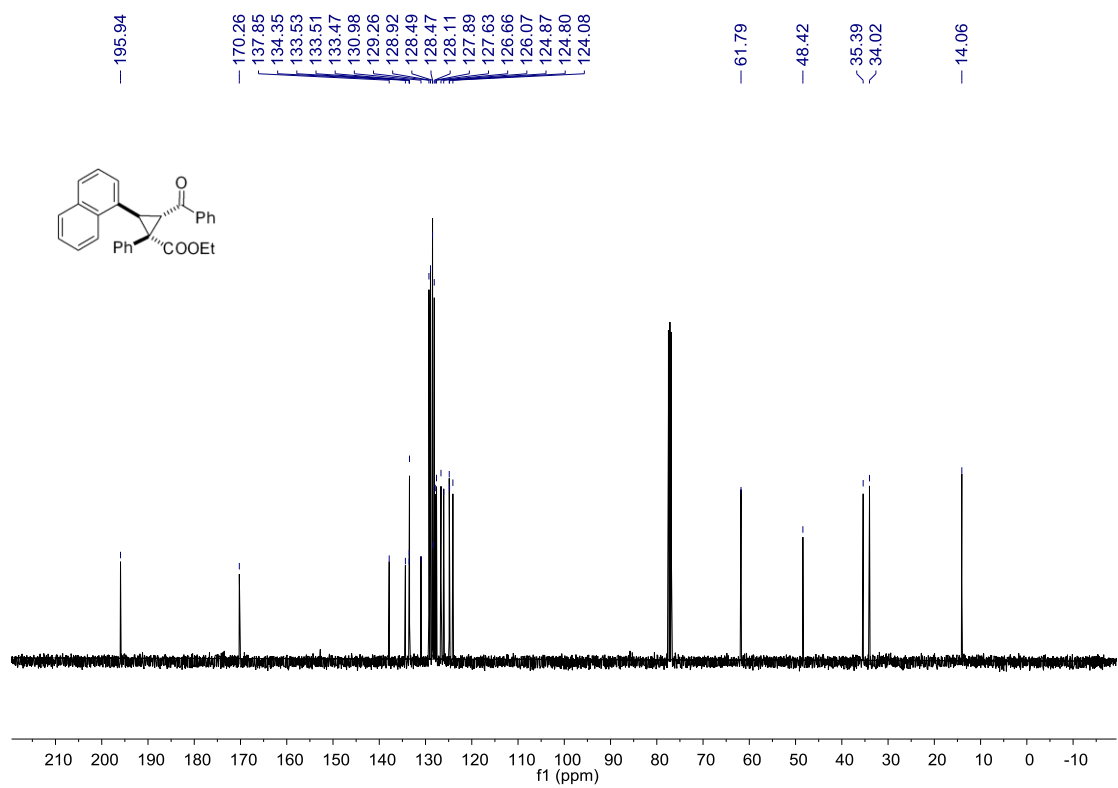
¹H NMR spectrum of **6ah** (400 MHz, CDCl₃)



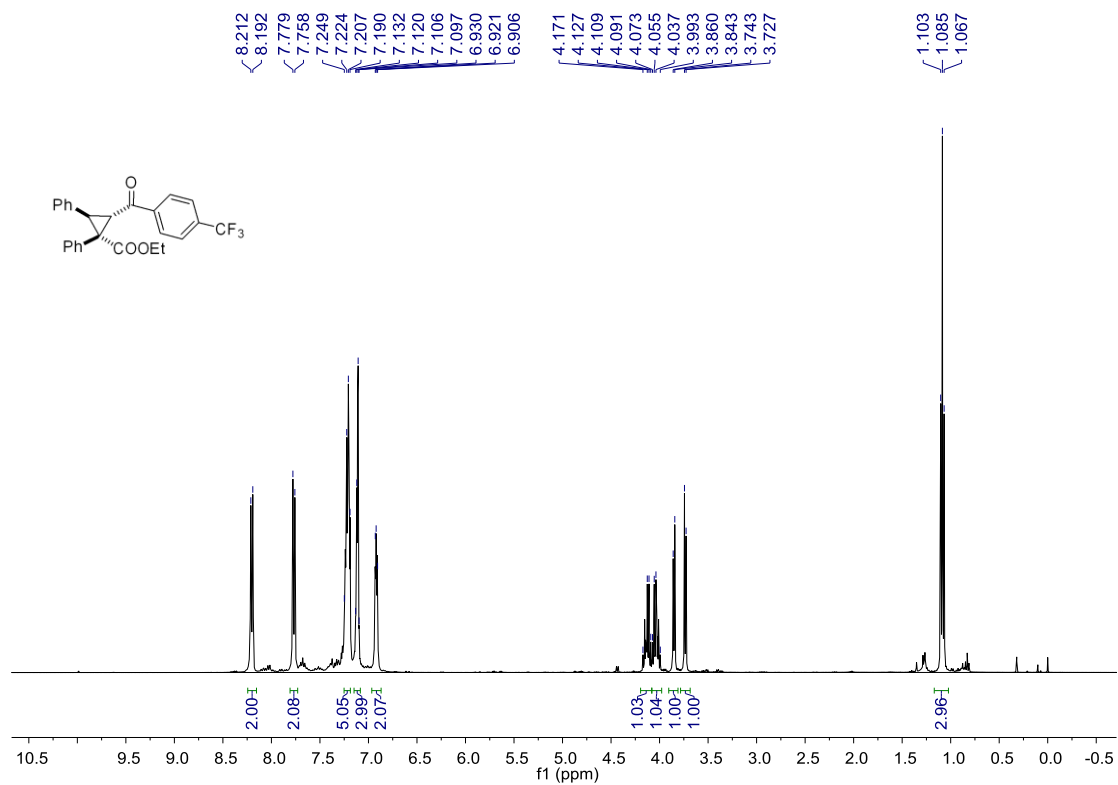
¹³C NMR spectrum of **6ah** (100 MHz, CDCl₃)



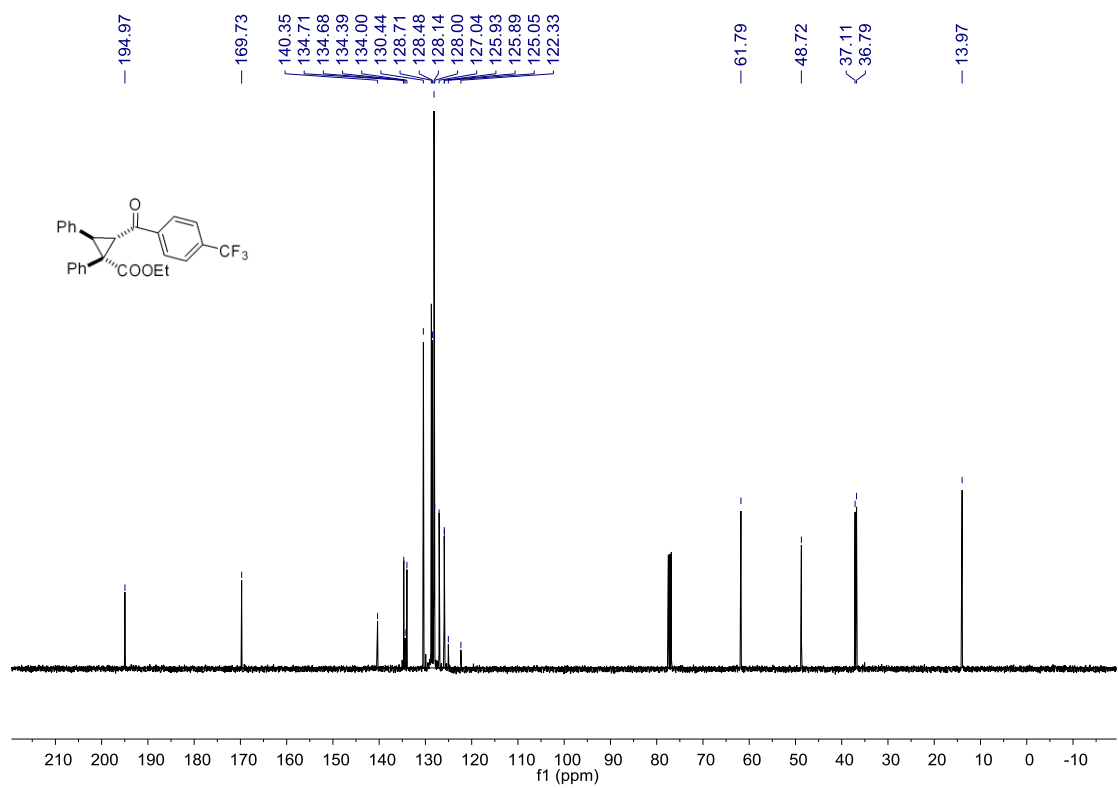
¹H NMR spectrum of **6ai** (400 MHz, CDCl₃)



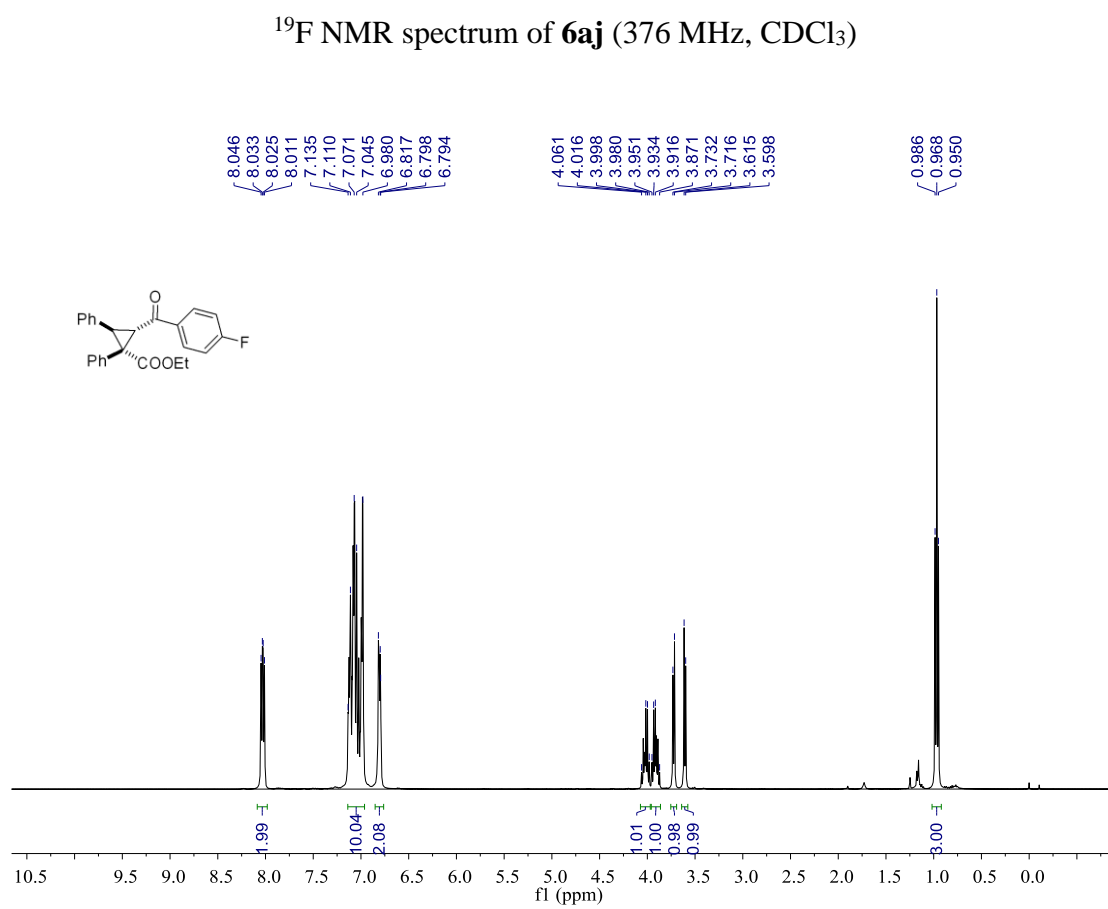
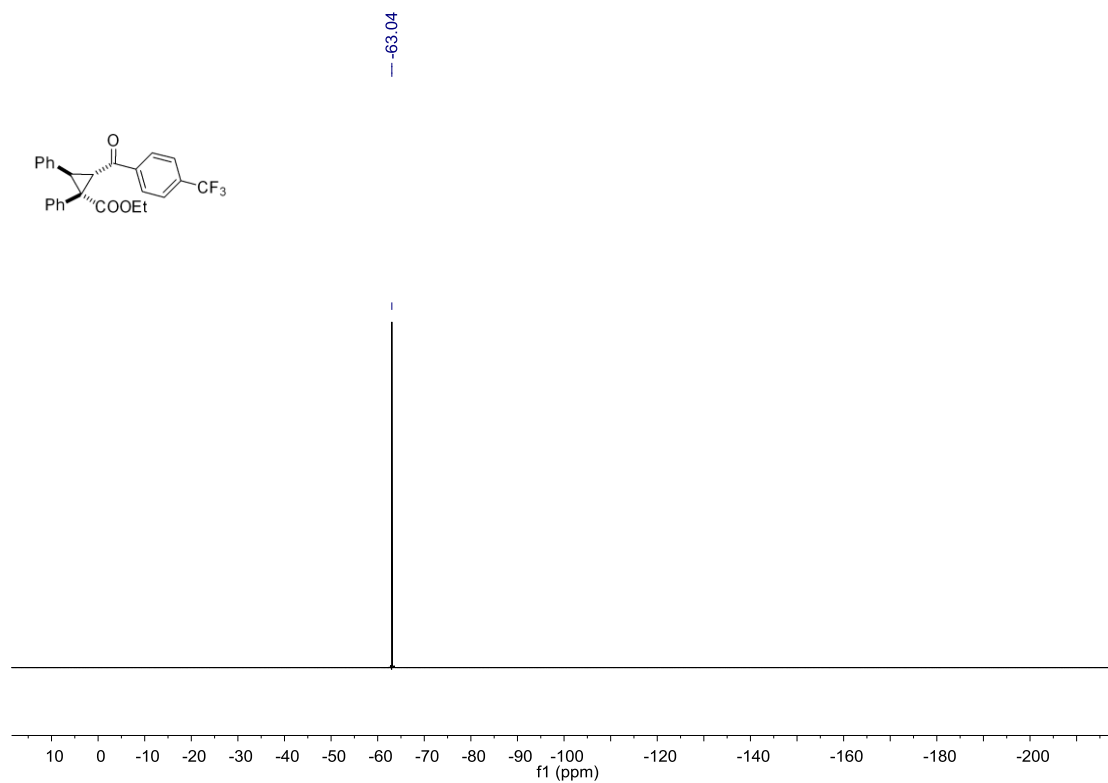
¹³C NMR spectrum of **6ai** (100 MHz, CDCl₃)

