

Supporting information for:

Probing the reactivity of *H*-phosphonate derivatives for the hydrophosphonylation of various alkenes and alkynes under free-radical conditions

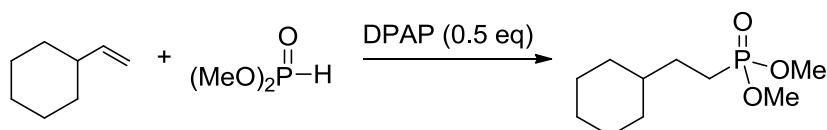
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Table : Influence of solvent on the hydrophosphonylation of vinylcyclohexane



Entry	Solvent	Dimethyl <i>H</i> -Phosphonate (eq.)	Light source	Time (min)	Yield (%)
1 ^(a)	<i>neat</i>	100	UV-A	30	99 ^(b)
2 ^(c)	THF	2	UV-A	120	46 ^(d)
3 ^(c)	<i>c</i> -Hex	2	UV-A	120	39 ^(d)
4 ^(c)	CH ₂ Cl ₂	2	UV-A	120	15 ^(d)
5 ^(c)	MeOH	2	UV-A	120	10 ^(d)
6 ^(c)	CH ₃ CN	2	UV-A	120	9 ^(d)

(a) Procedure A

(b) After purification by column chromatography

(c) Procedure C

(d) Determined by ³¹P NMR of the crude material

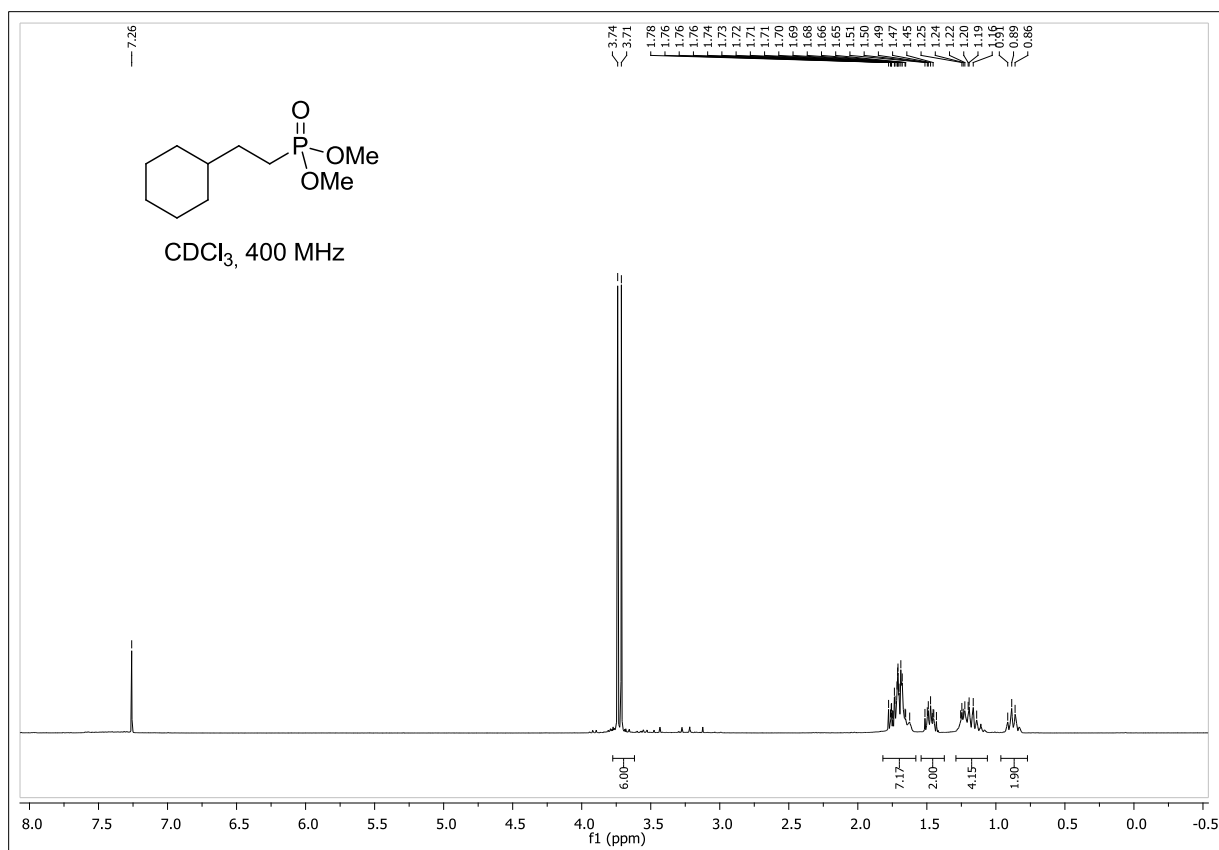


Table 1, Entry 1: ¹H NMR spectrum