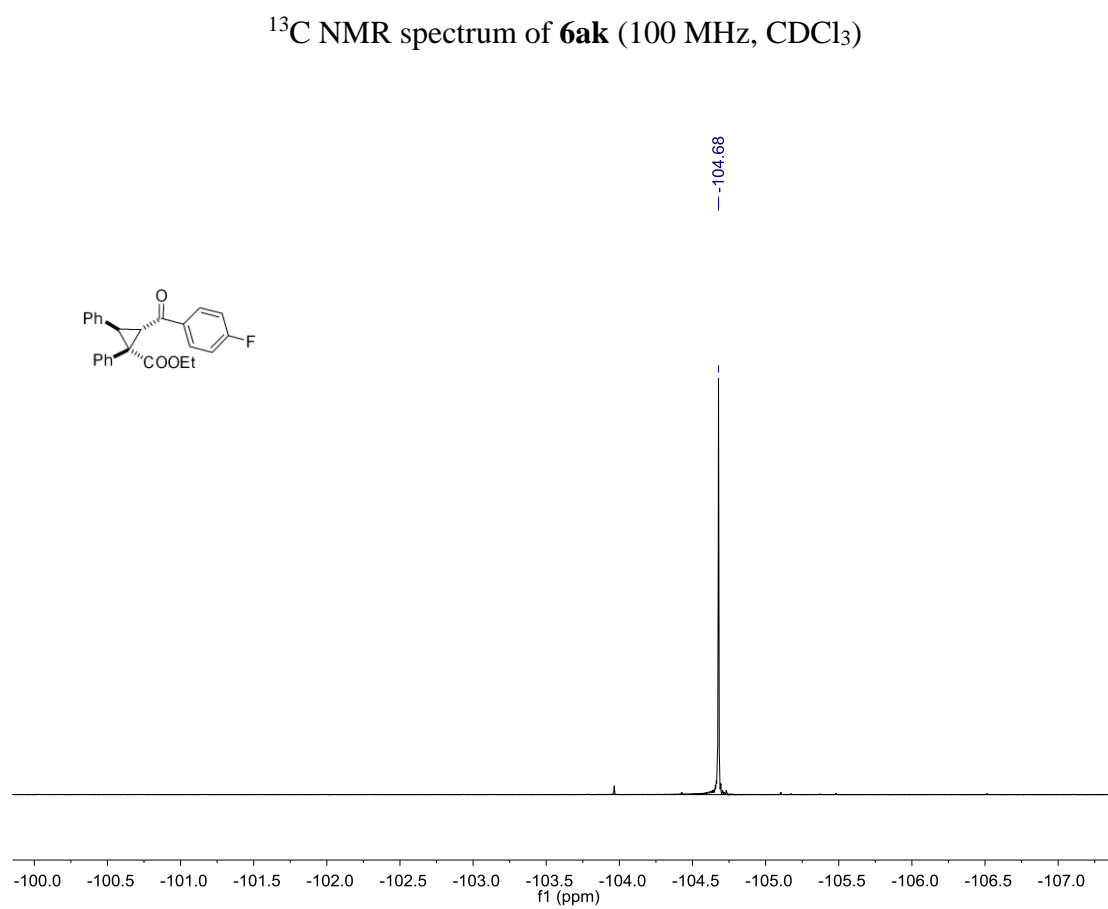
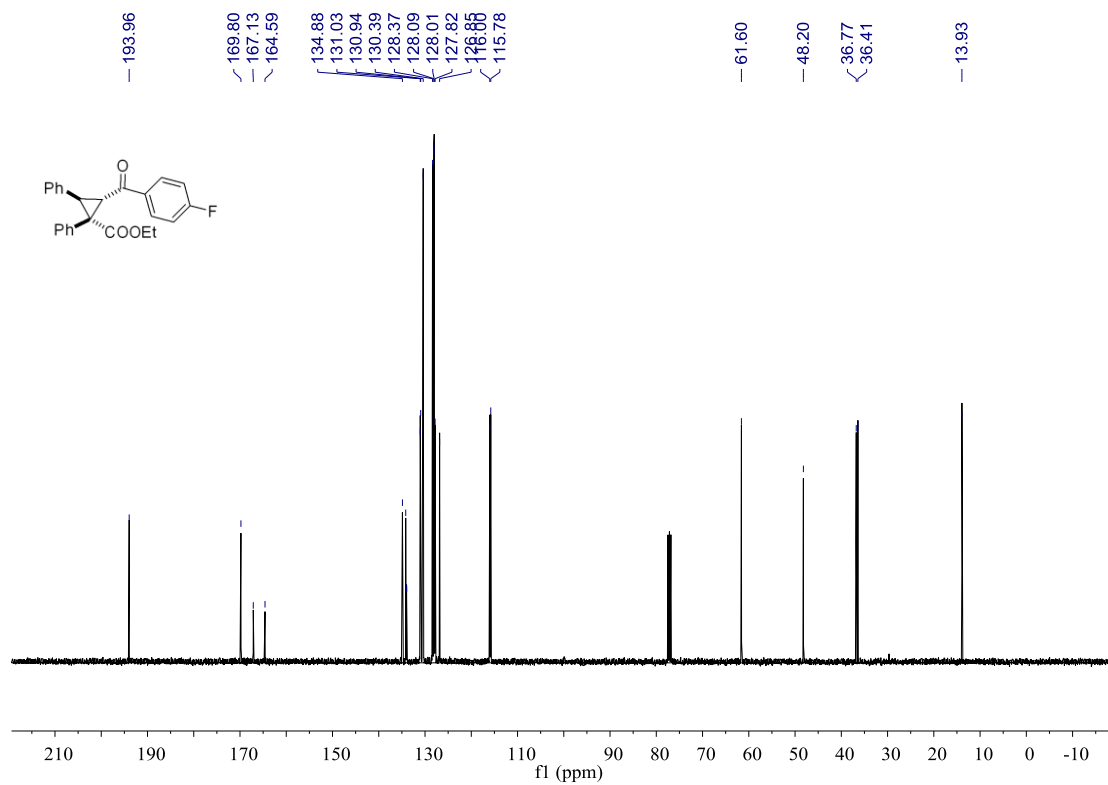


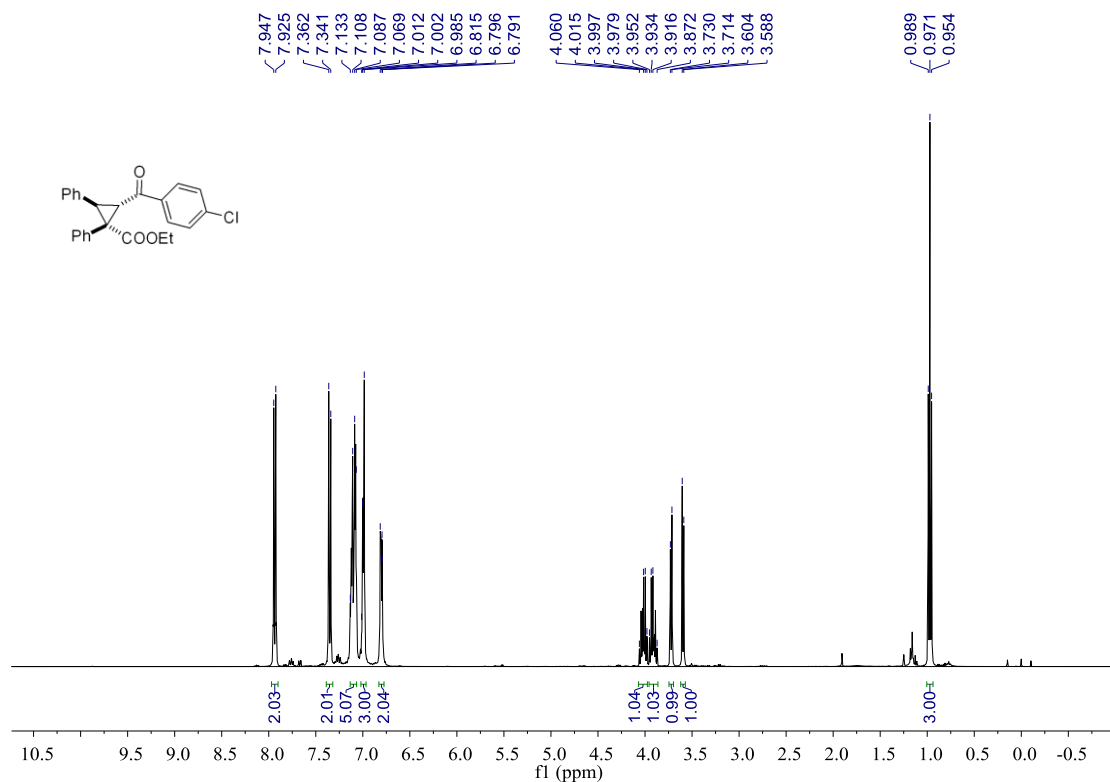
¹H NMR spectrum of **6aj** (400 MHz, CDCl₃)



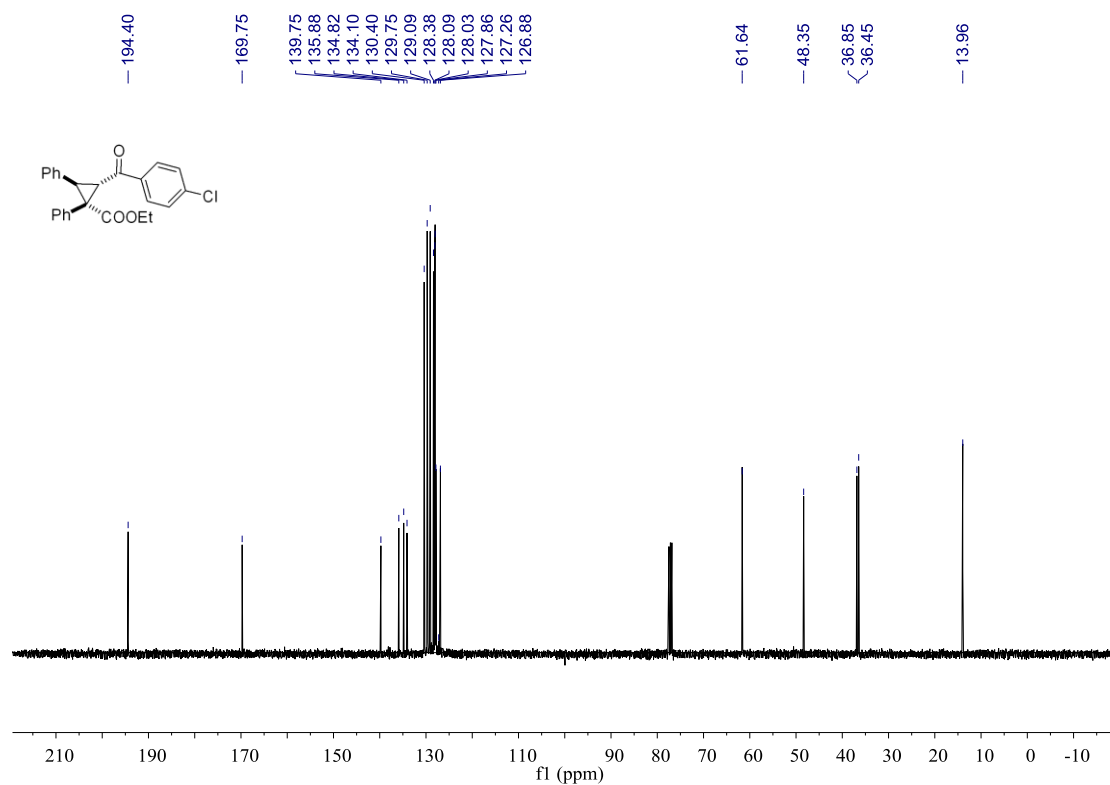
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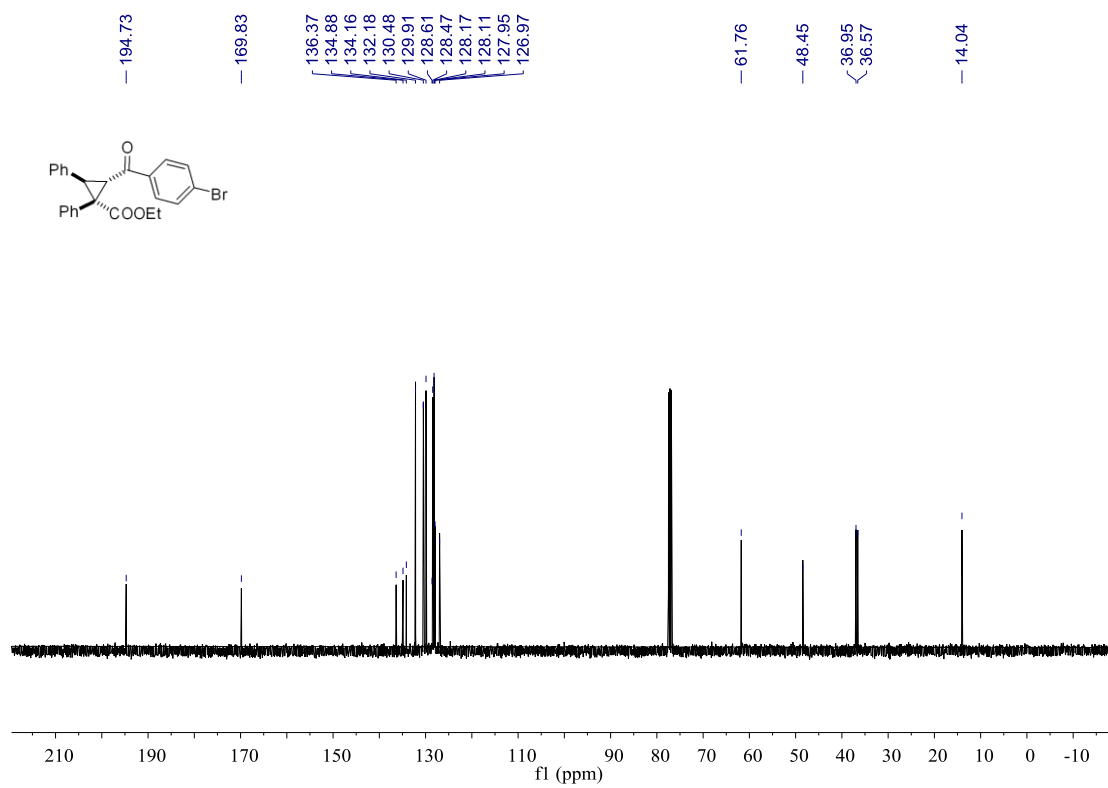
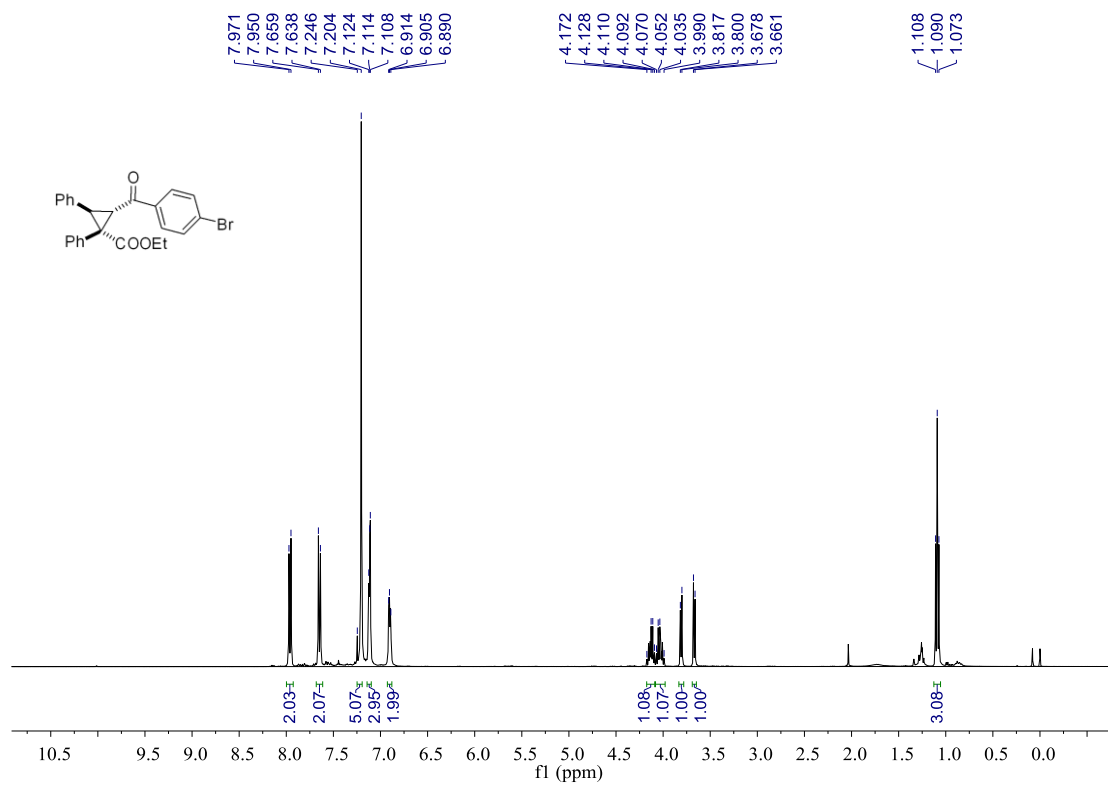


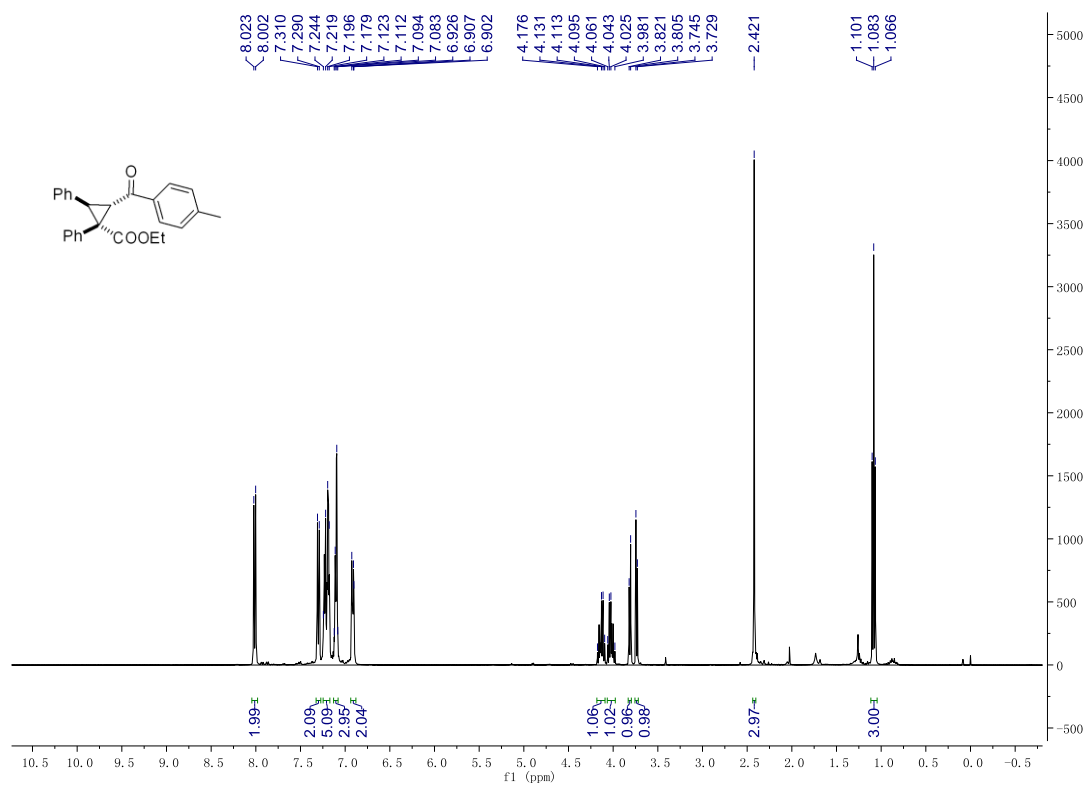


¹H NMR spectrum of **6al** (400 MHz, CDCl₃)

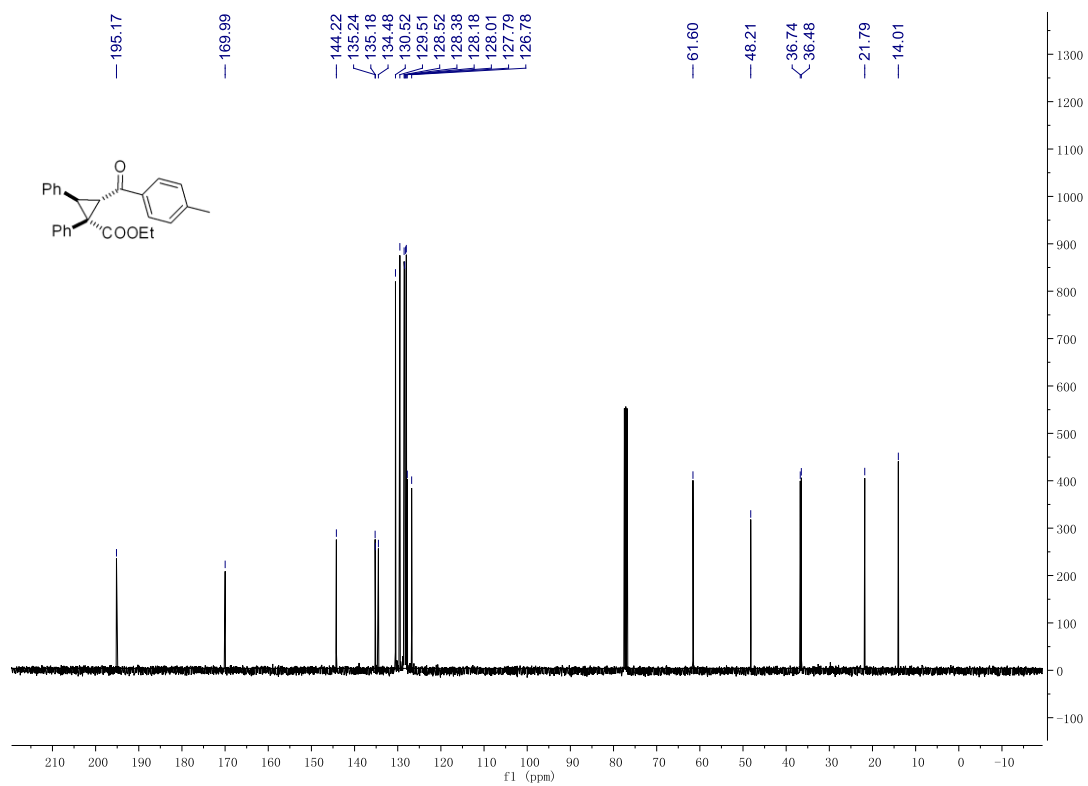


¹³C NMR spectrum of **6al** (100 MHz, CDCl₃)

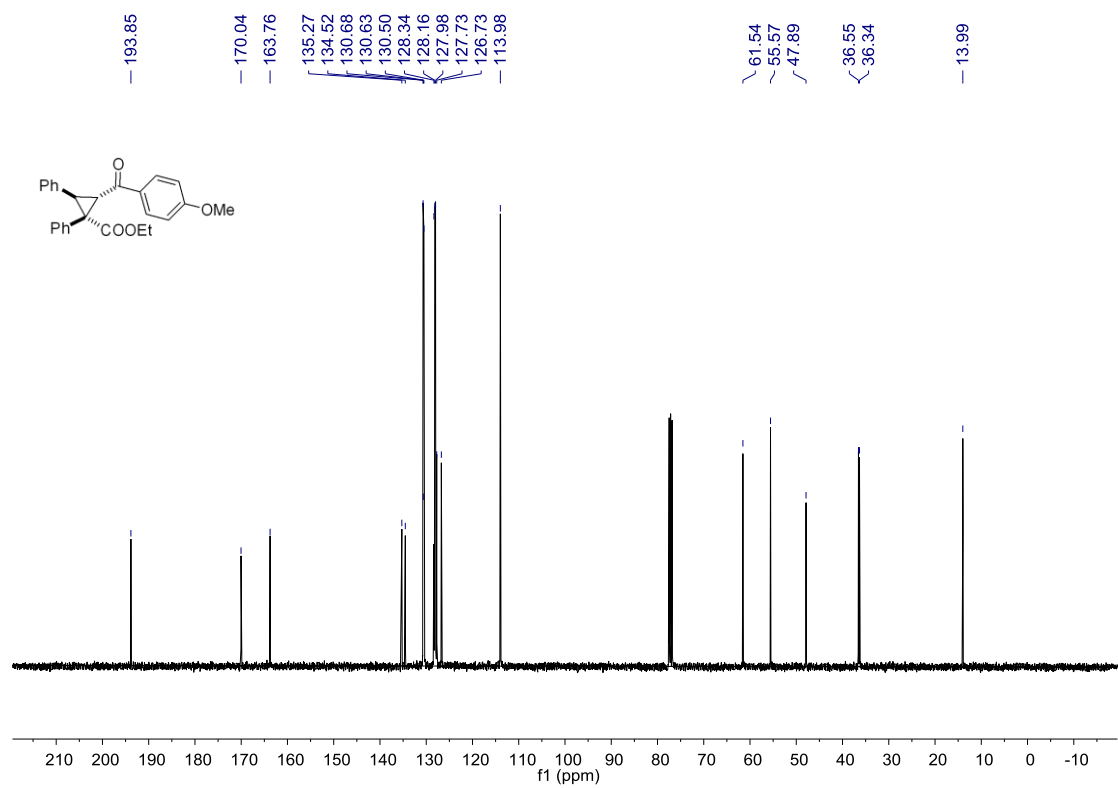
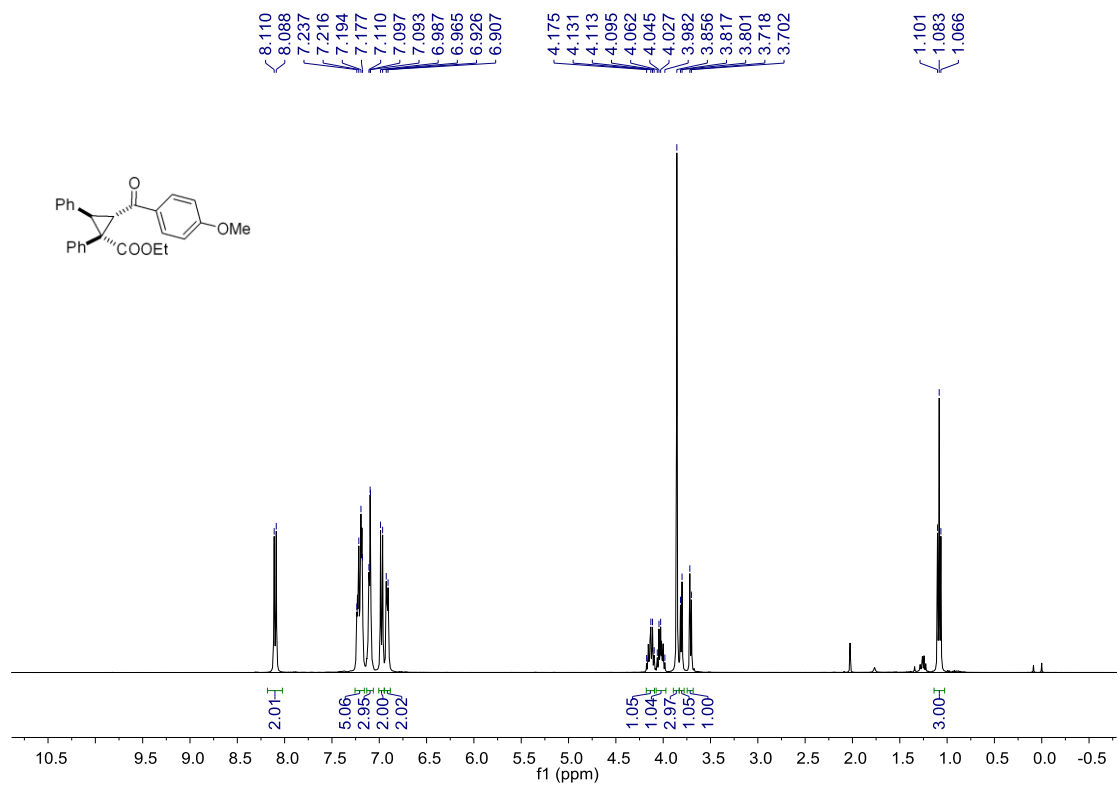