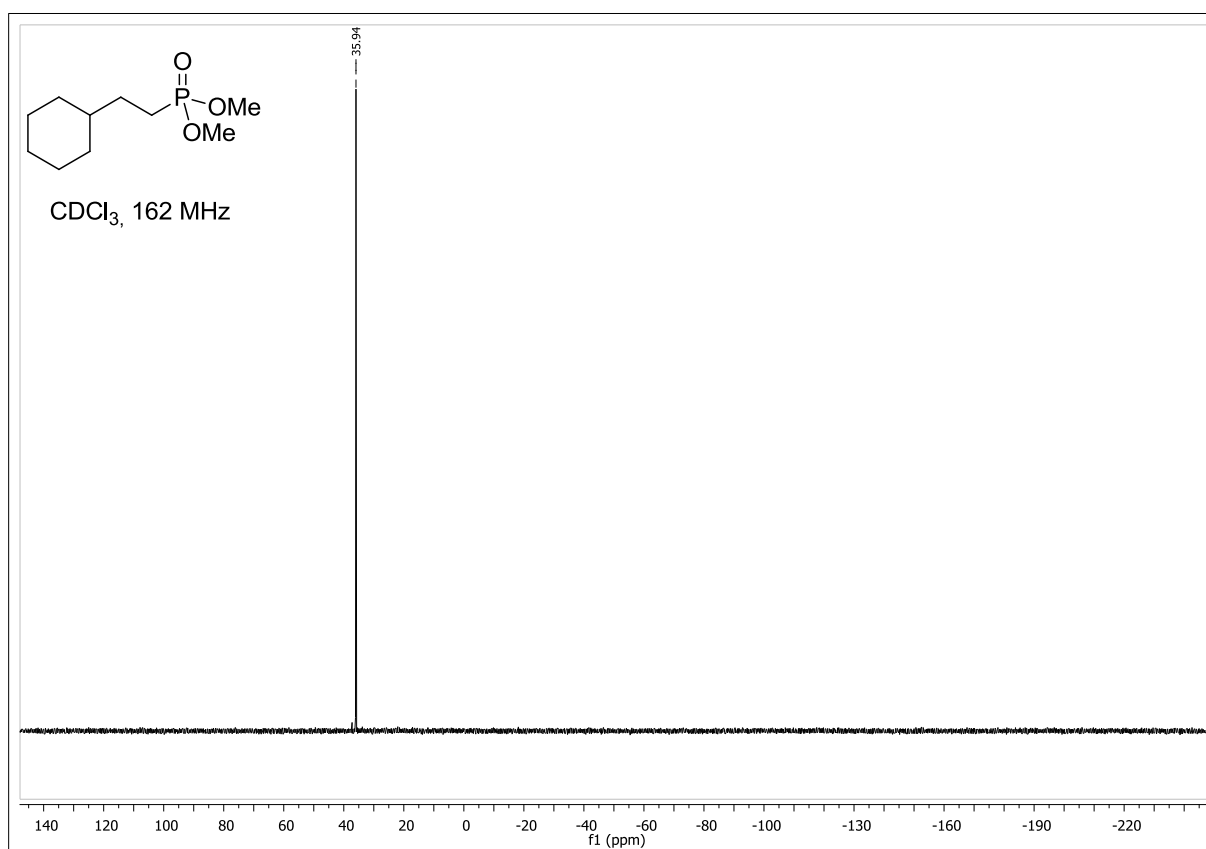


Table 1, Entry 1: ³¹P NMR spectrum

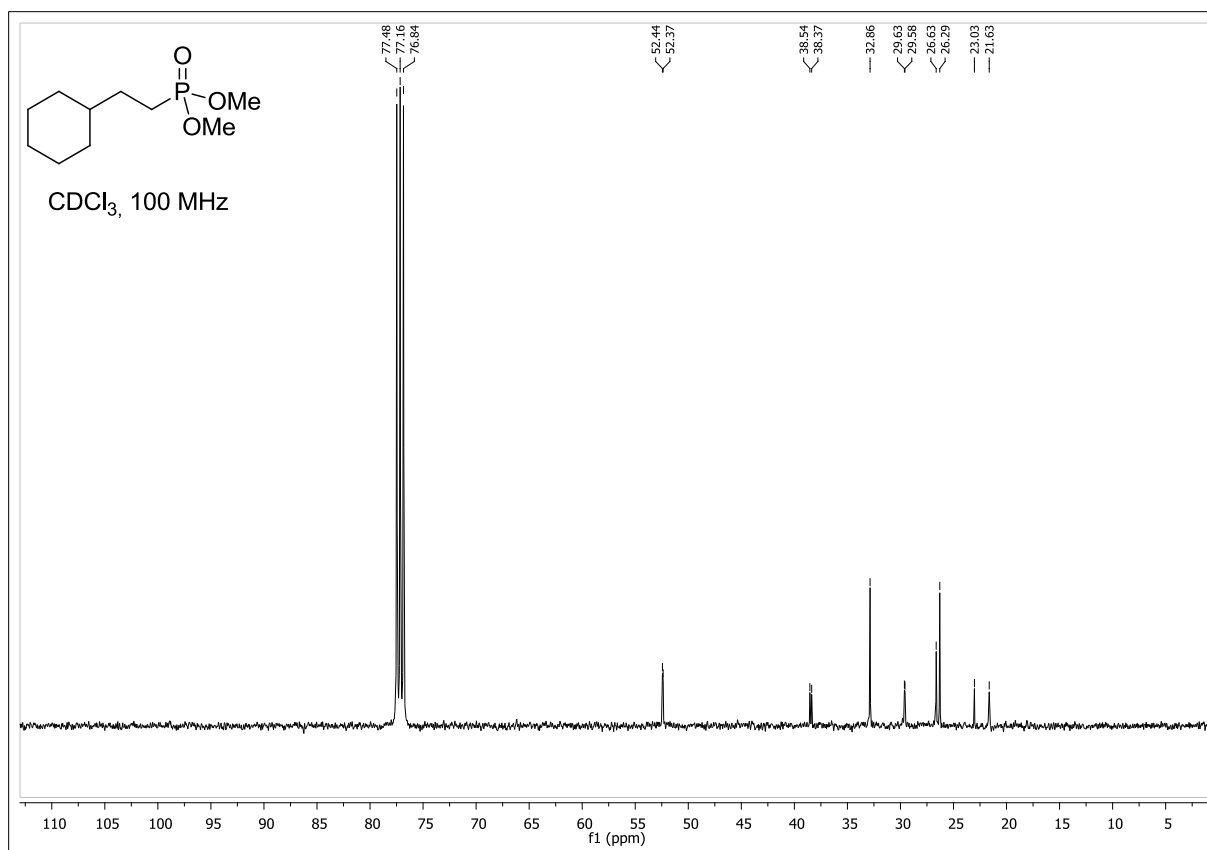


Table 1, Entry 1: ¹³C NMR spectrum

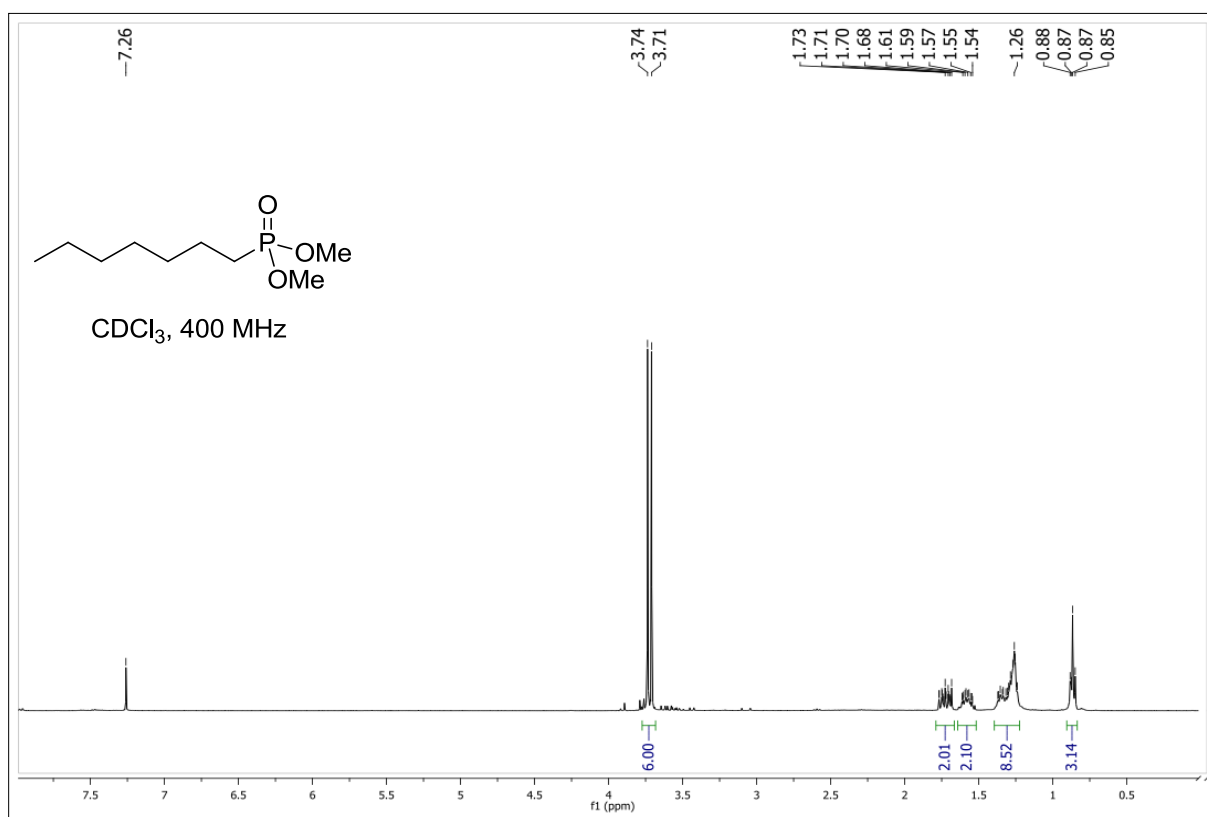


Table 1, Entry 2: ¹H NMR spectrum

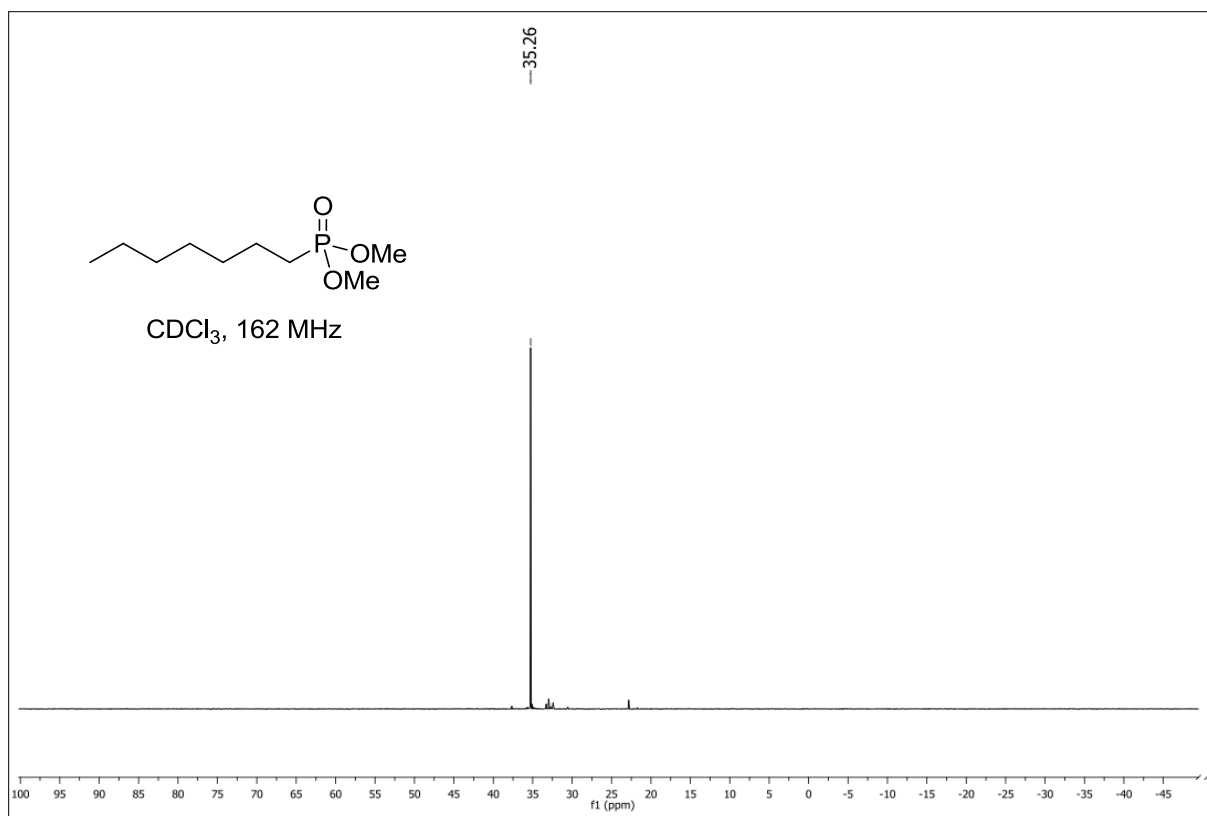


Table 1, Entry 2: ³¹P NMR spectrum

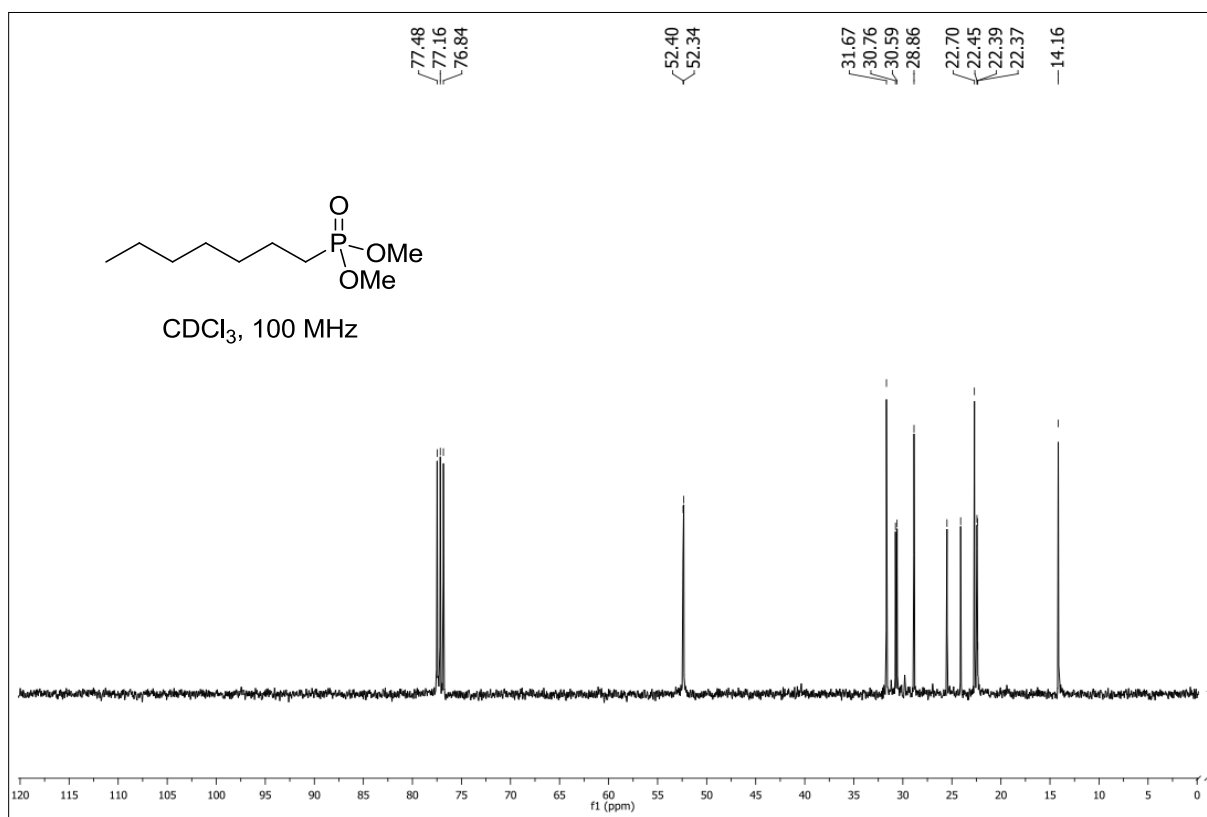


Table 1, Entry 2: ¹³C NMR spectrum

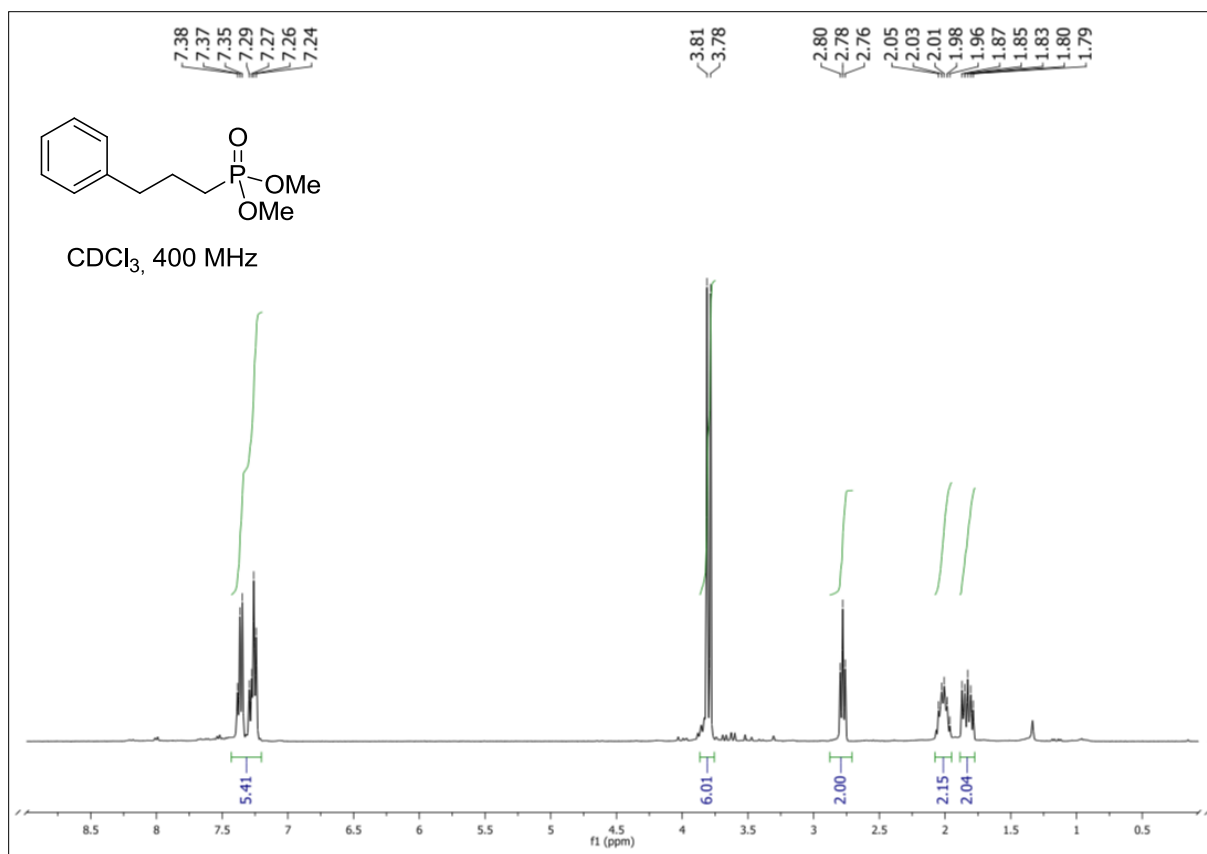


Table 1, Entry 4: ¹H NMR spectrum

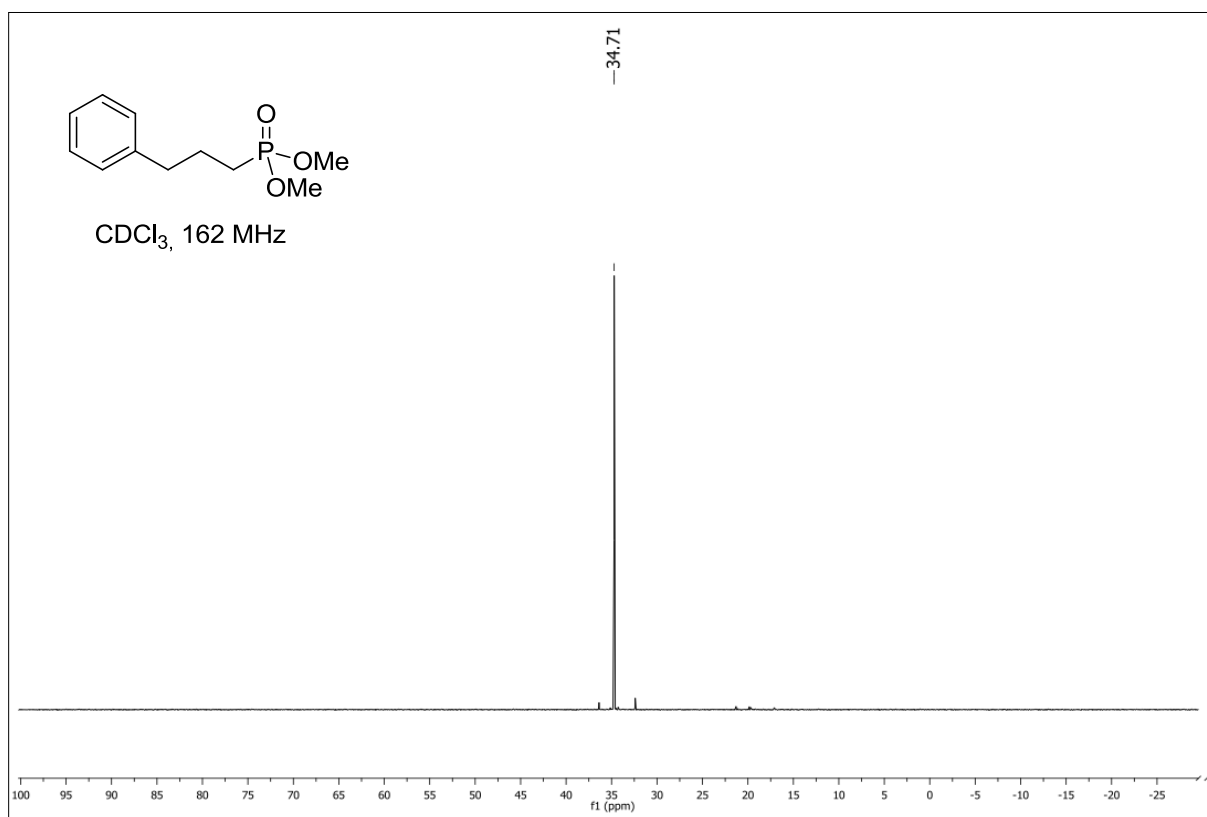


Table 1, Entry 4: ³¹P NMR spectrum

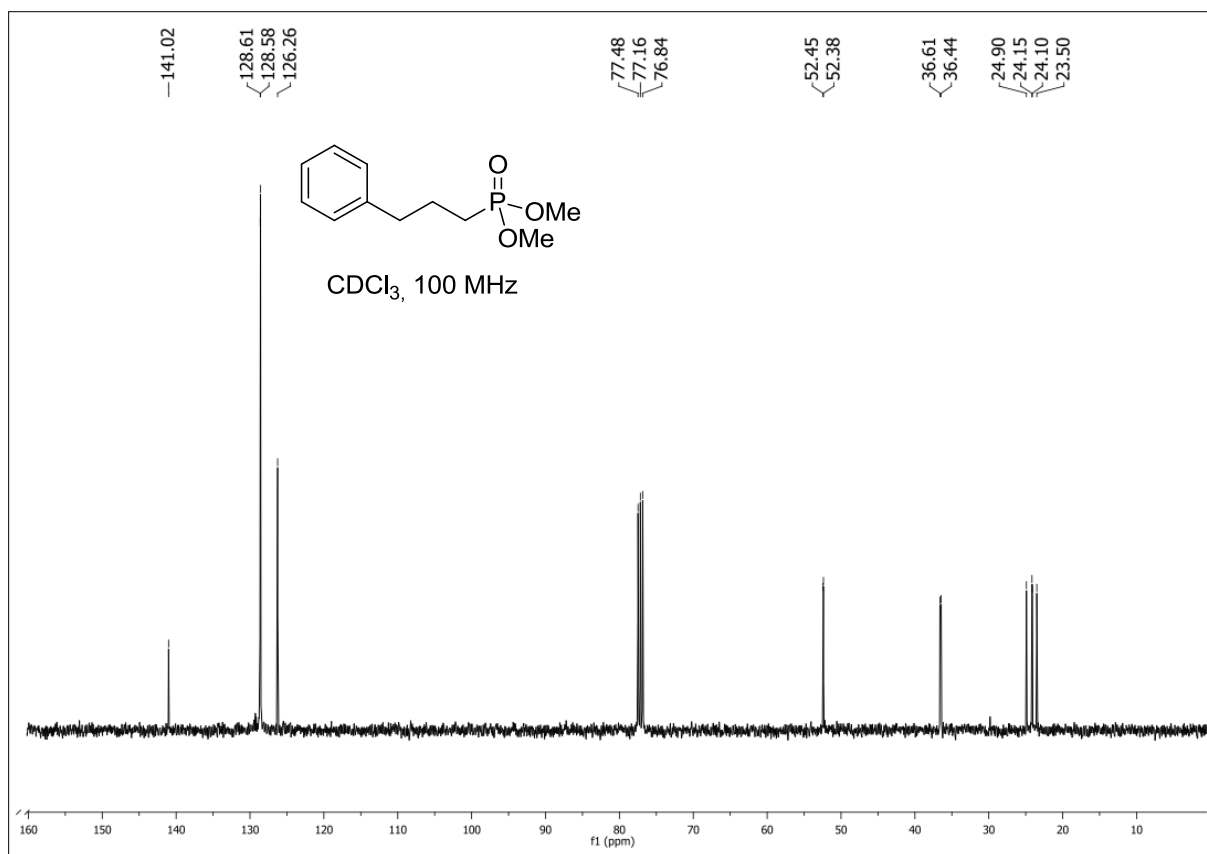


Table 1, Entry 4: ^{13}C NMR spectrum

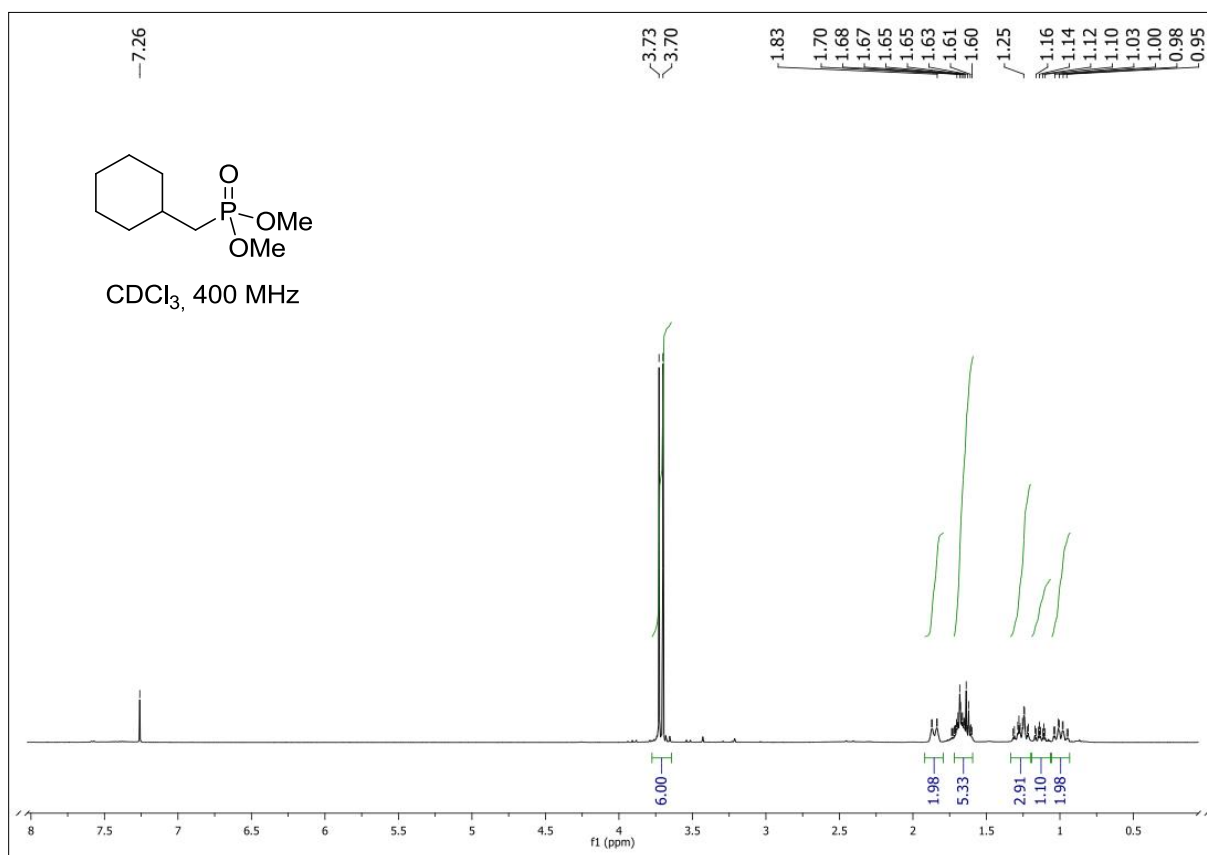


Table 1, Entry 5: ^1H NMR spectrum

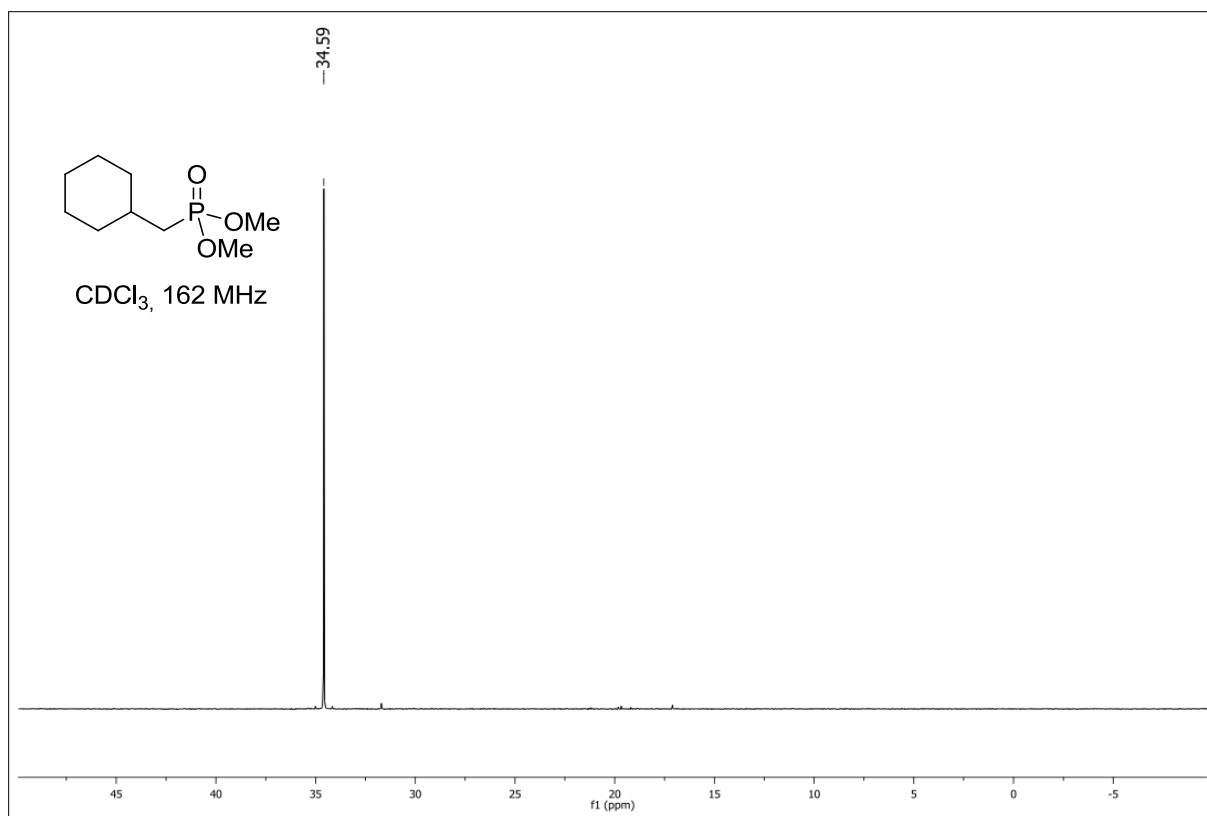


Table 1, Entry 5: ³¹P NMR spectrum

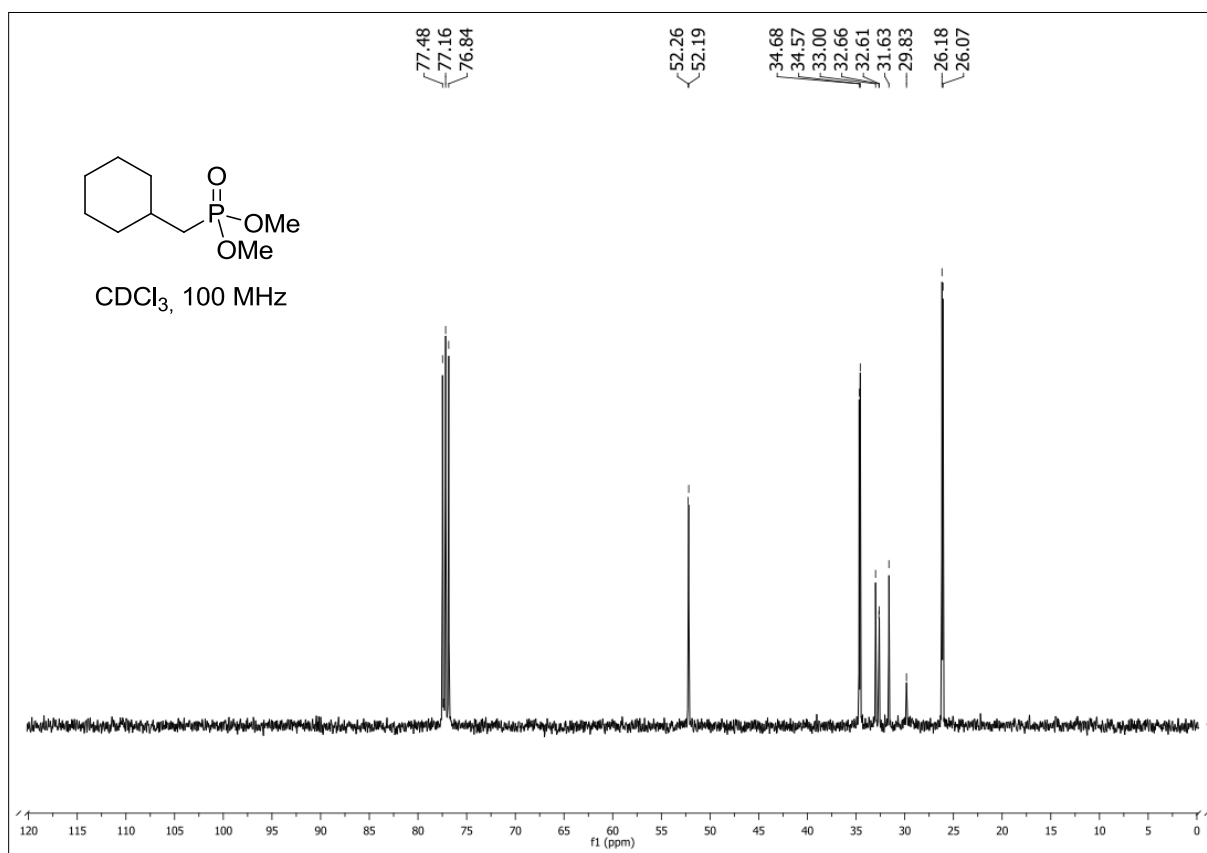


Table 1, Entry 5: ¹³C NMR spectrum