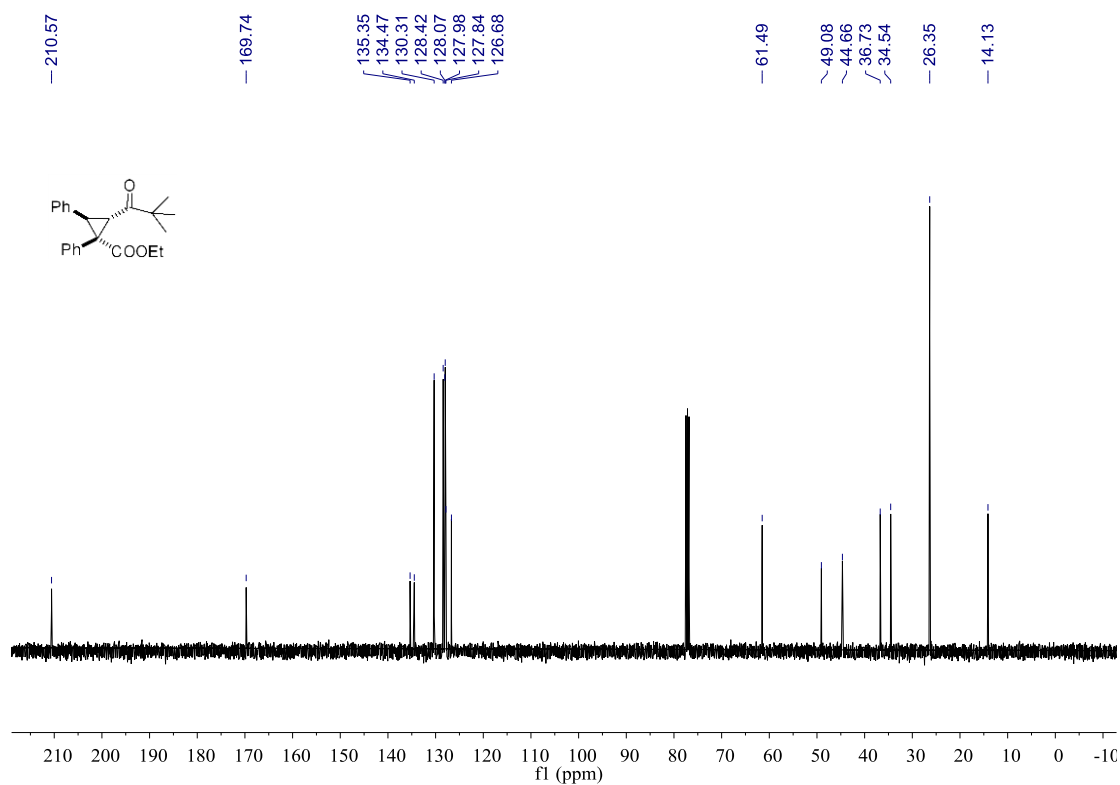
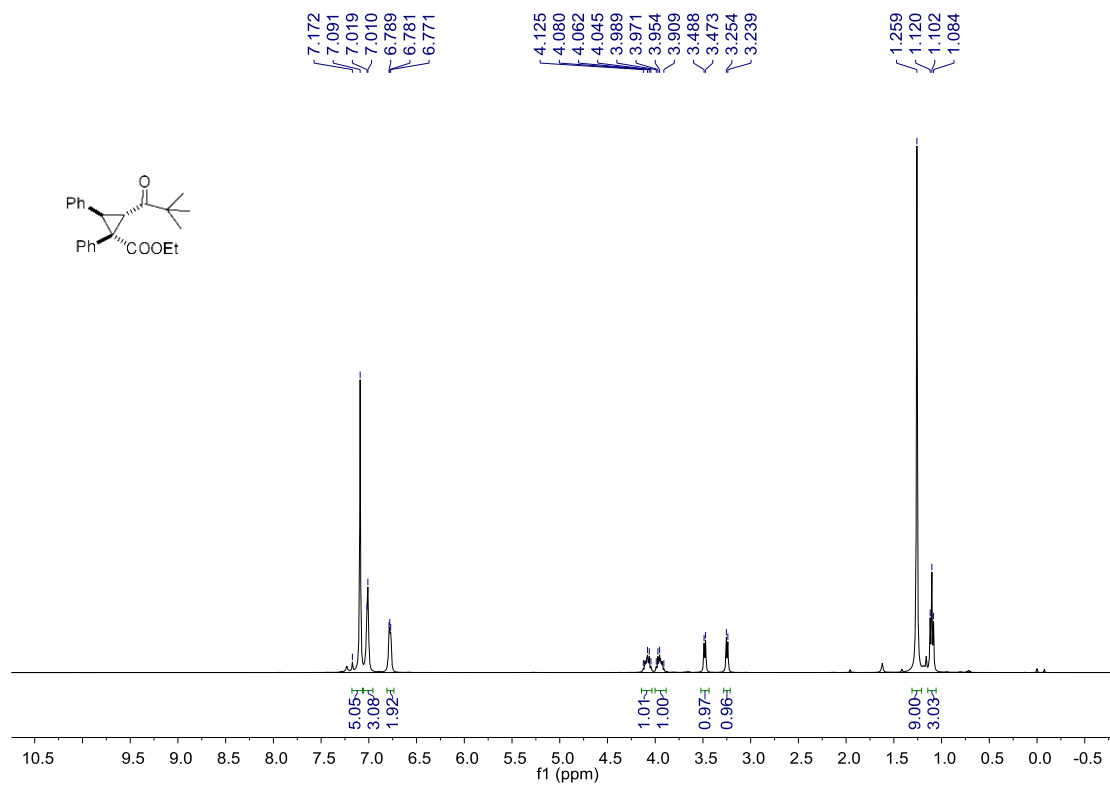


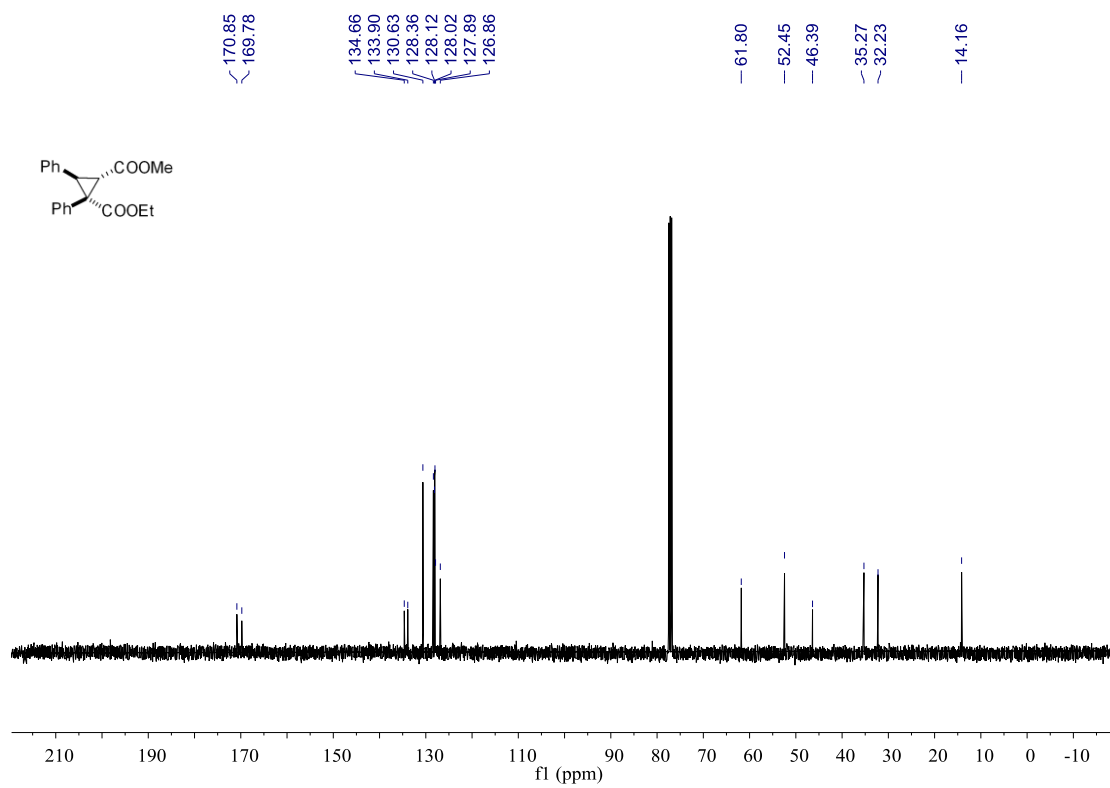
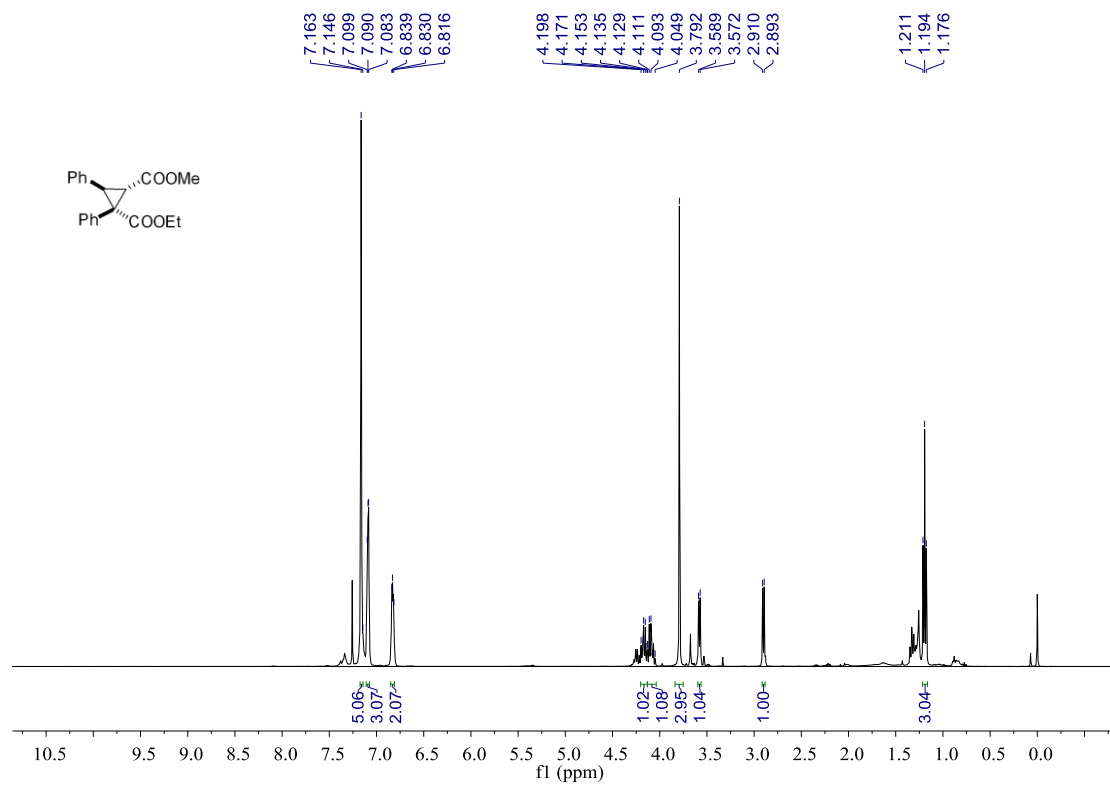
^1H NMR spectrum of **6an** (400 MHz, CDCl_3)

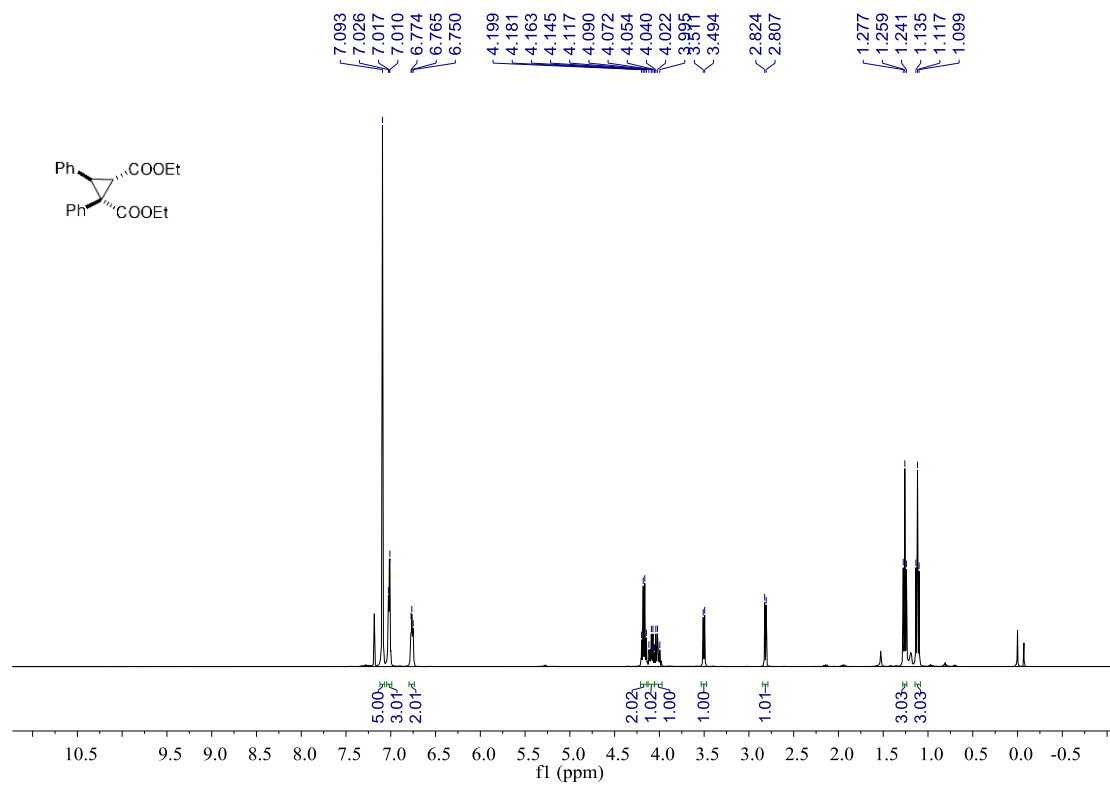


^{13}C NMR spectrum of **6an** (100 MHz, CDCl_3)

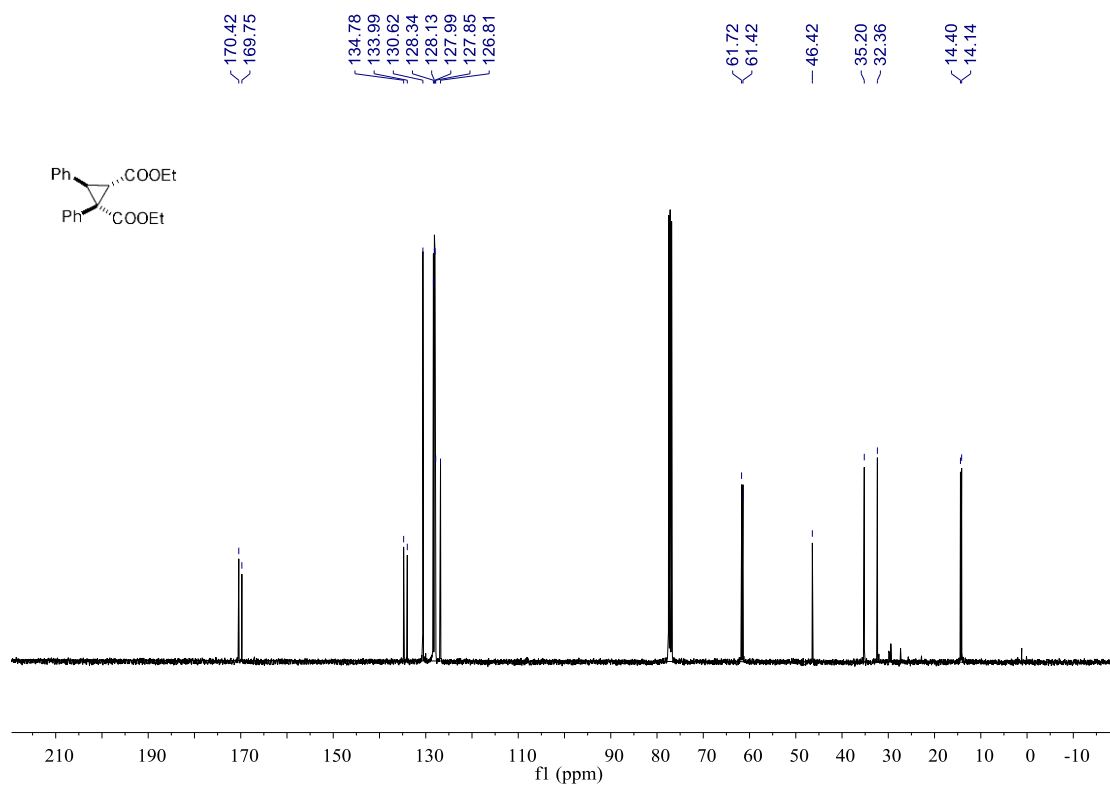




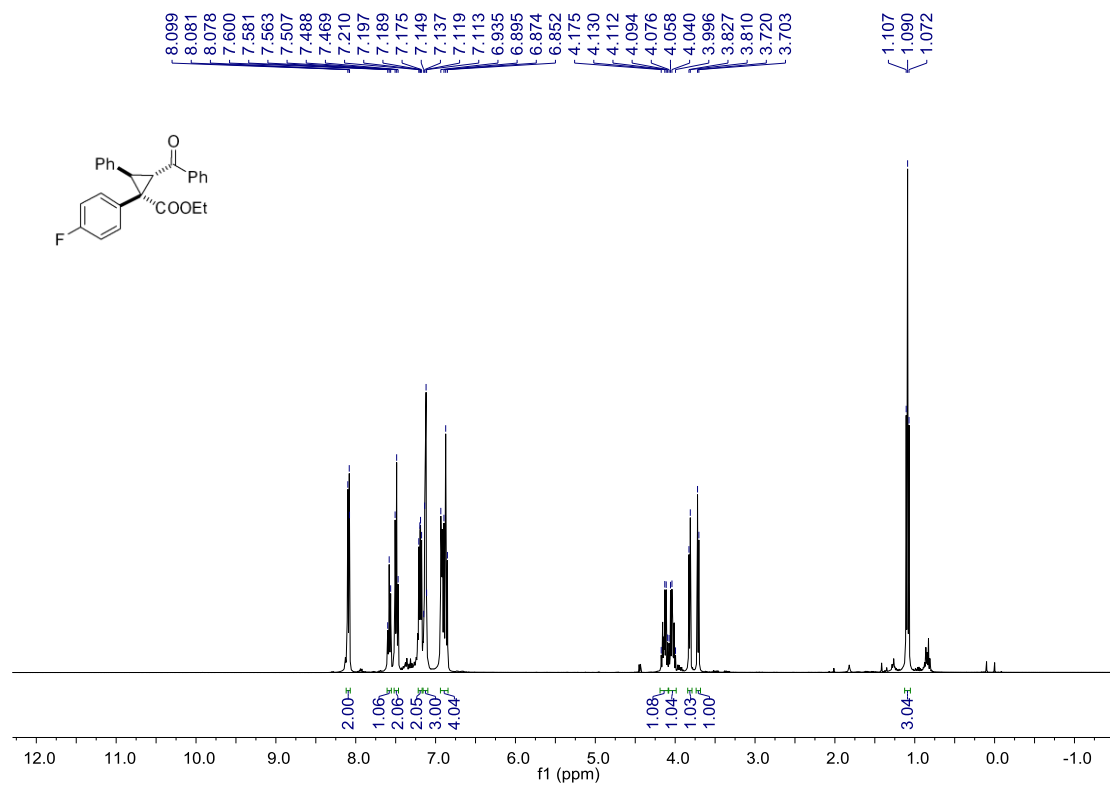




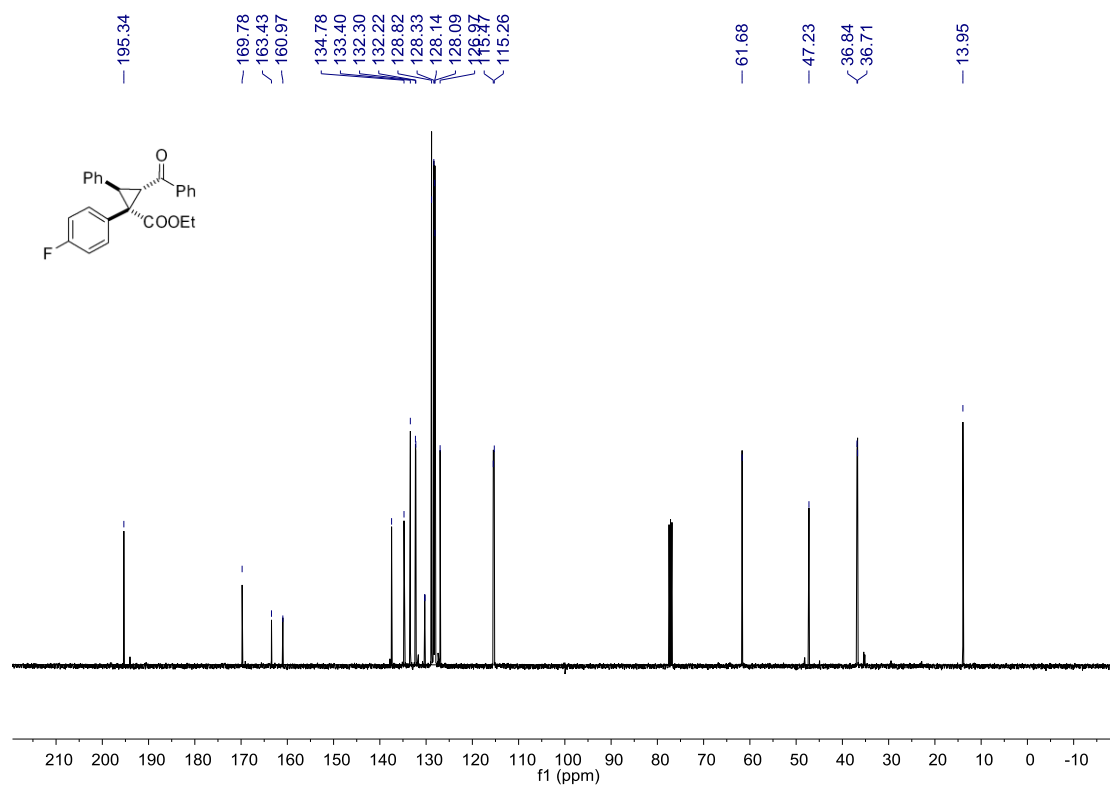
¹H NMR spectrum of **6ar** (400 MHz, CDCl₃)



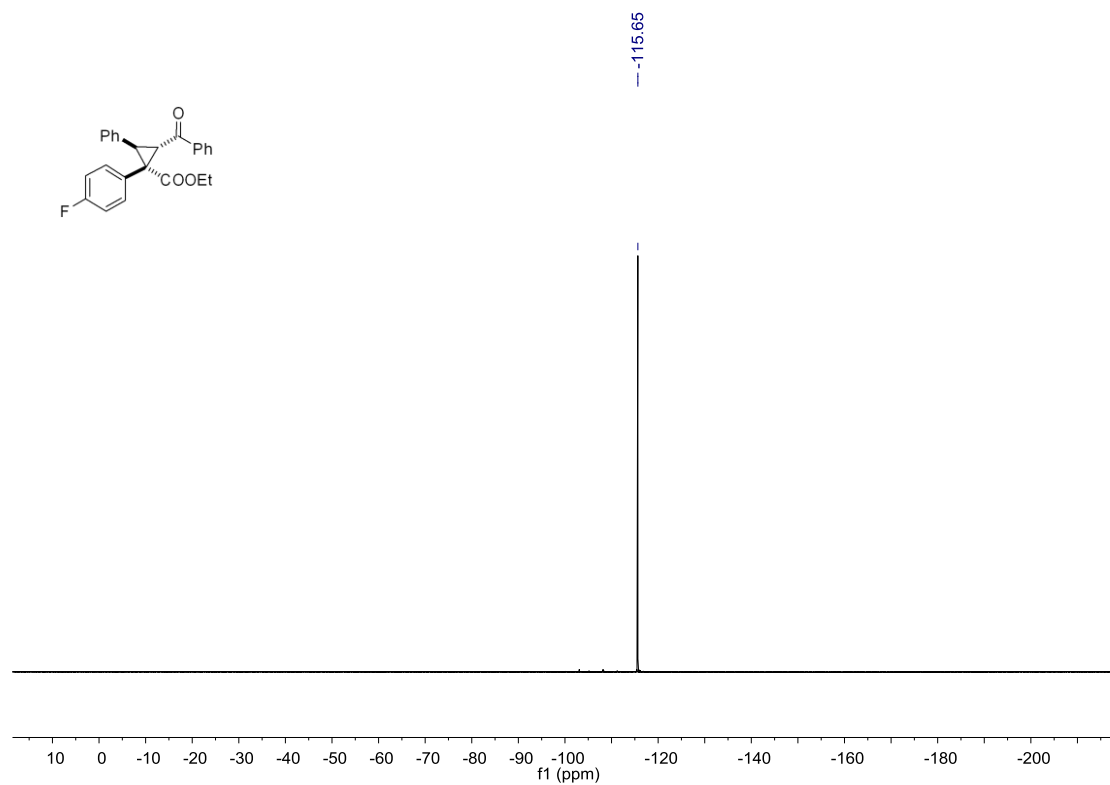
¹³C NMR spectrum of **6ar** (100 MHz, CDCl₃)



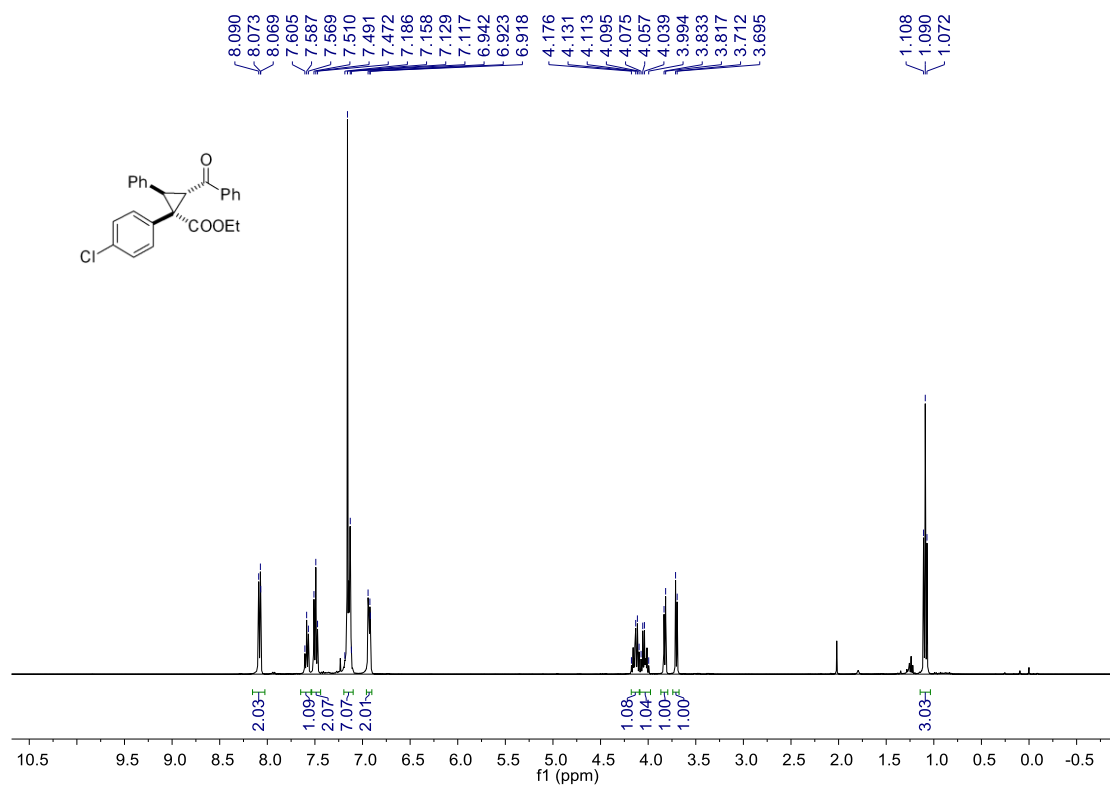
^1H NMR spectrum of **6ba** (400 MHz, CDCl_3)



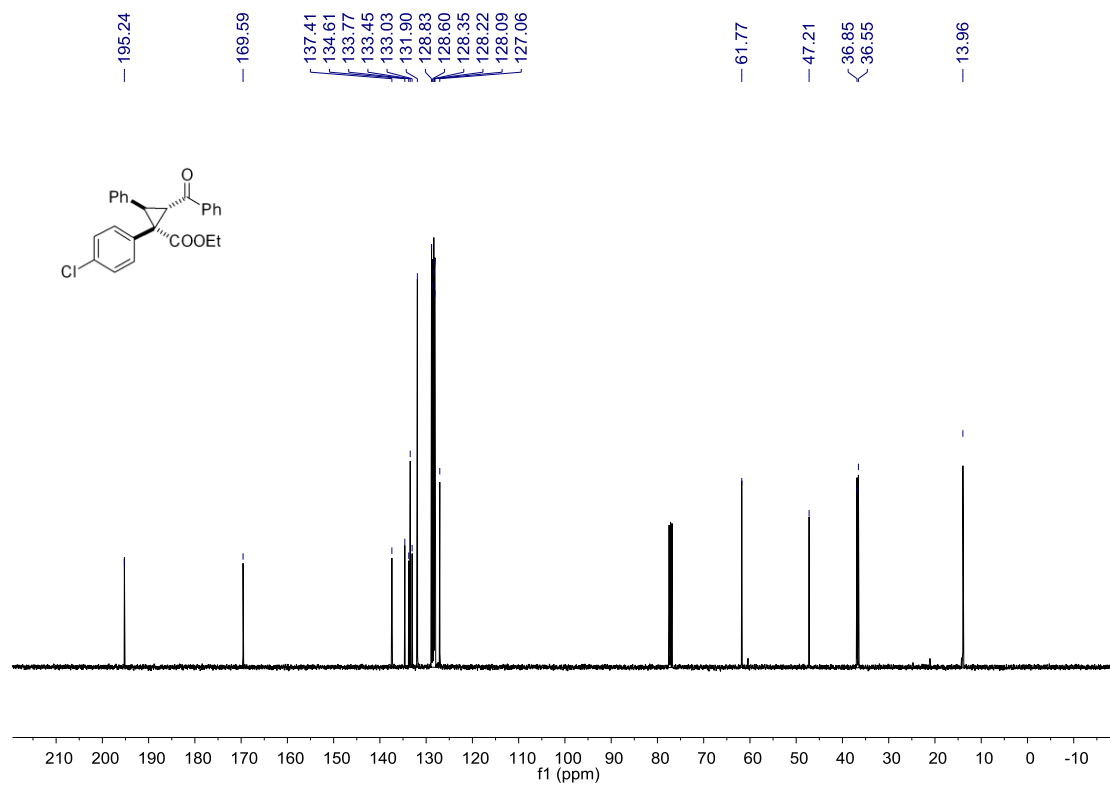
^{13}C NMR spectrum of **6ba** (100 MHz, CDCl_3)