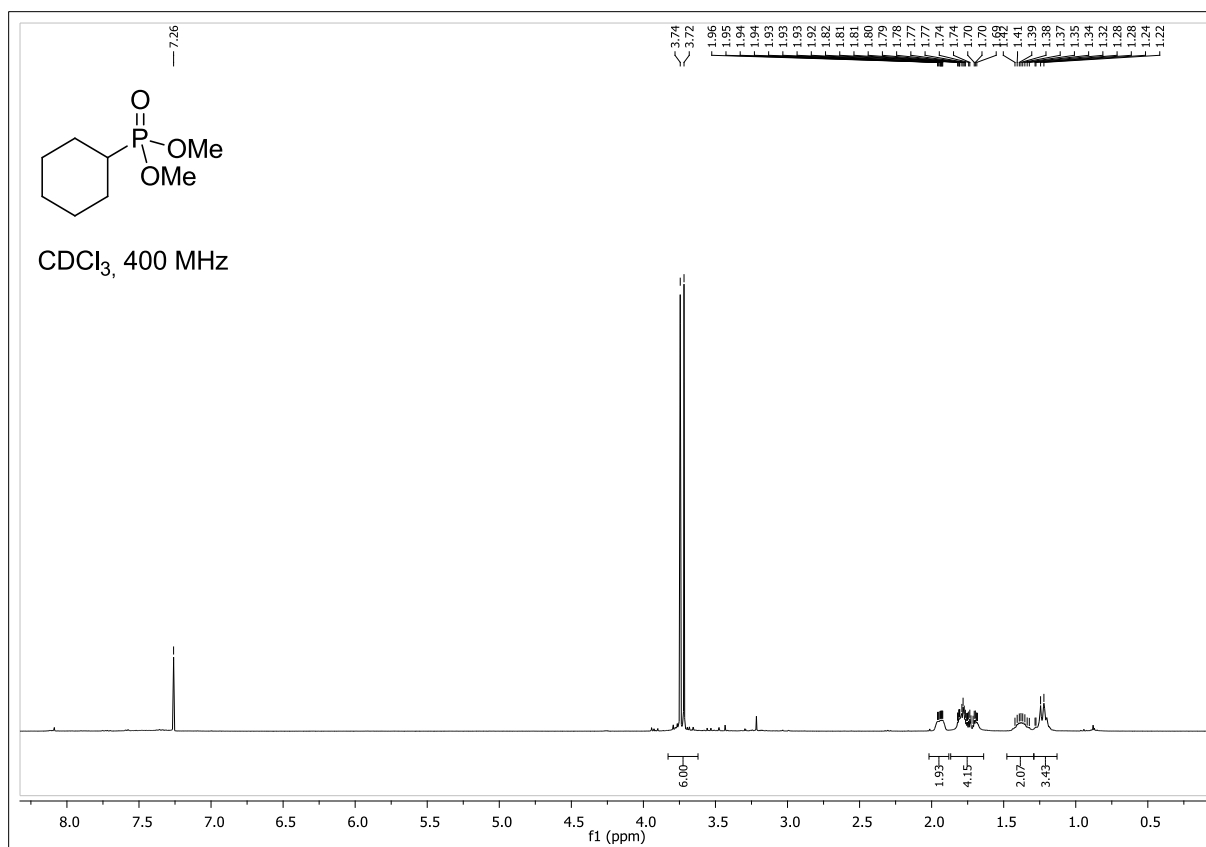


Table 1, Entry 6: ^1H NMR spectrum

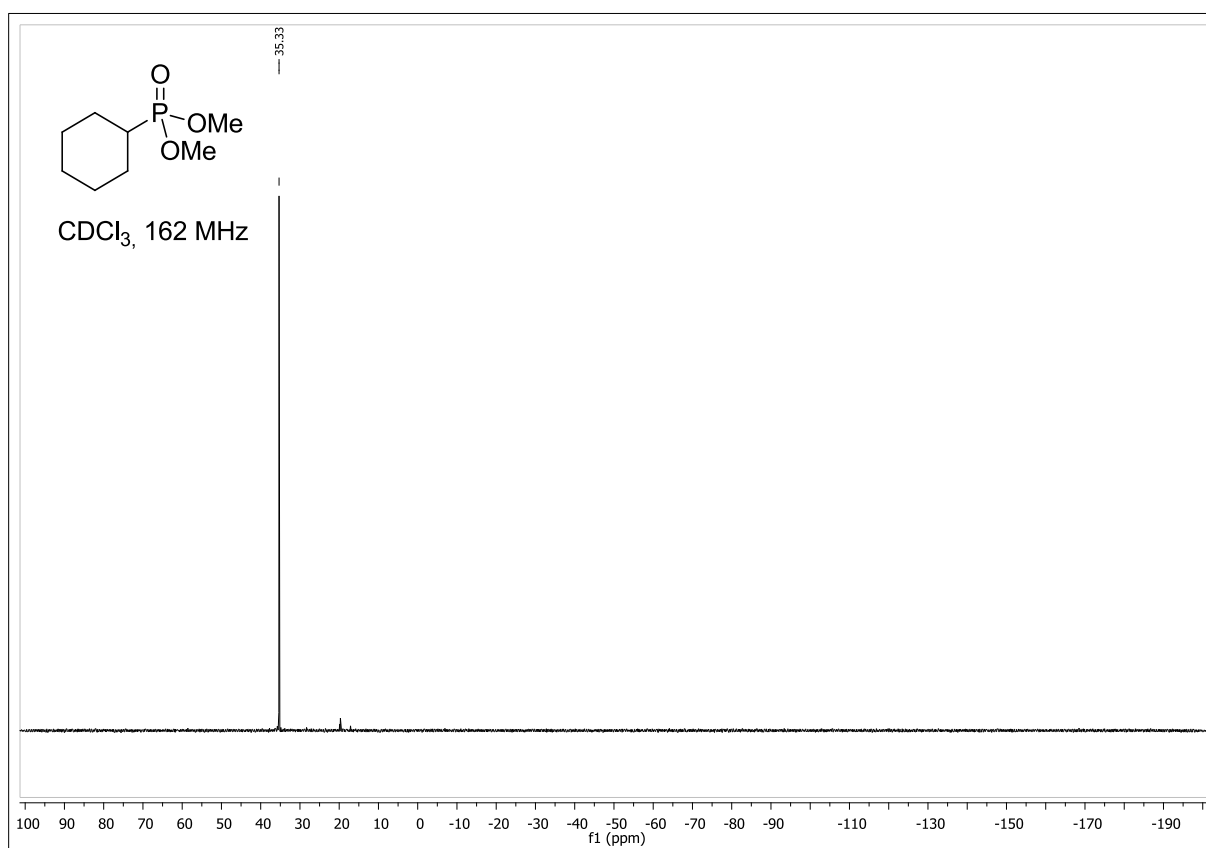


Table 1, Entry 6: ^{31}P NMR spectrum

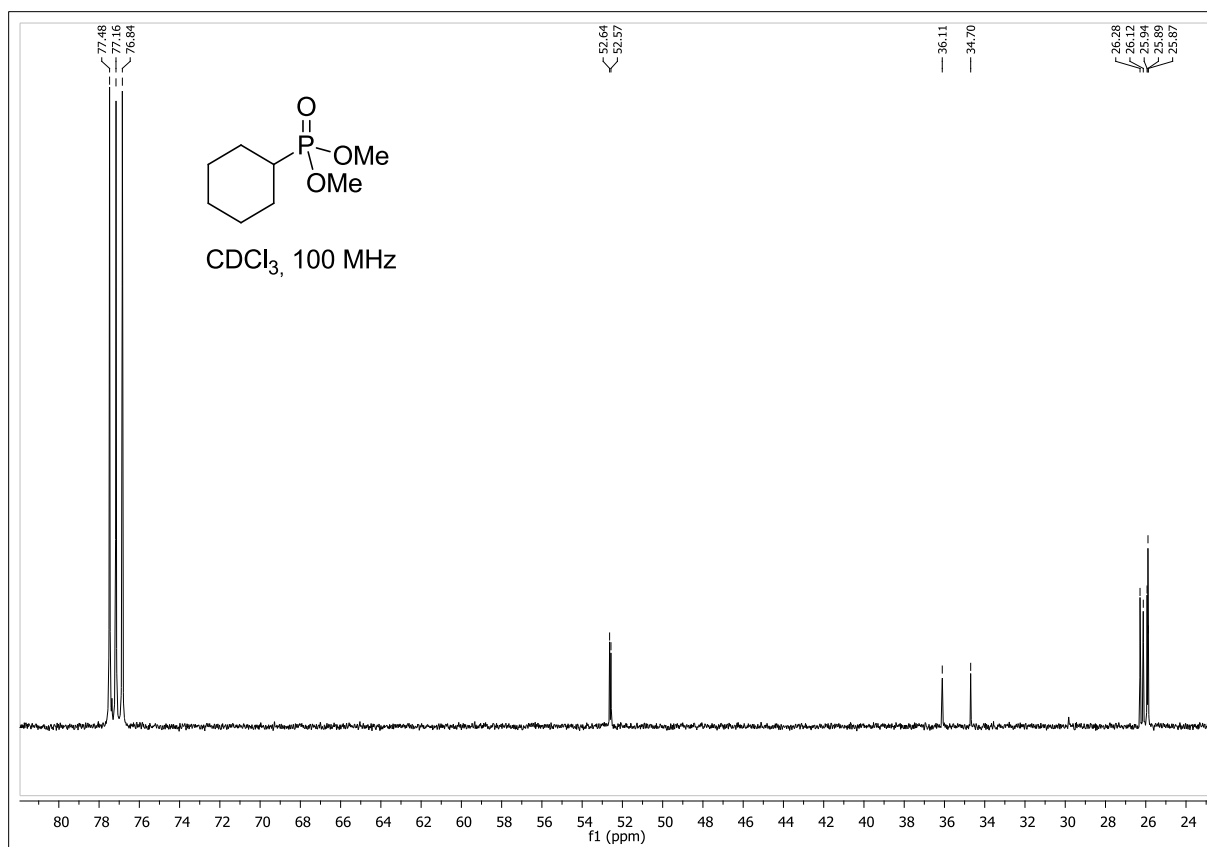


Table 1, Entry 6: ¹³C NMR spectrum

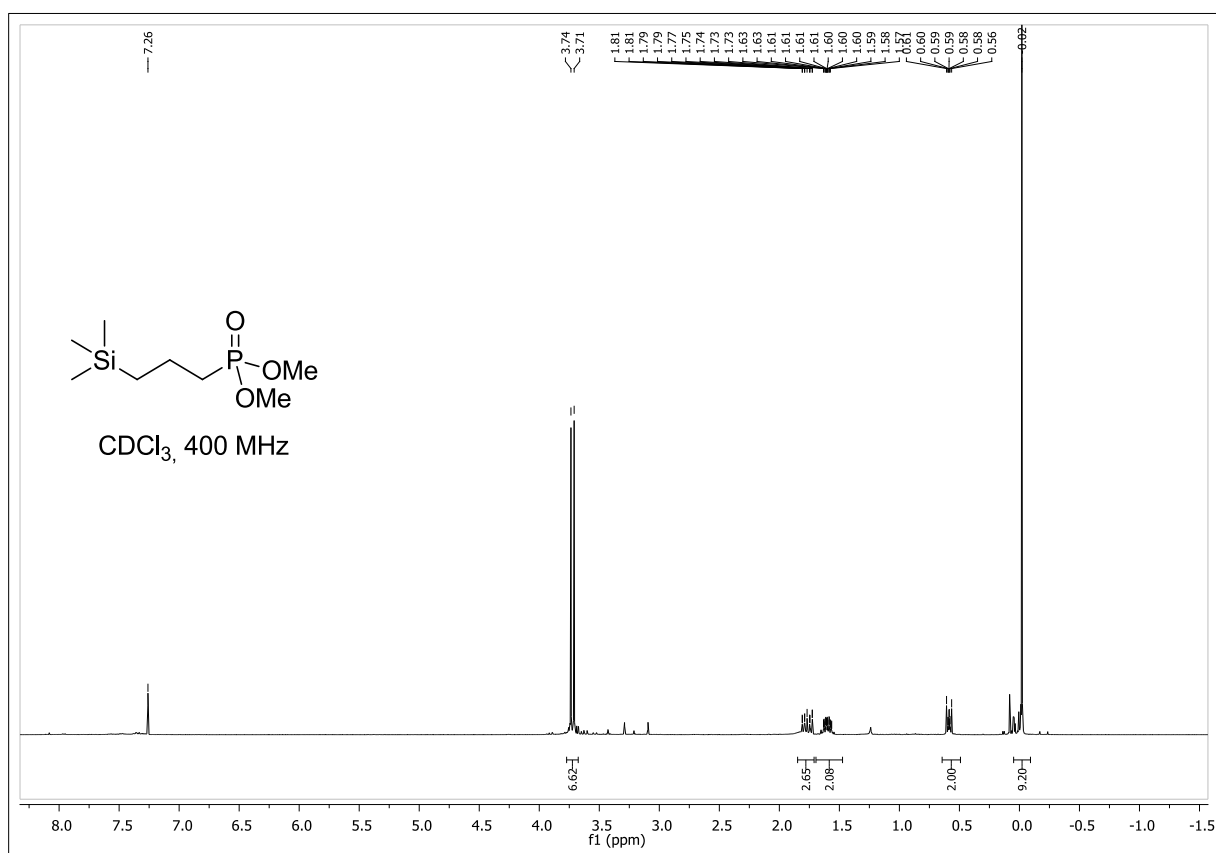


Table 1, Entry 7: ¹H NMR spectrum

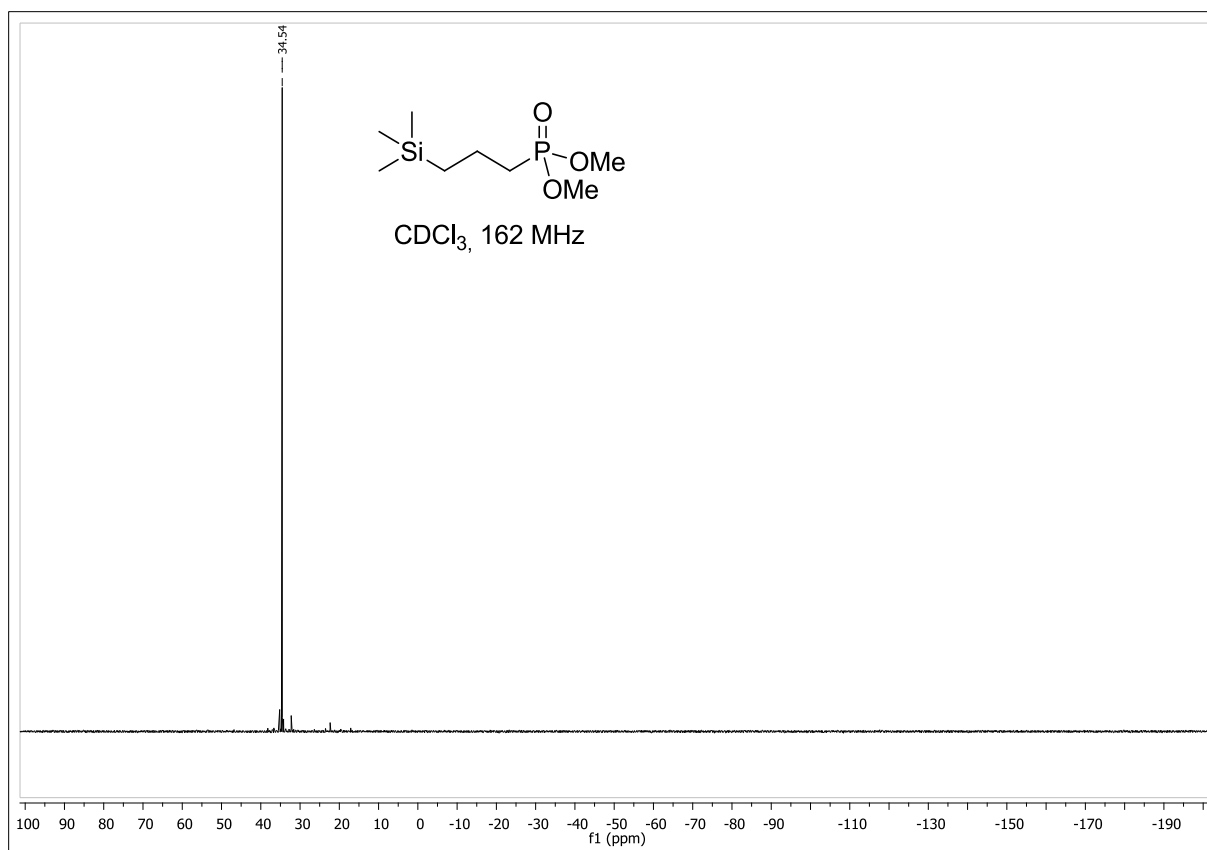


Table 1, Entry 7: ³¹P NMR spectrum

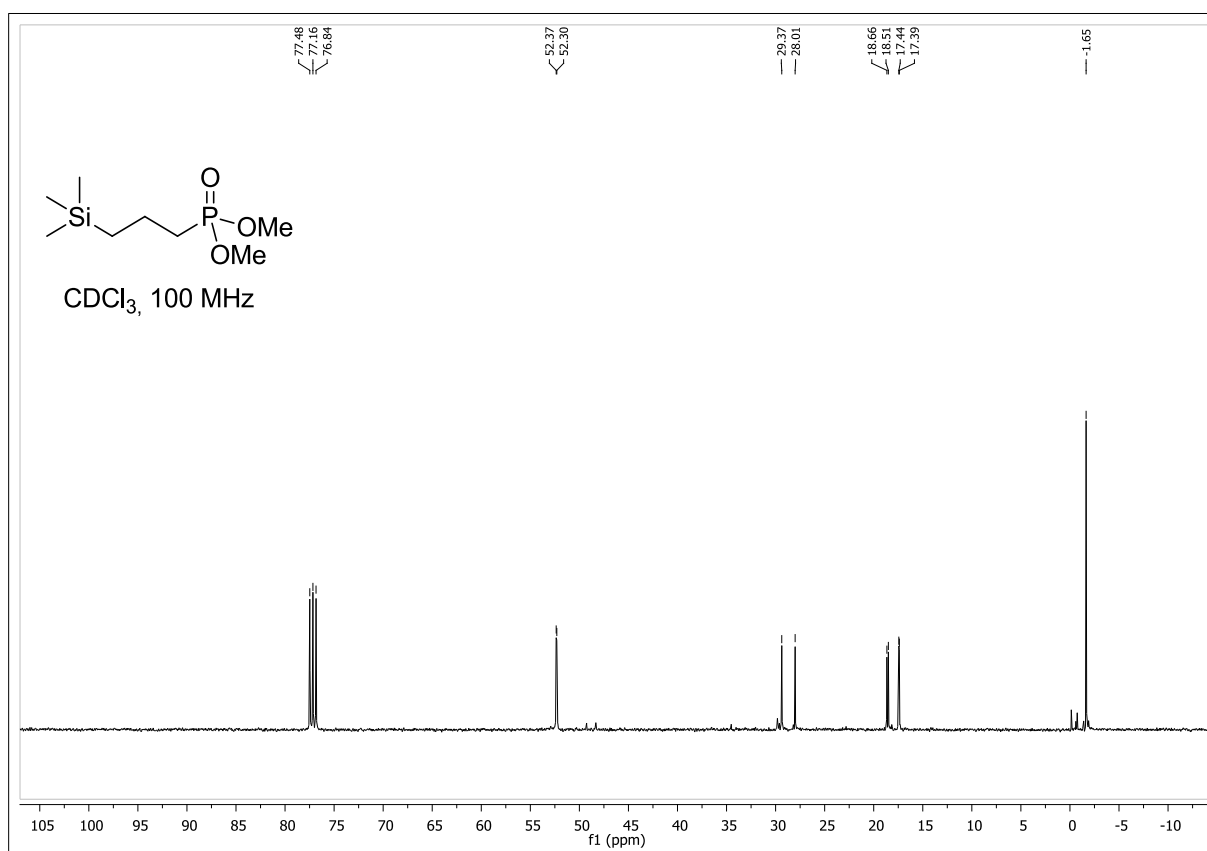


Table 1, Entry 7: ¹³C NMR spectrum

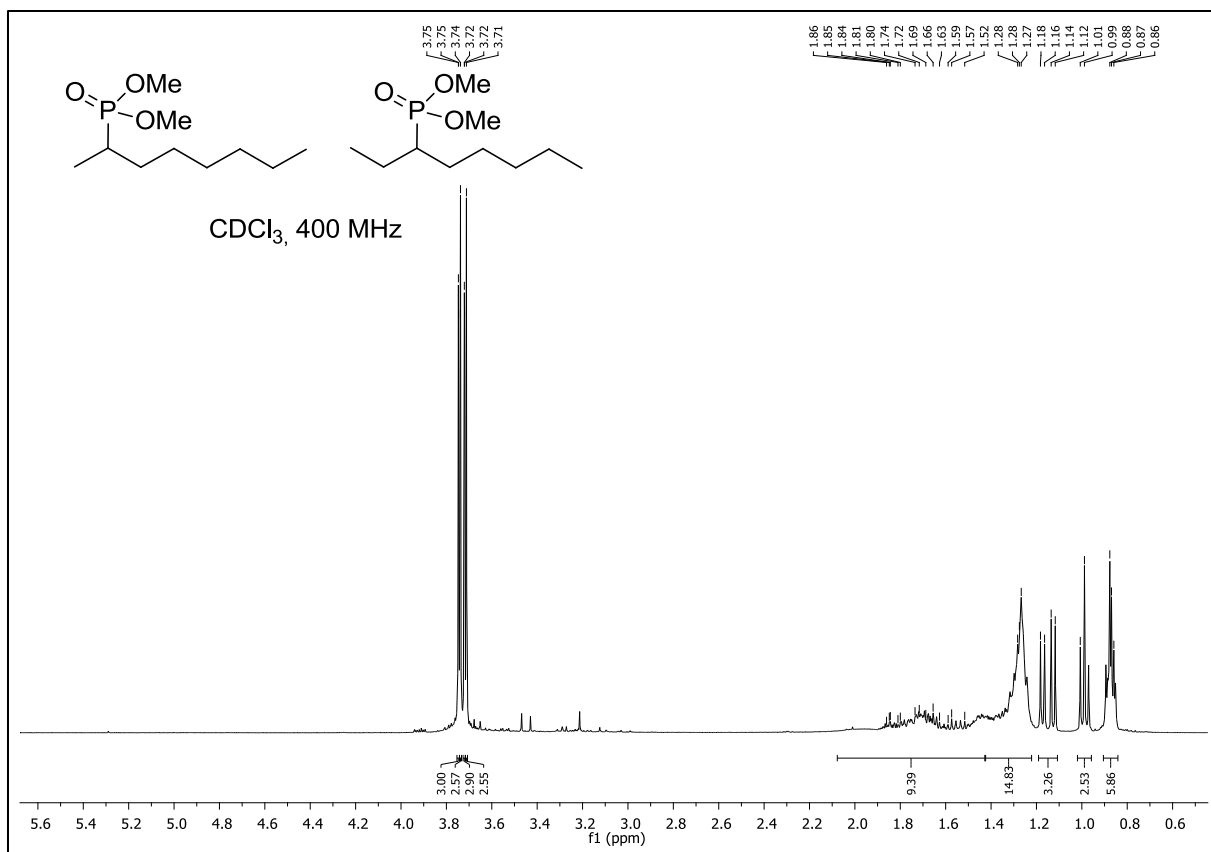


Table 1, Entry 8: ^1H NMR spectrum

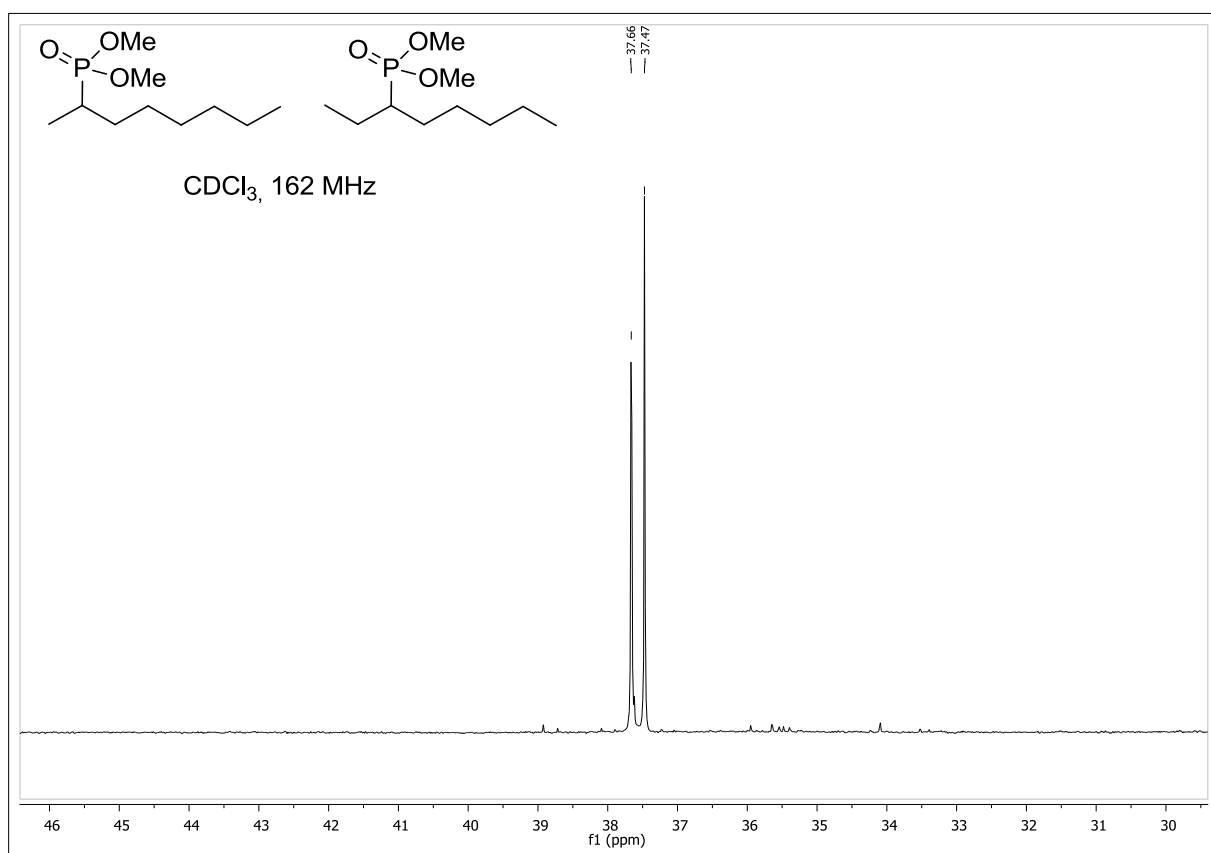


Table 1, Entry 8: ^{31}P NMR spectrum

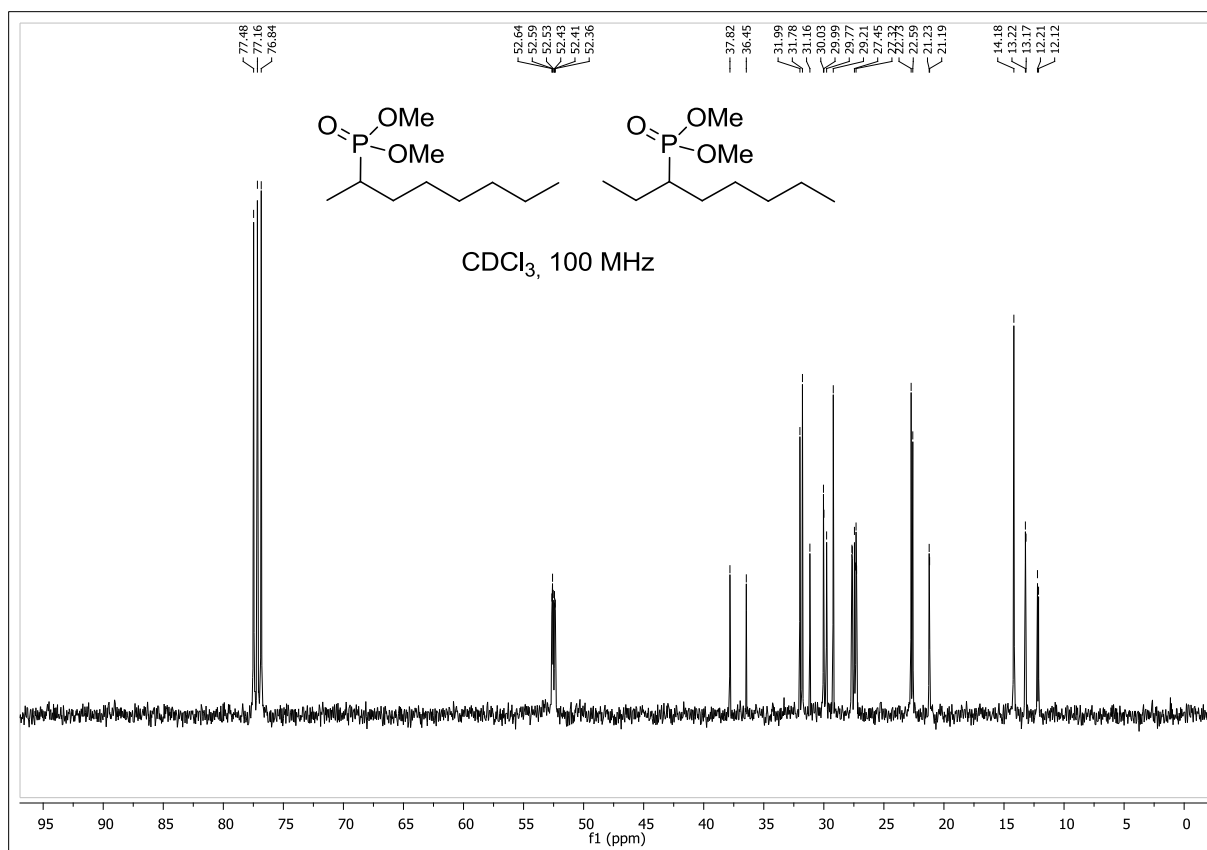


Table 1, Entry 8: ¹³C NMR spectrum

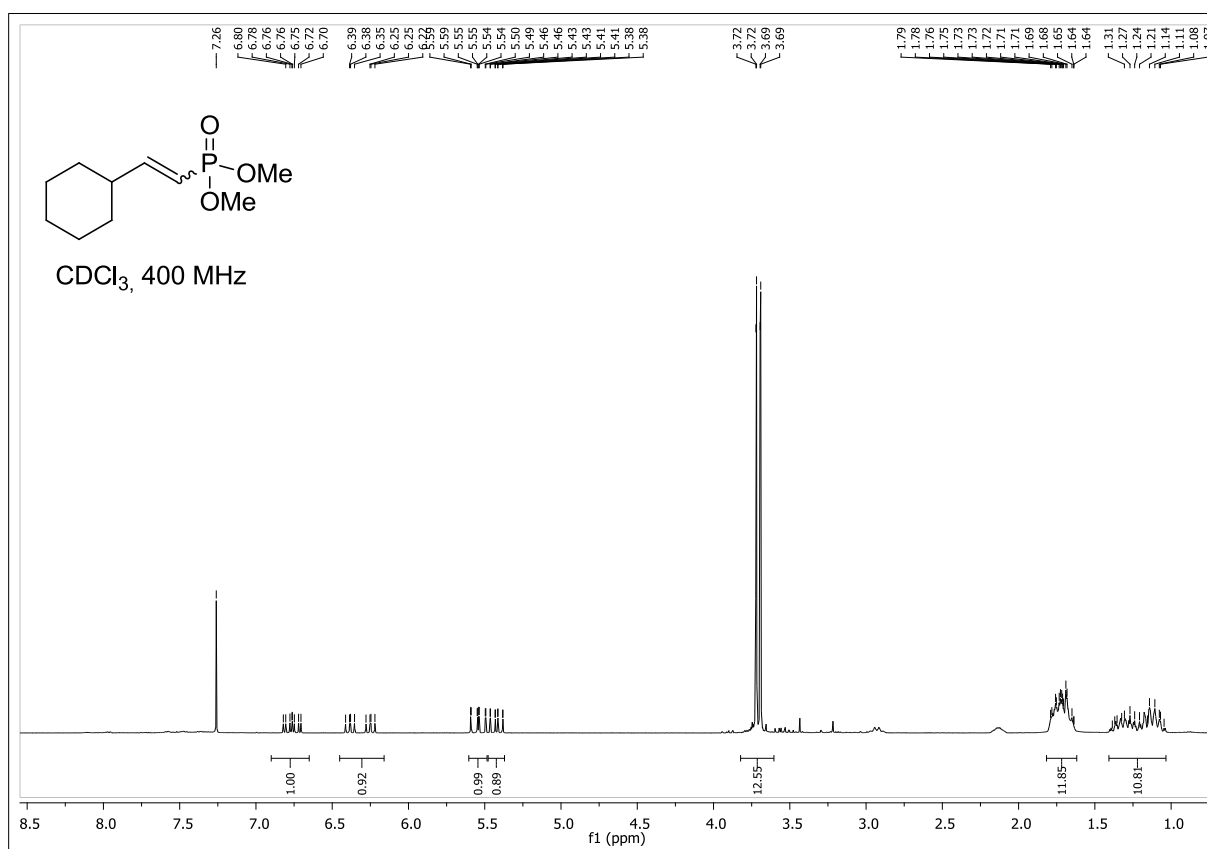
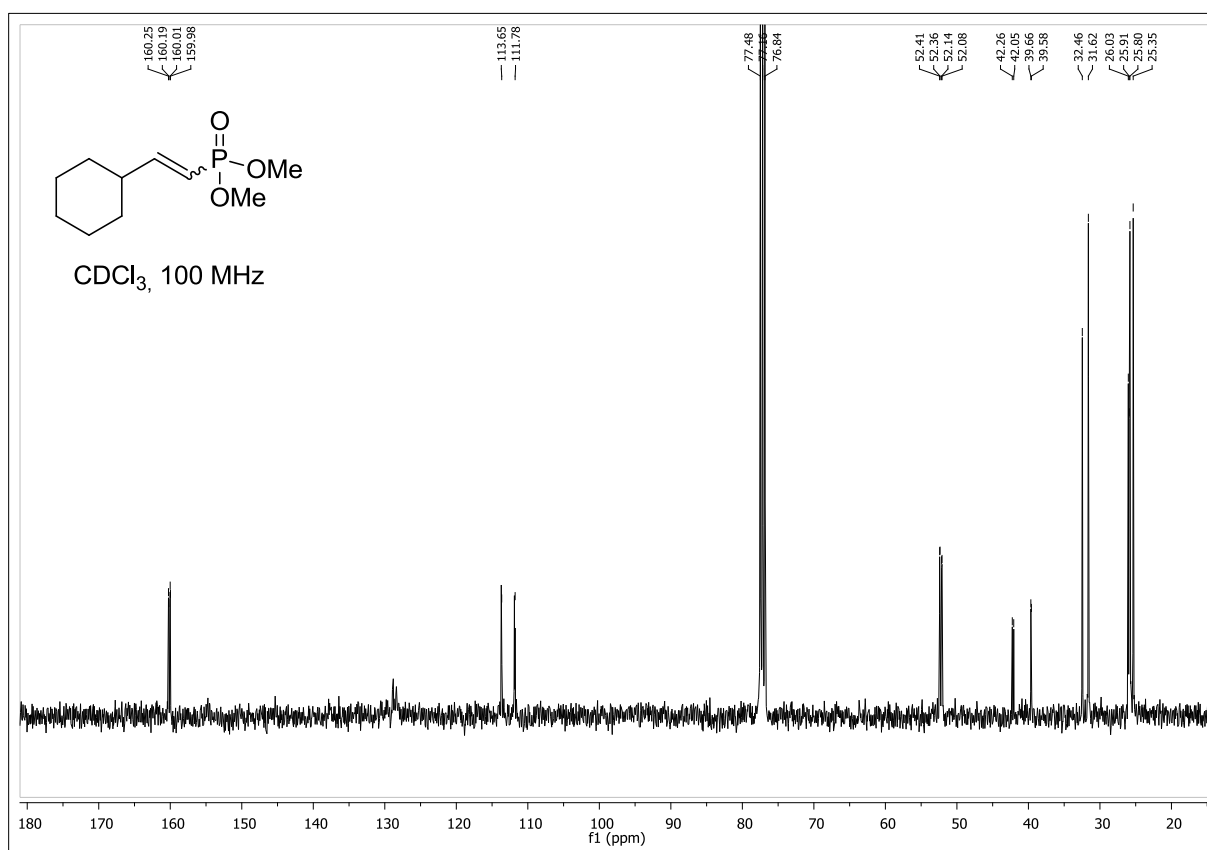
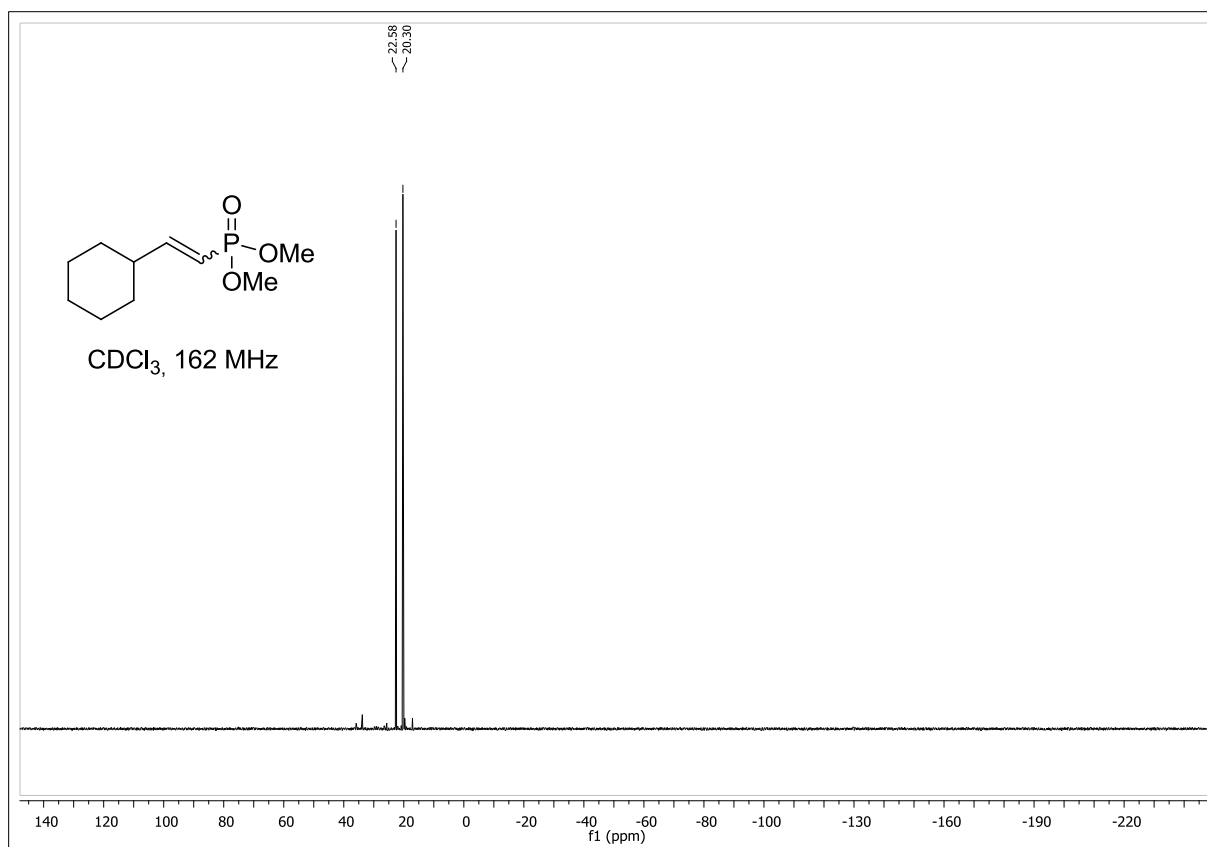