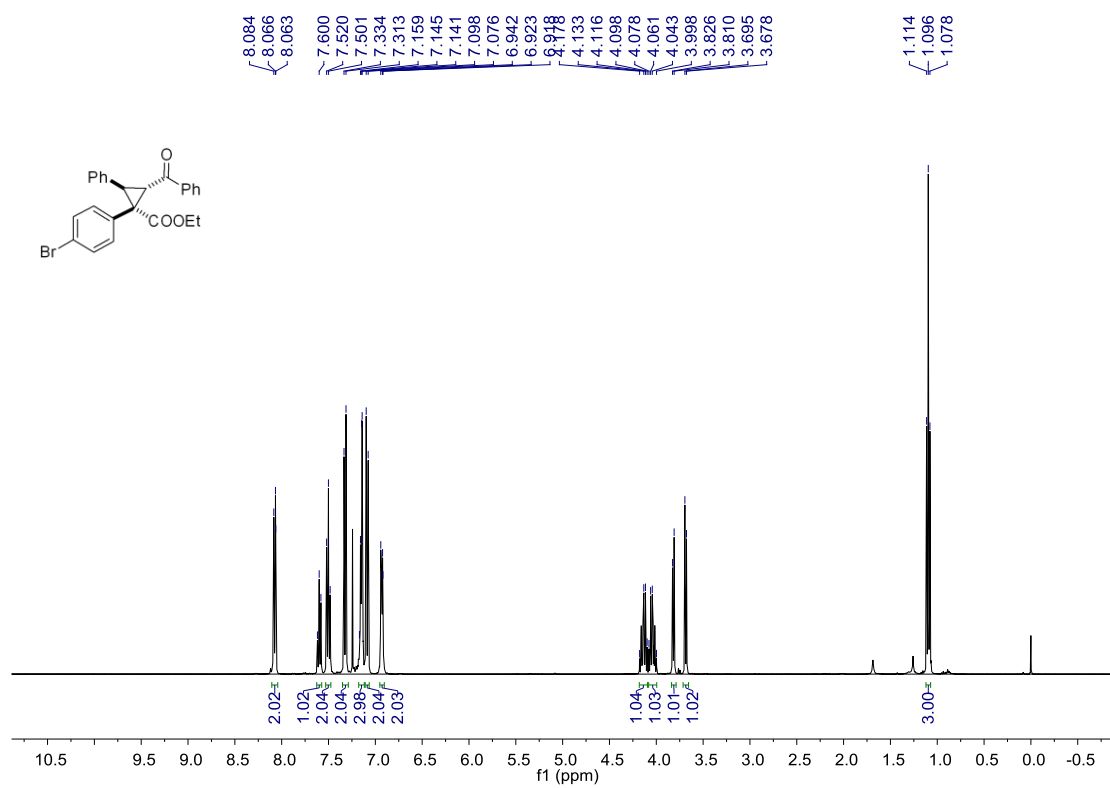
^{19}F NMR spectrum of **6ba** (376 MHz, CDCl_3)



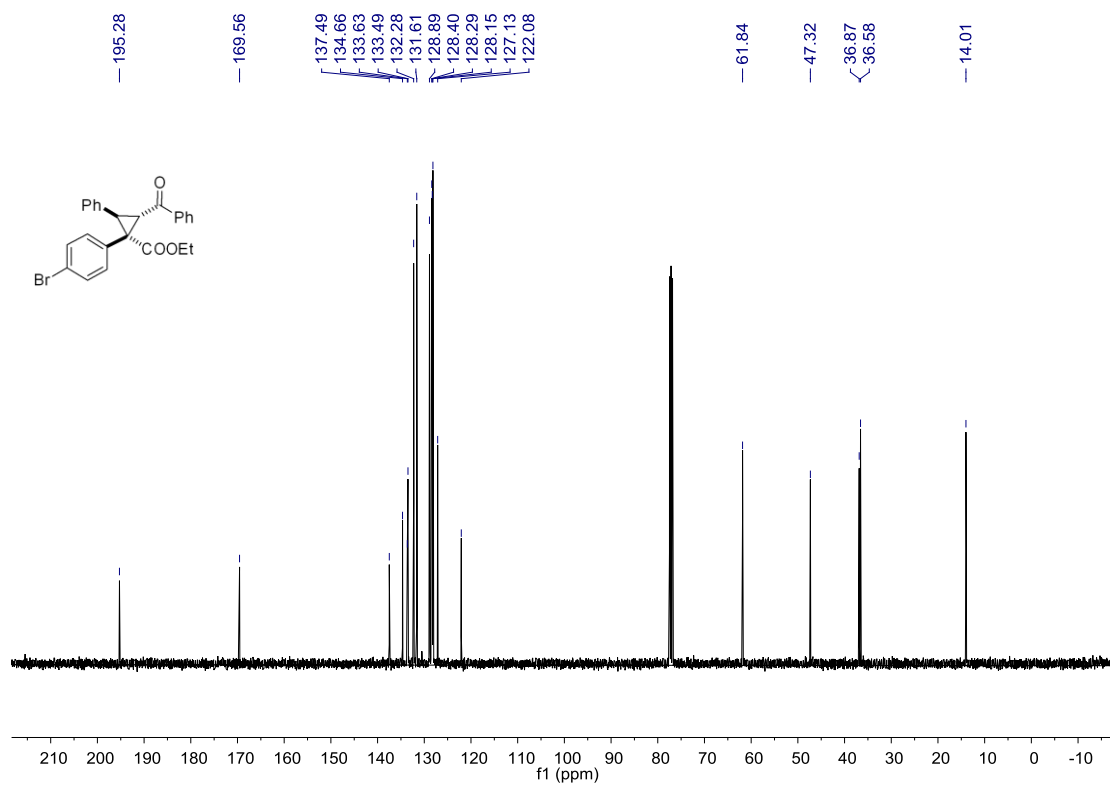
^1H NMR spectrum of **6ca** (400 MHz, CDCl_3)



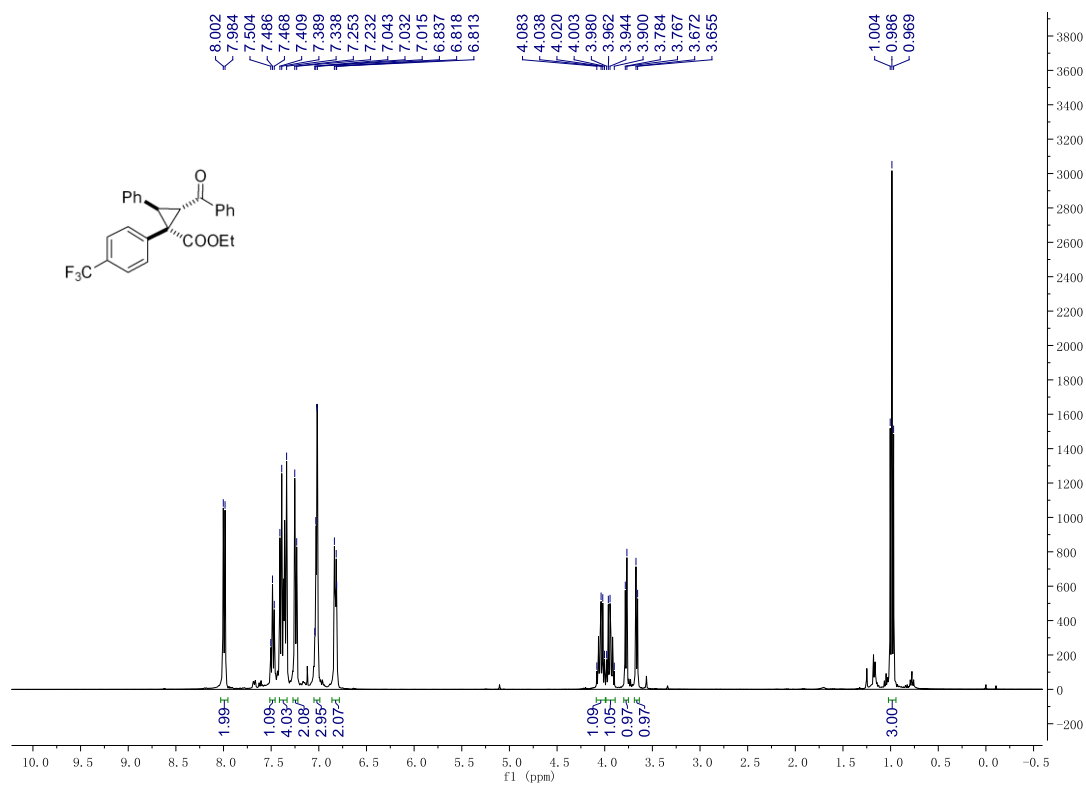
^{13}C NMR spectrum of **6ca** (100 MHz, CDCl_3)



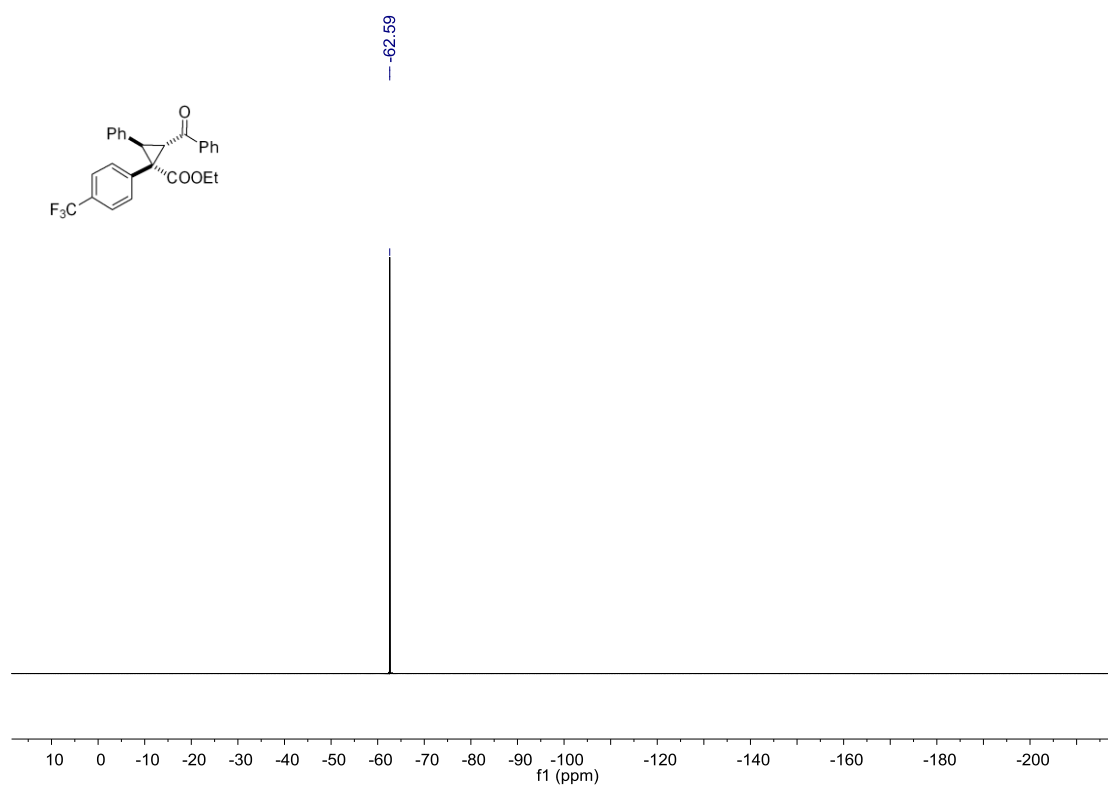
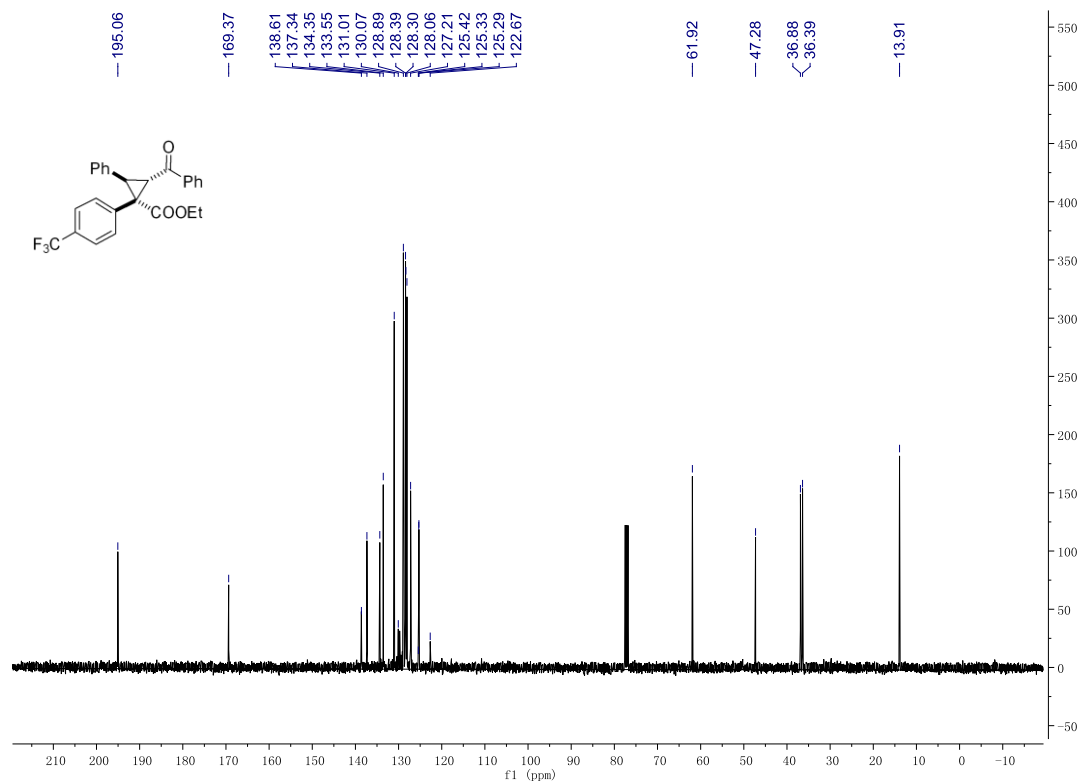
^1H NMR spectrum of **6da** (400 MHz, CDCl_3)