Table 2, Entry 1: ¹H NMR spectrum



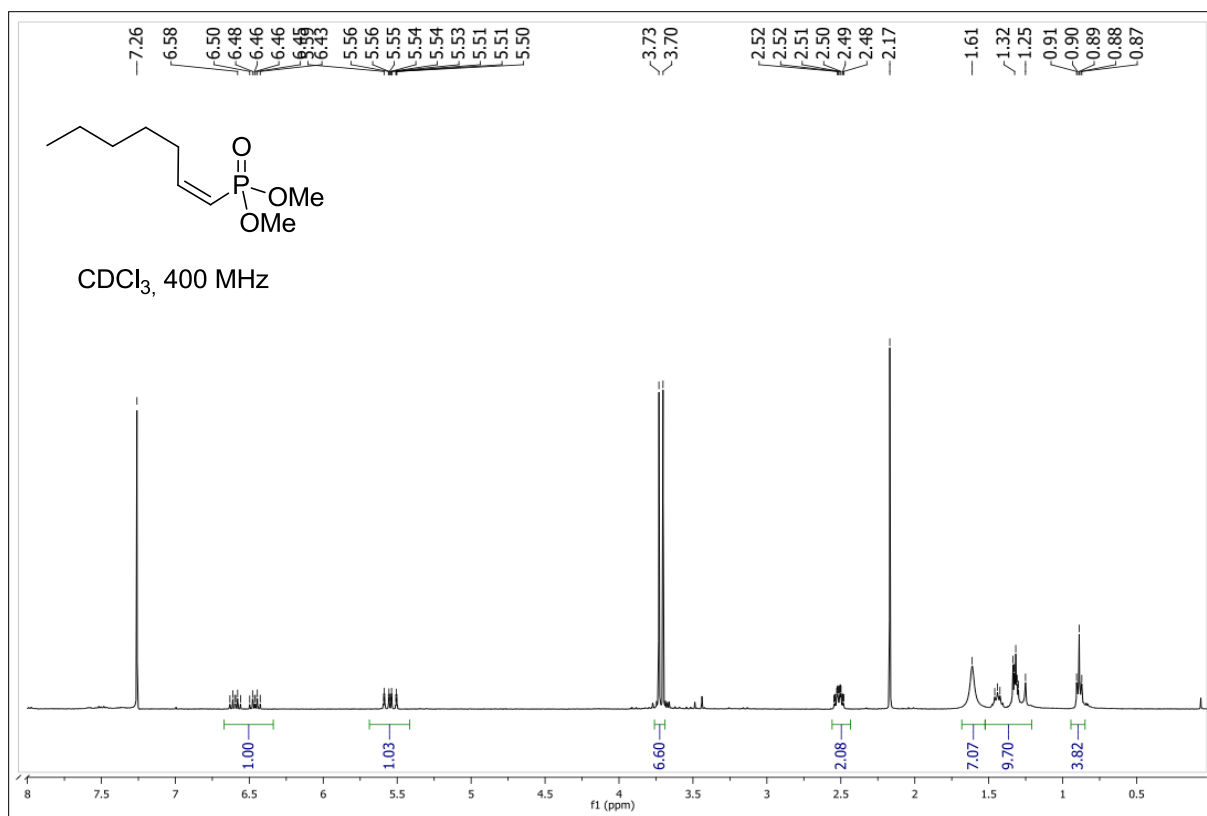


Table 2, Entry 2: ¹H NMR spectrum

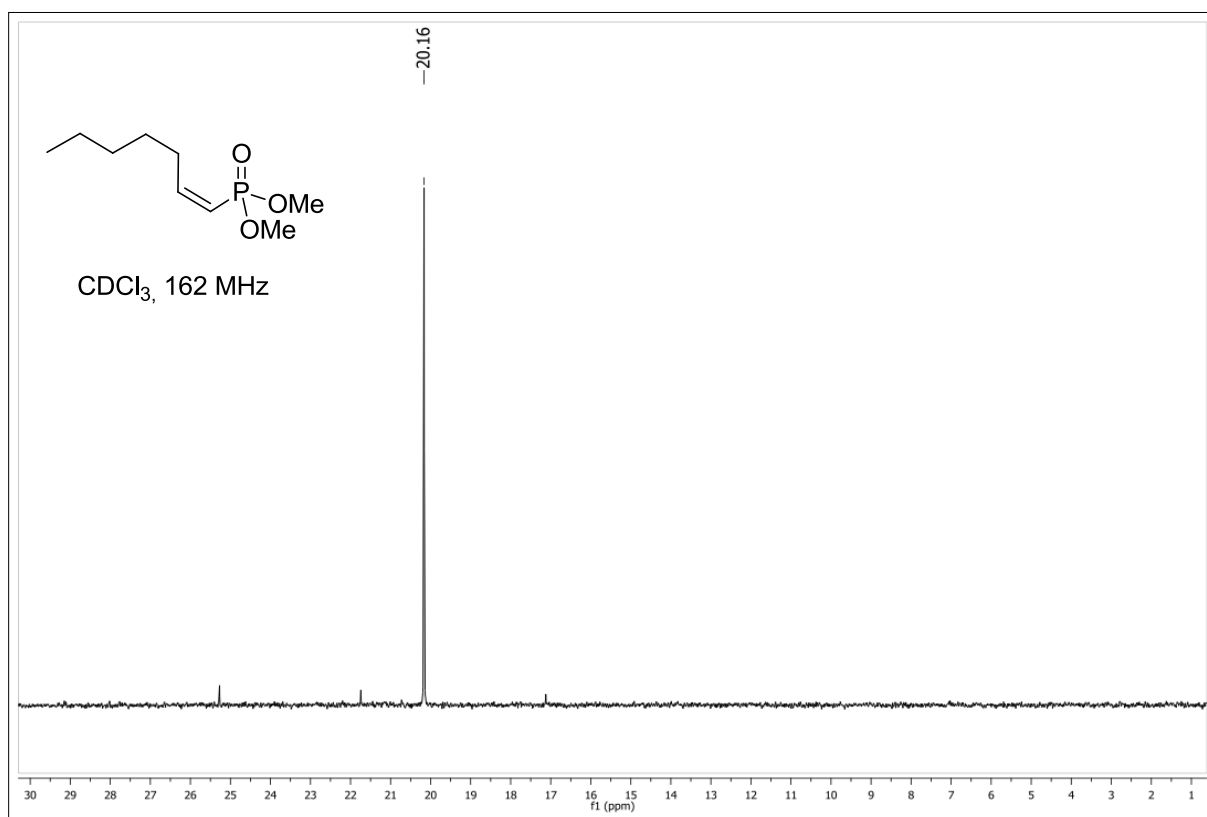


Table 2, Entry 2: ³¹P NMR spectrum

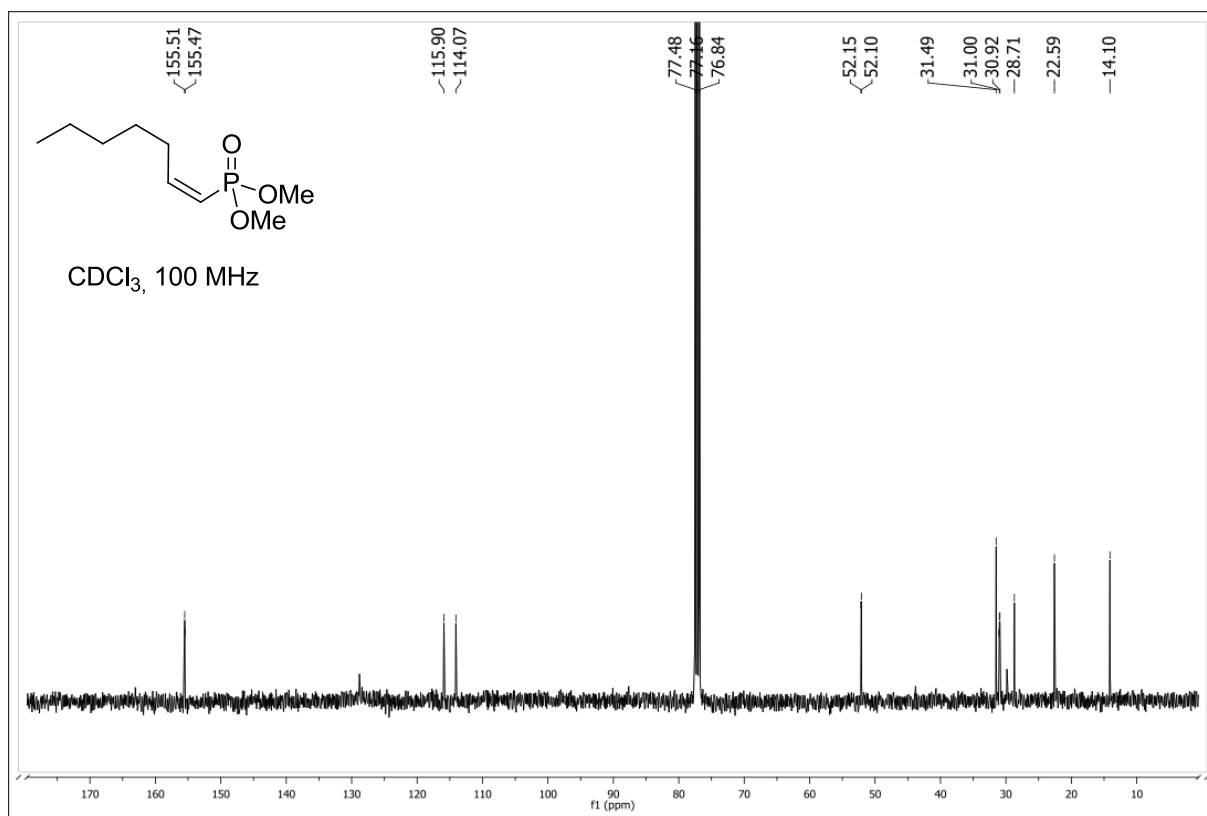


Table 2, Entry 2: ¹³C NMR spectrum

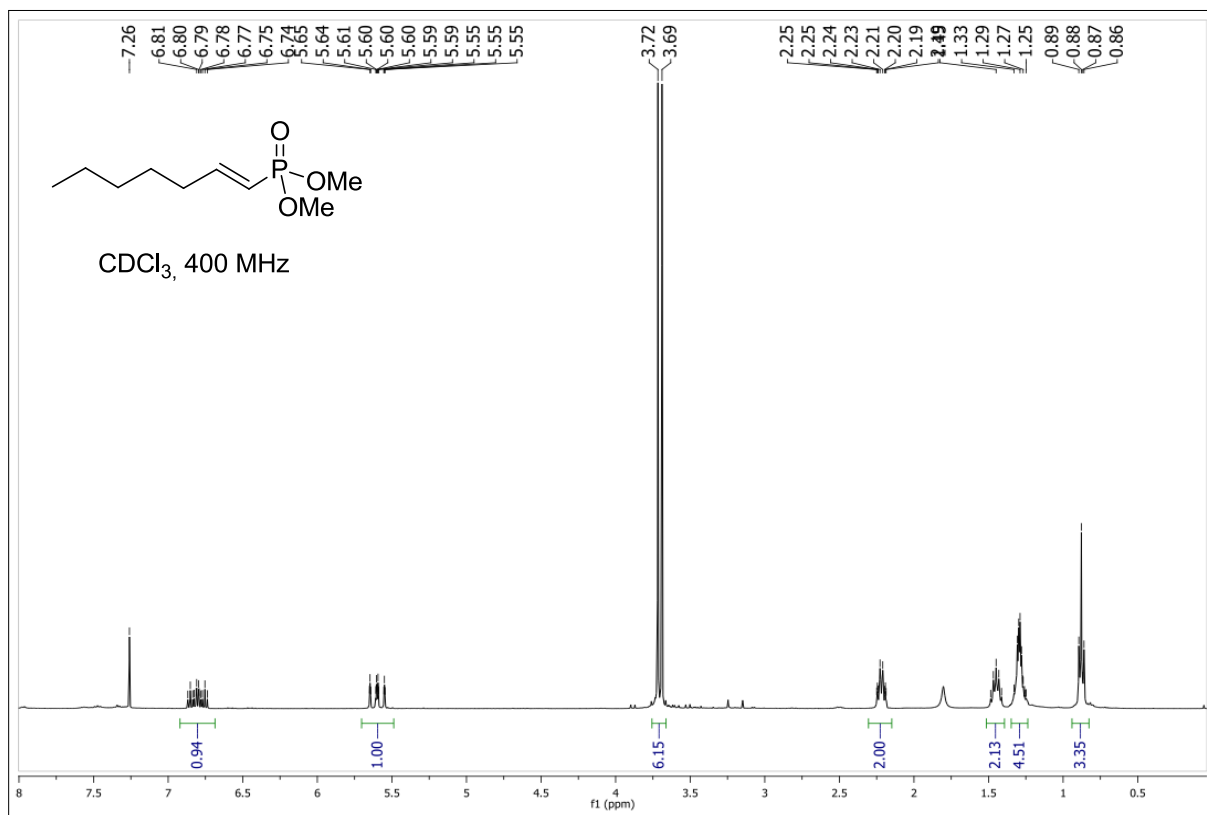


Table 2, Entry 2: ¹H NMR spectrum

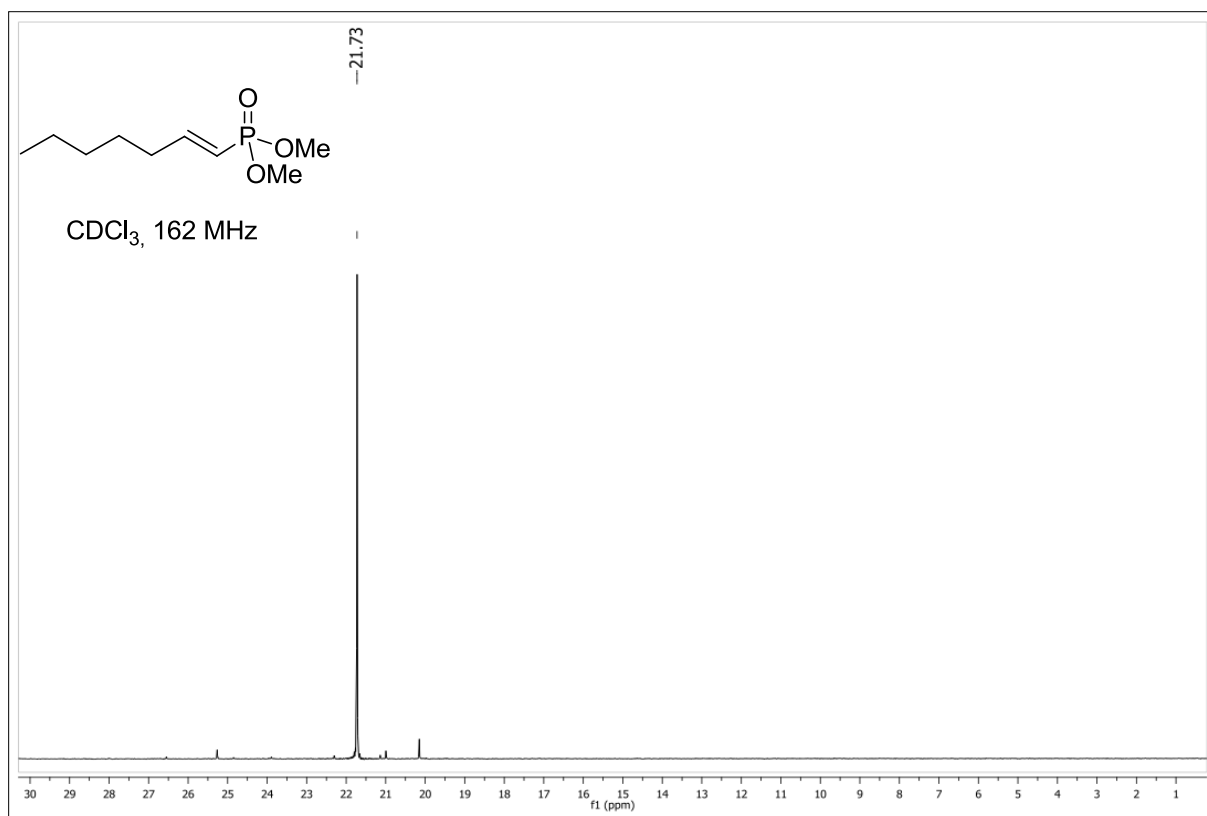