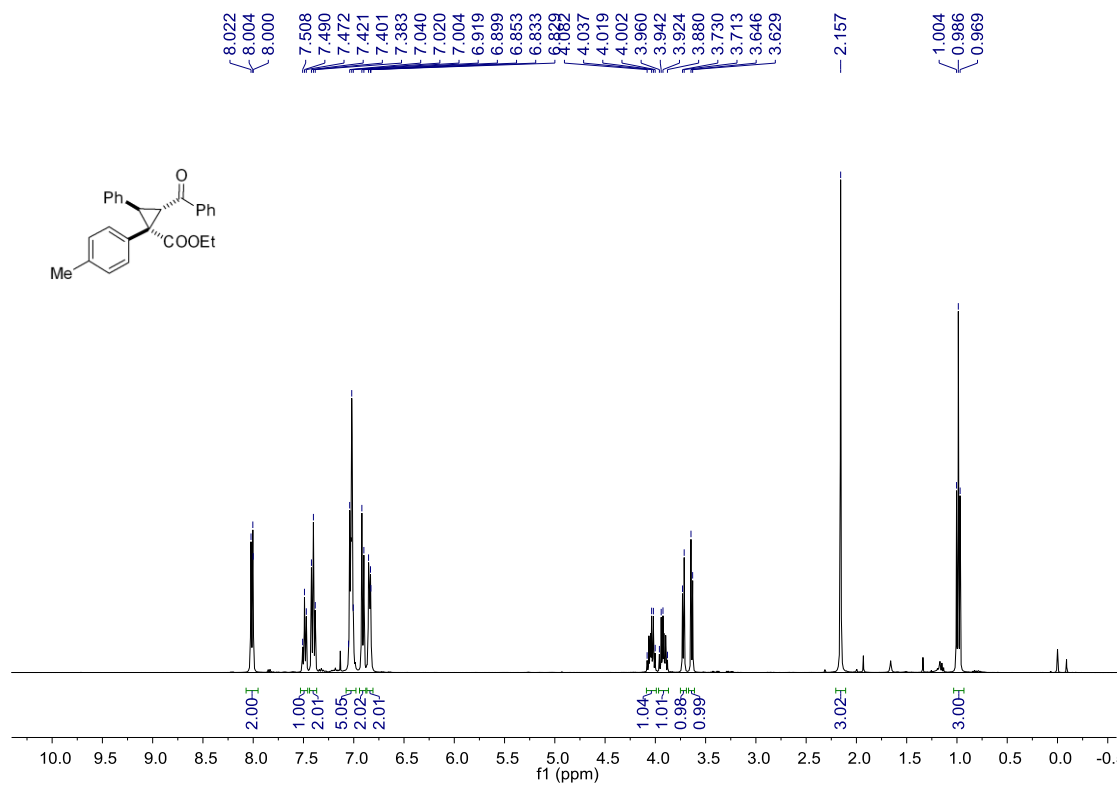


^{13}C NMR spectrum of **6da** (100 MHz, CDCl_3)

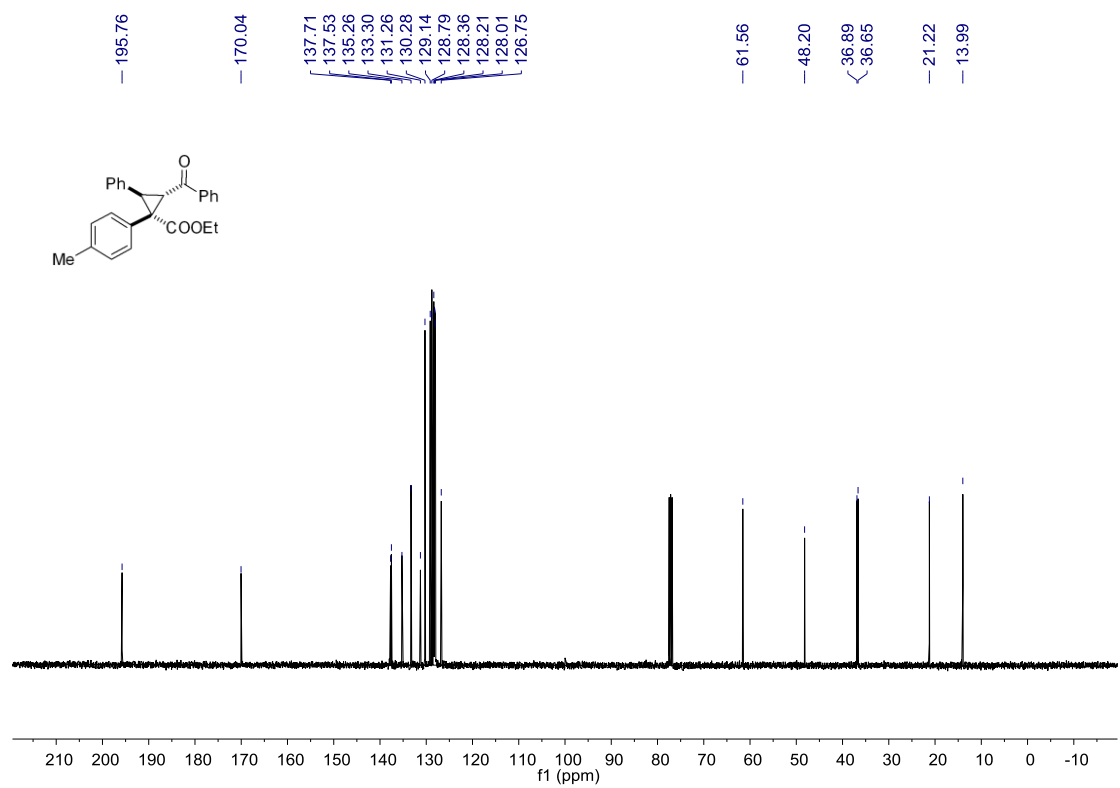


^1H NMR spectrum of **6ea** (400 MHz, CDCl_3)

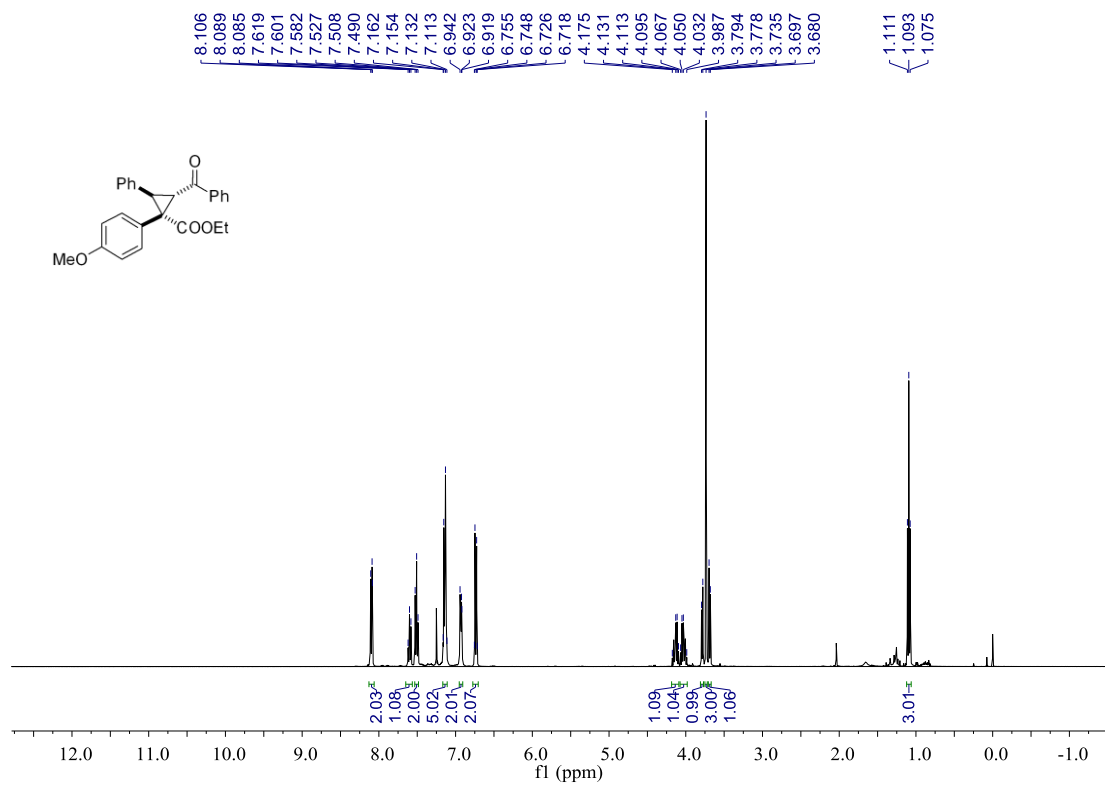




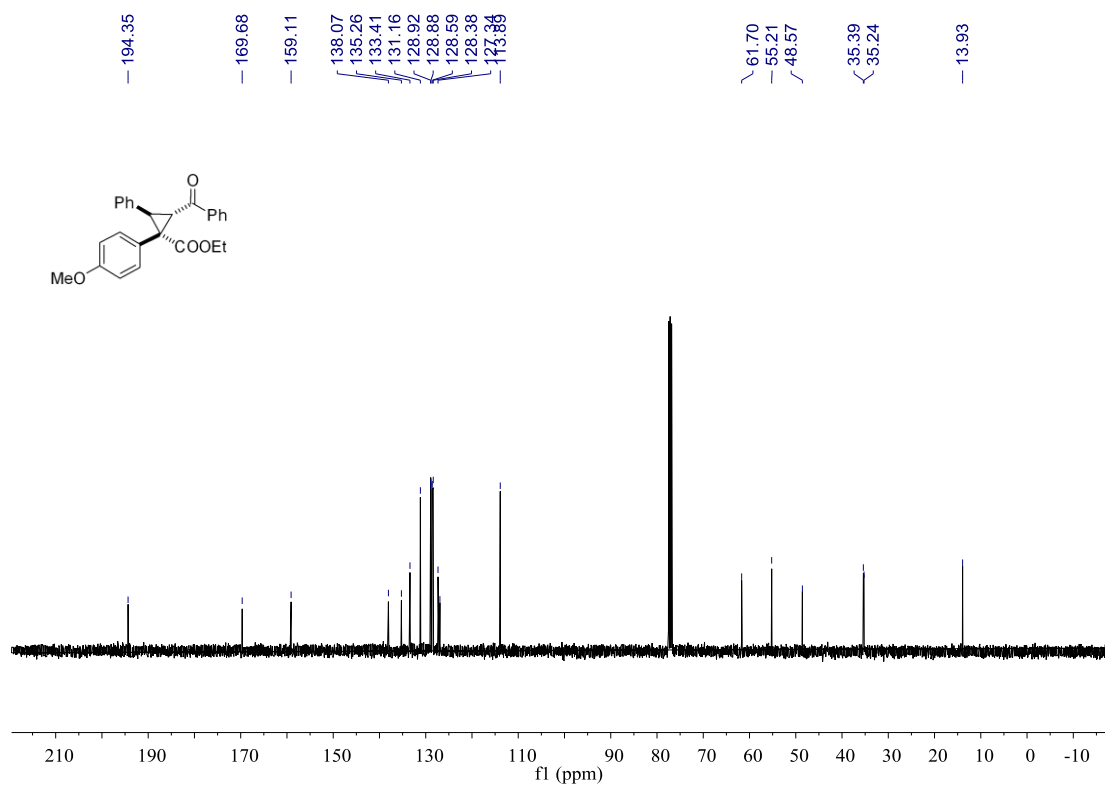
¹H NMR spectrum of **6fa** (400 MHz, CDCl₃)



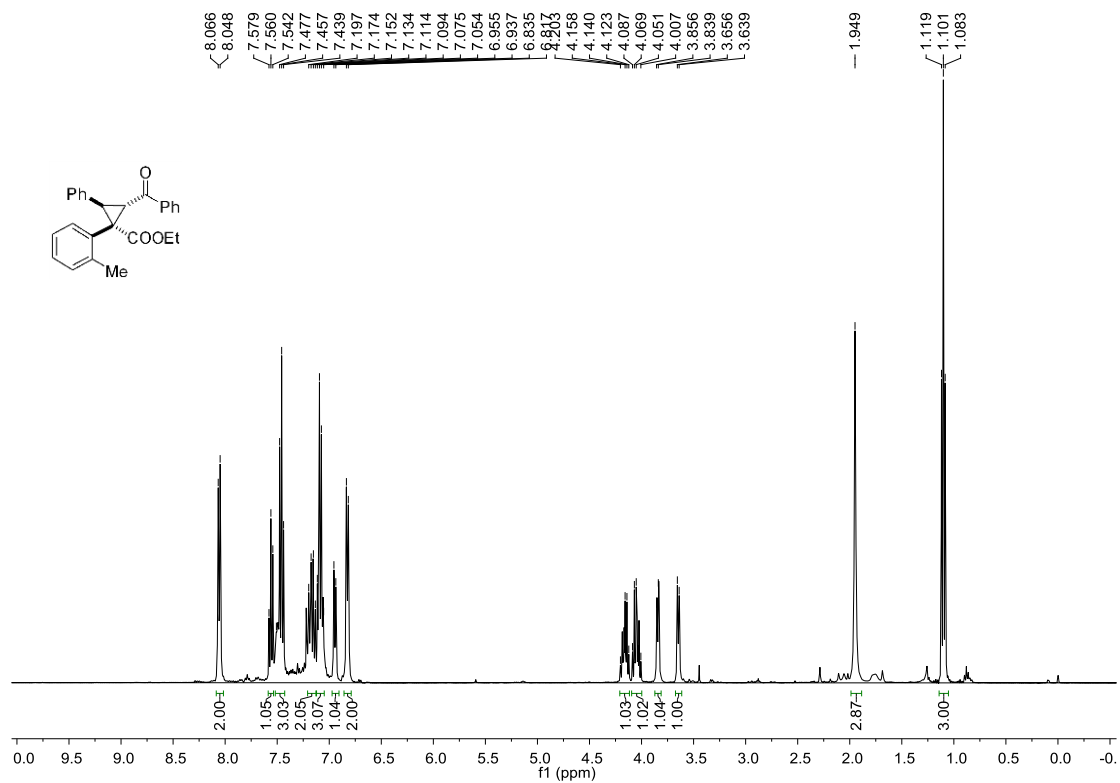
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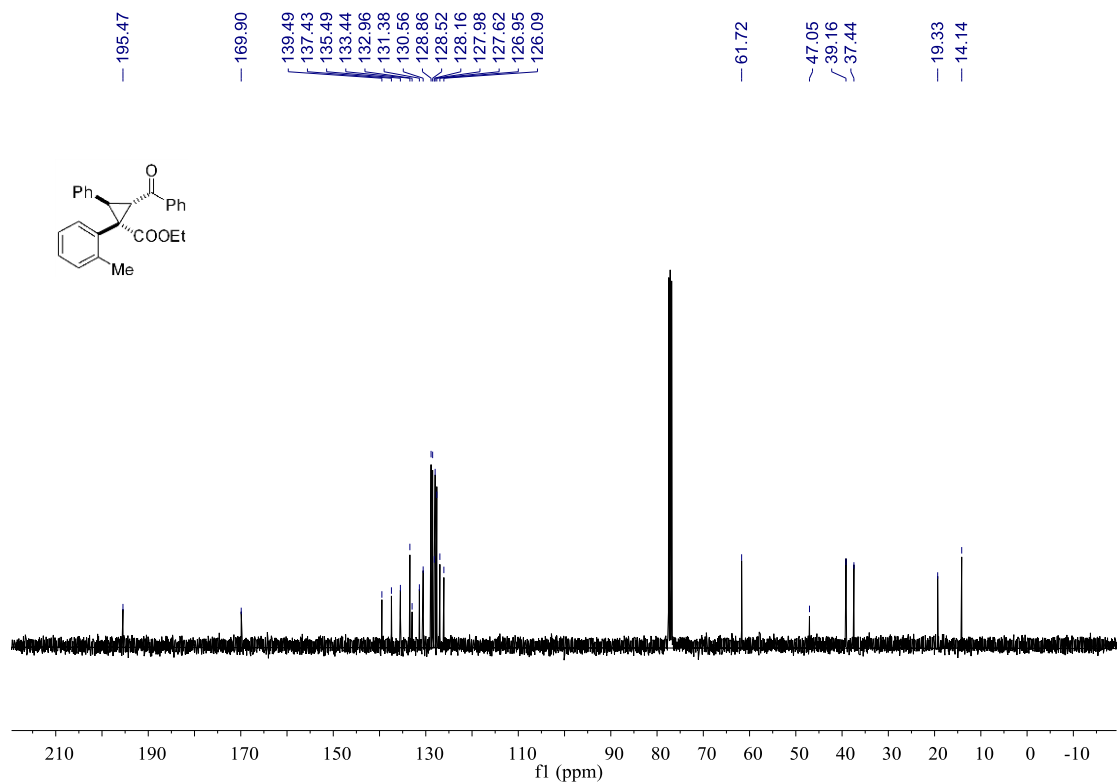
¹H NMR spectrum of **6ga** (400 MHz, CDCl₃)



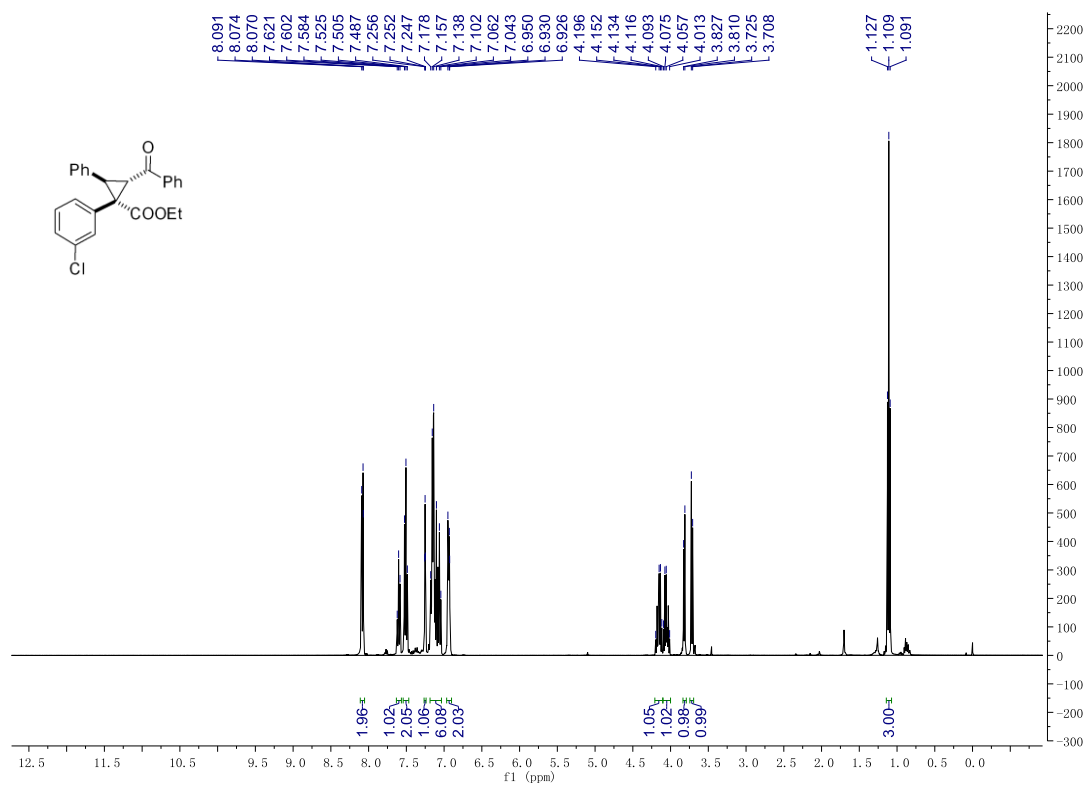
¹³C NMR spectrum of **6ga** (100 MHz, CDCl₃)



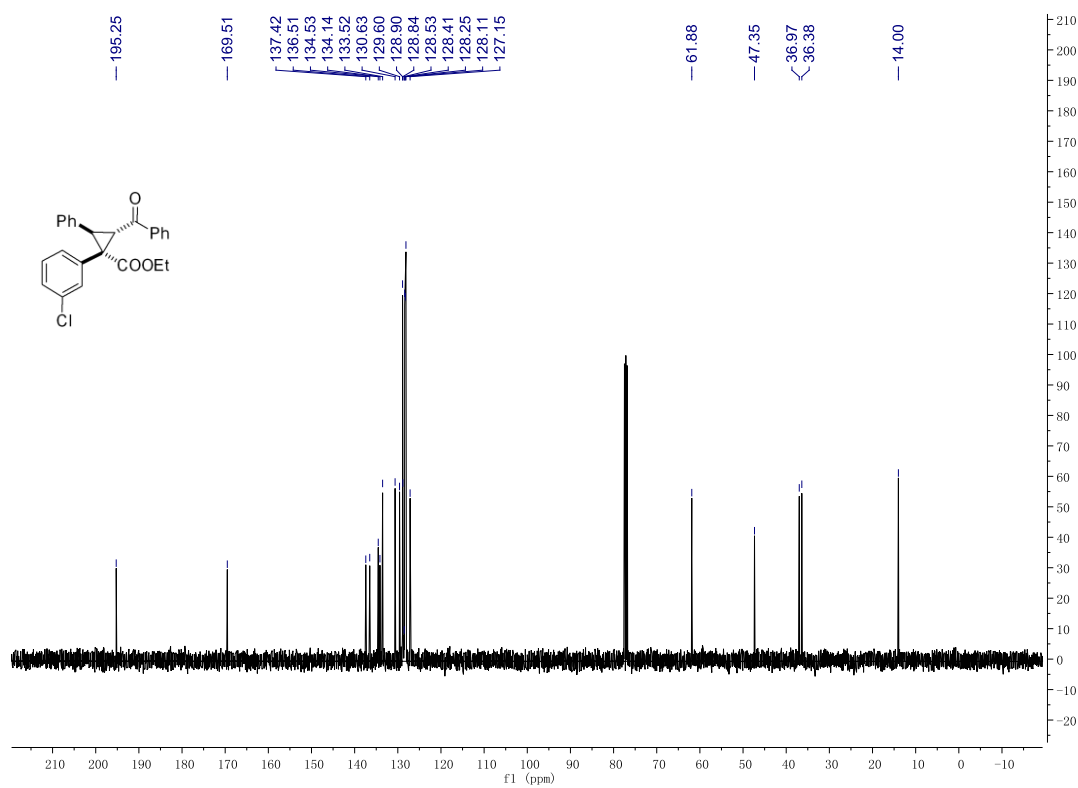
¹H NMR spectrum of 6ha (400 MHz, CDCl₃)



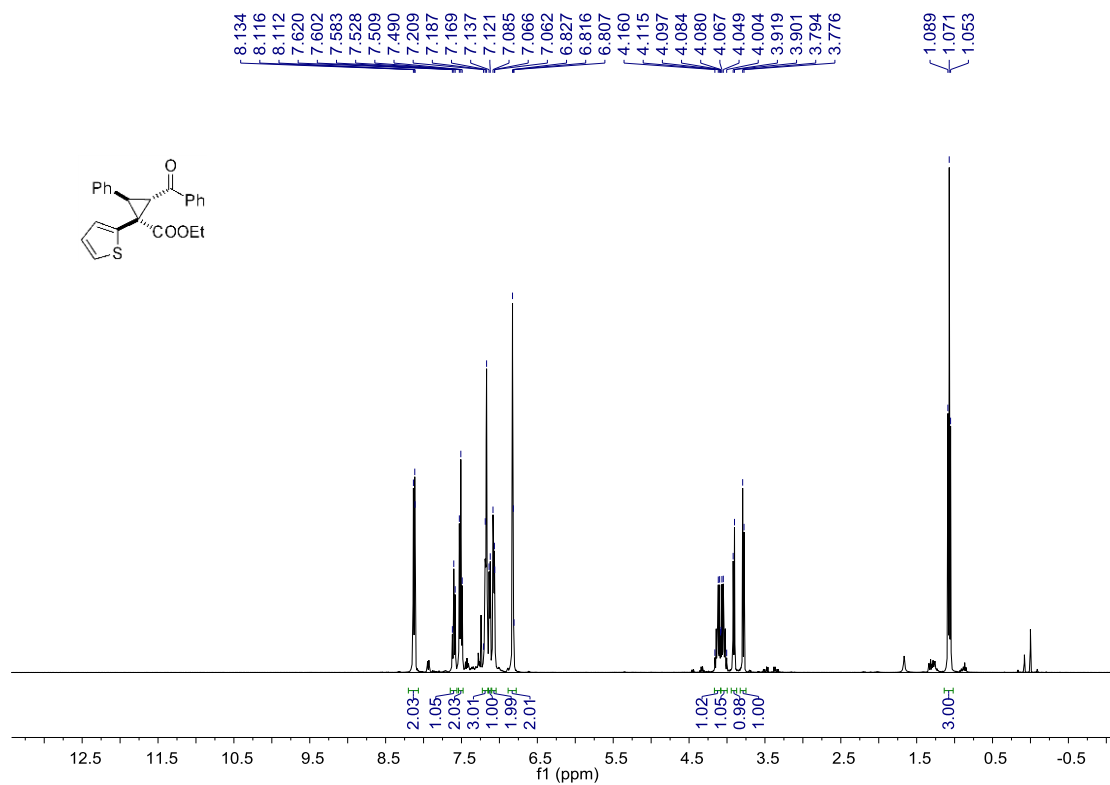
¹³C NMR spectrum of 6ha (100 MHz, CDCl₃)



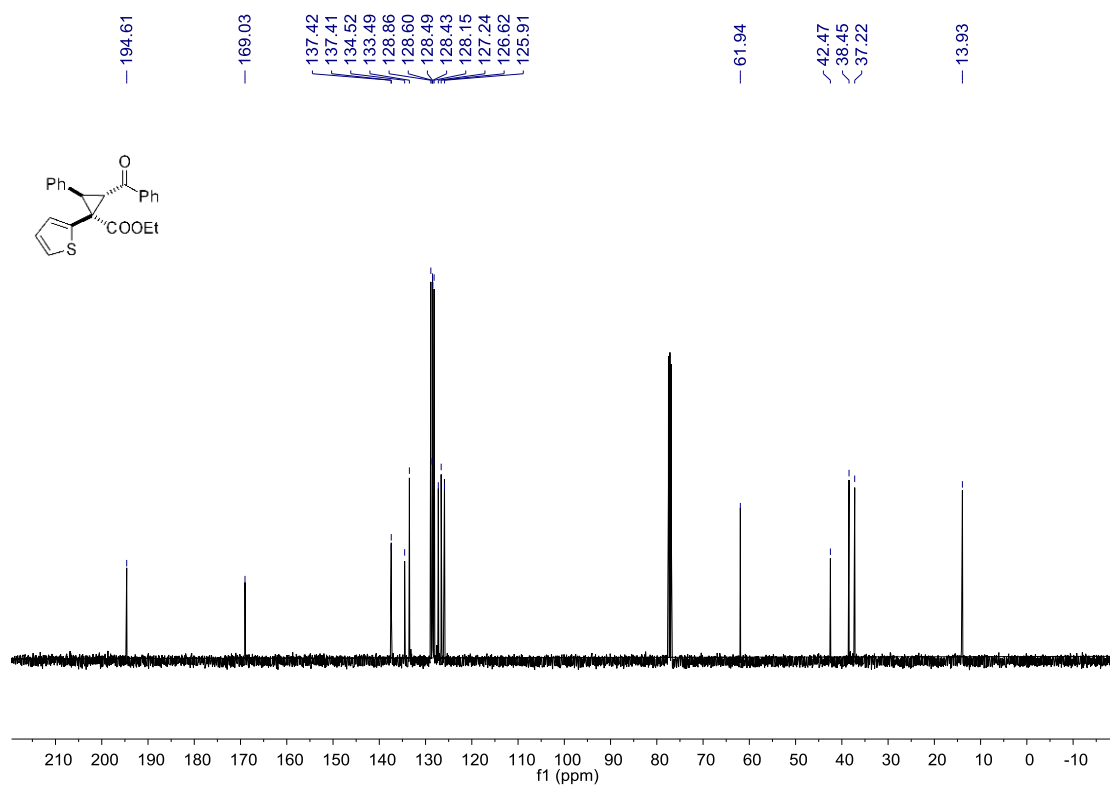
¹H NMR spectrum of **6ia (400 MHz, CDCl₃)**



¹³C NMR spectrum of **6ia (100 MHz, CDCl₃)**

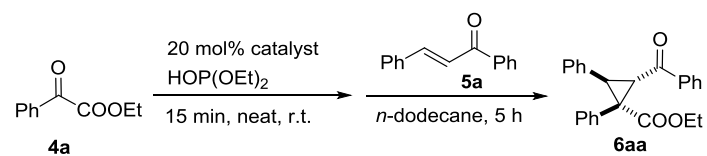


¹H NMR spectrum of **6ja** (400 MHz, CDCl₃)



¹³C NMR spectrum of **6ja** (100 MHz, CDCl₃)

Results of control experiments conducted at 120 °C and 180 °C^a



catalyst	GC yield of 6aa (%)		Isolated yield of 6aa (%)	
	120 °C	180 °C	120 °C	180 °C
$[(\text{Me}_3\text{Si})_2\text{N}]_3\text{Yb}(\mu\text{-Cl})\text{Li}(\text{THF})_3$	80	83		
$[(\text{Me}_3\text{Si})_2\text{N}]_3\text{La}(\mu\text{-Cl})\text{Li}(\text{THF})_3$	78	89	63	80

^a Reactions were conducted under argon by reacting ethyl 2-oxo-2-phenylacetate (0.5 mmol), diethyl phosphite (0.6 mmol), and chalcone (1.0 mmol) in *n*-dodecane (0.5 mL) for 5 h. The catalyst loading is relative to ethyl 2-oxo-2-phenylacetate.