Table 2, Entry 2: ³¹P NMR spectrum

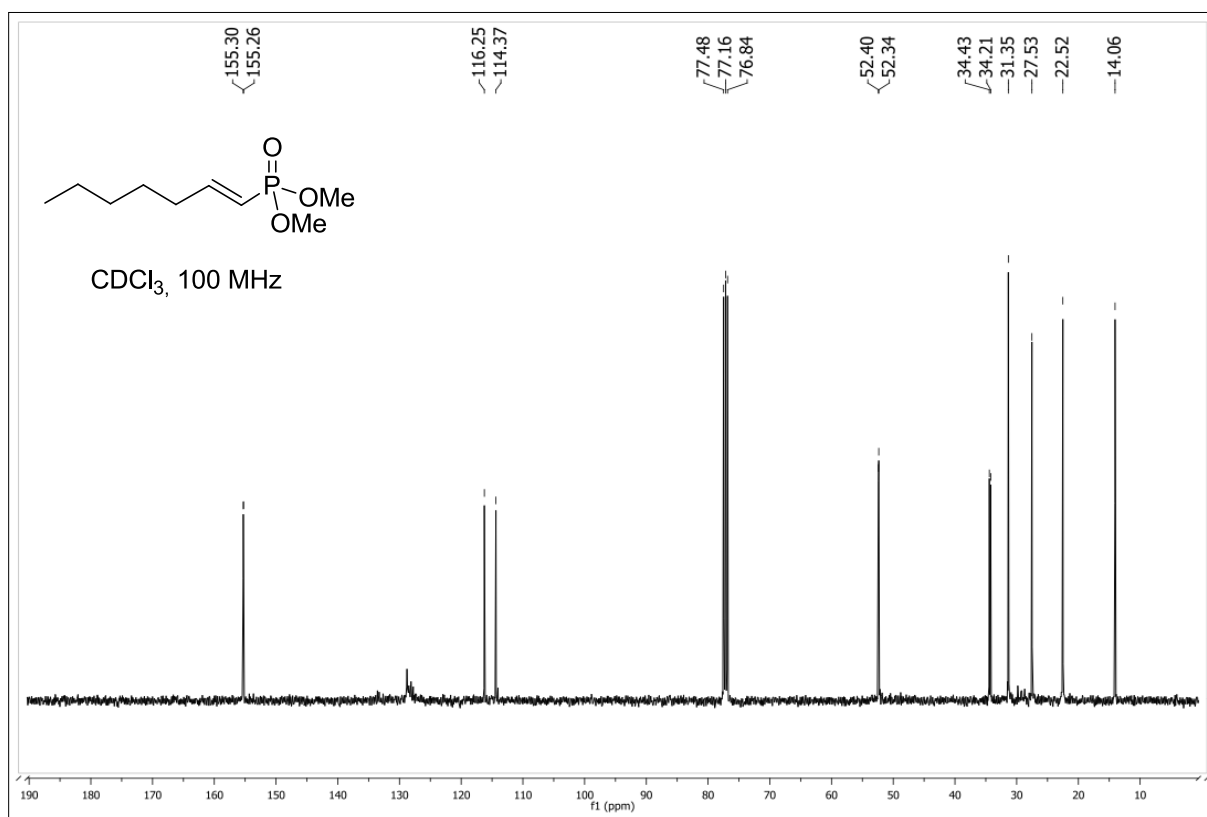


Table 2, Entry 2: ¹³C NMR spectrum

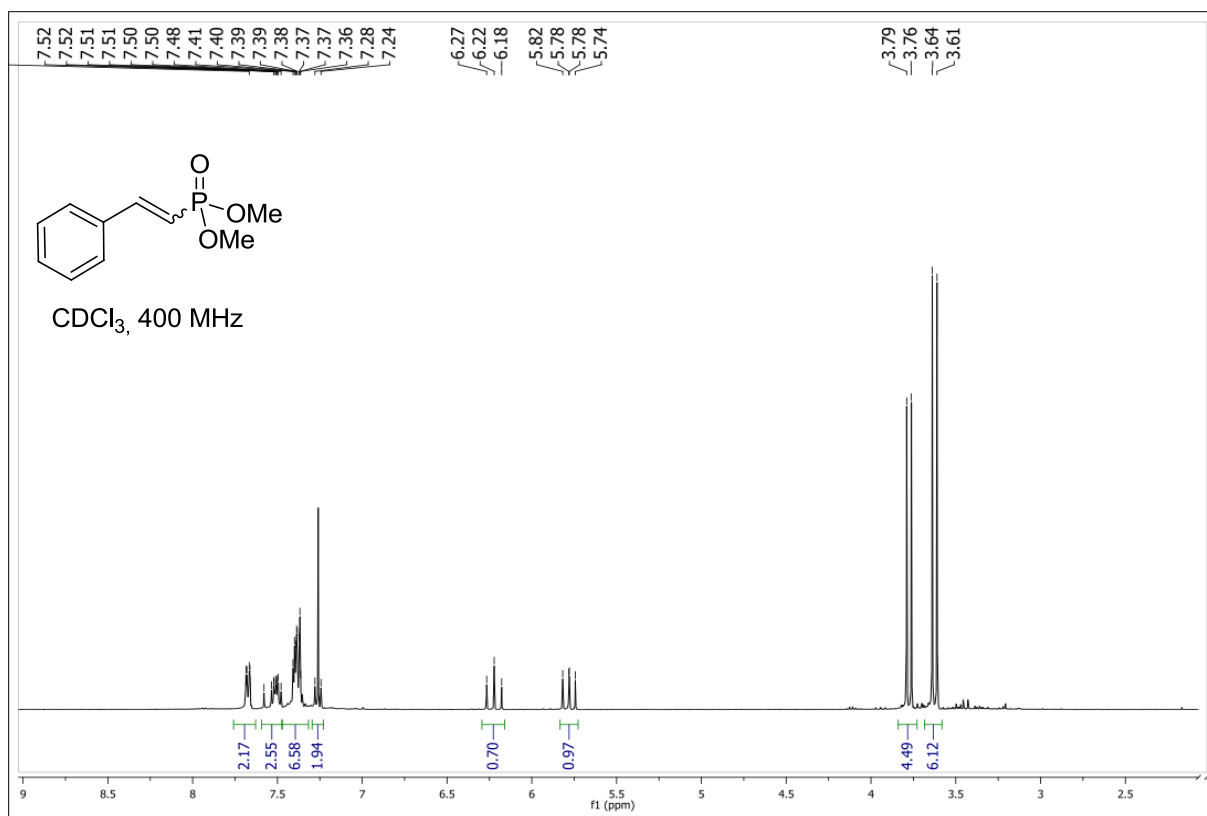


Table 2, Entry 3: ¹H NMR spectrum

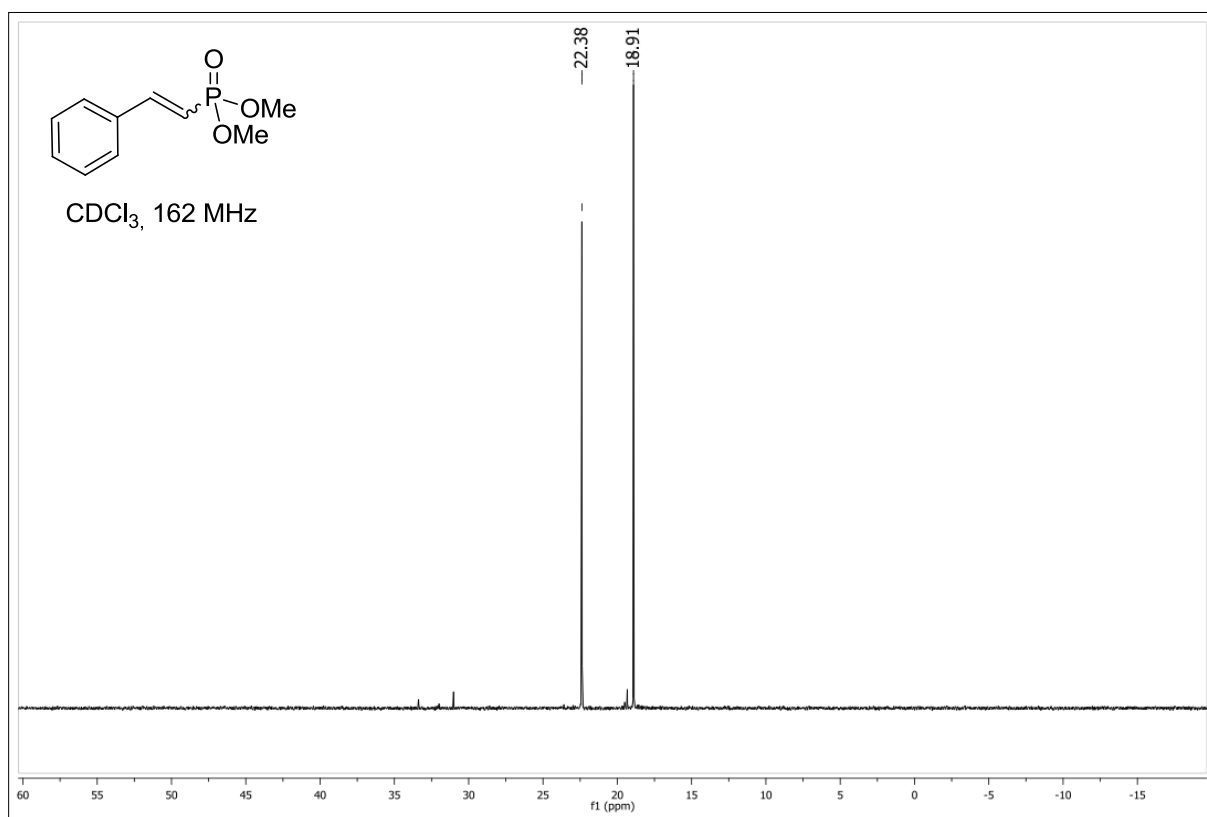


Table 2, Entry 3: ³¹P NMR spectrum

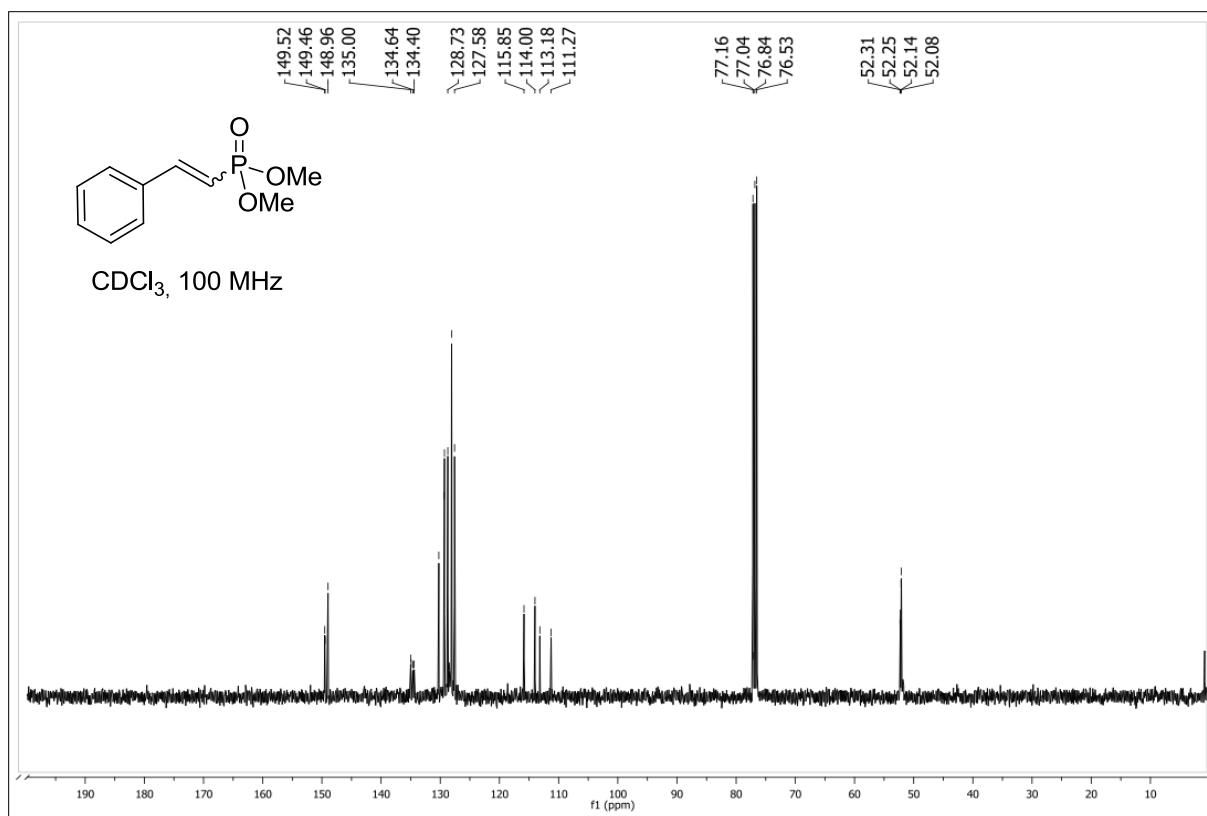


Table 2, Entry 3: ¹³C NMR spectrum

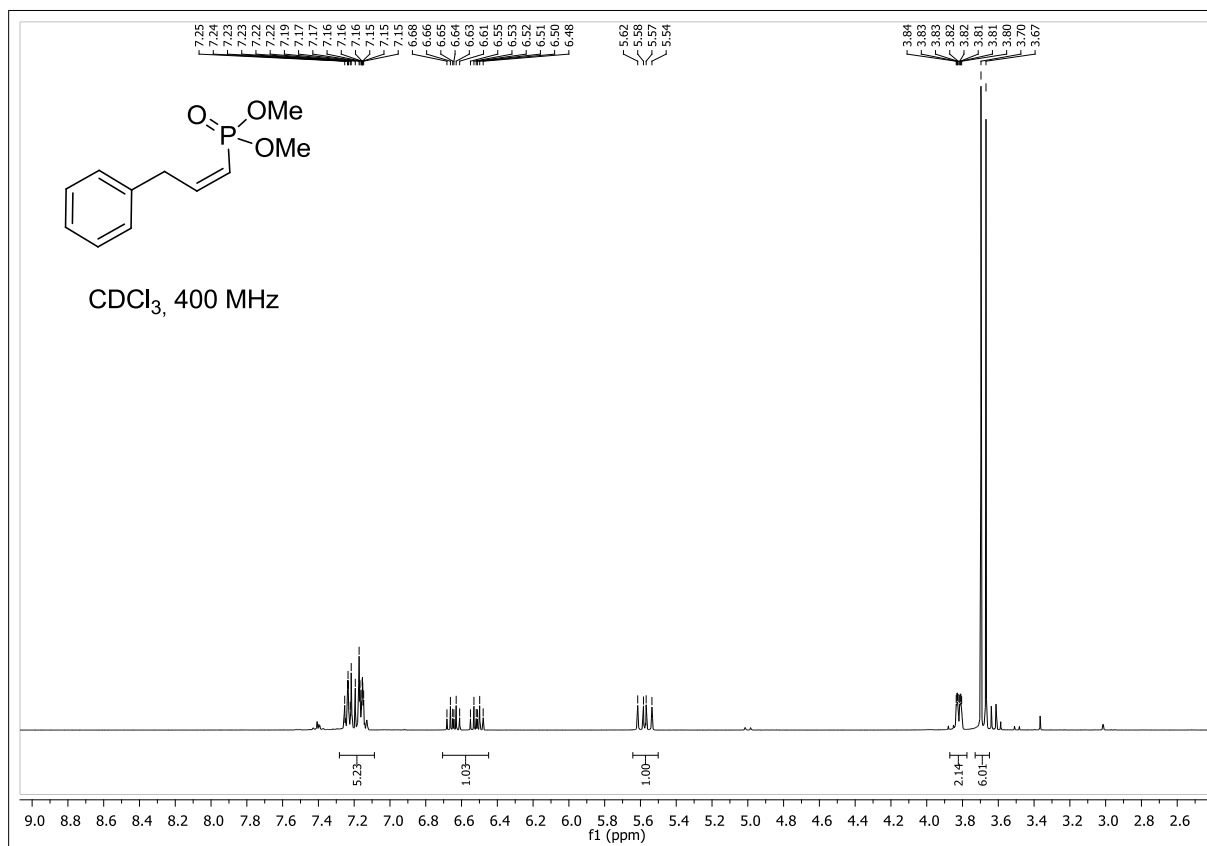


Table 2, Entry 4: ¹H NMR spectrum

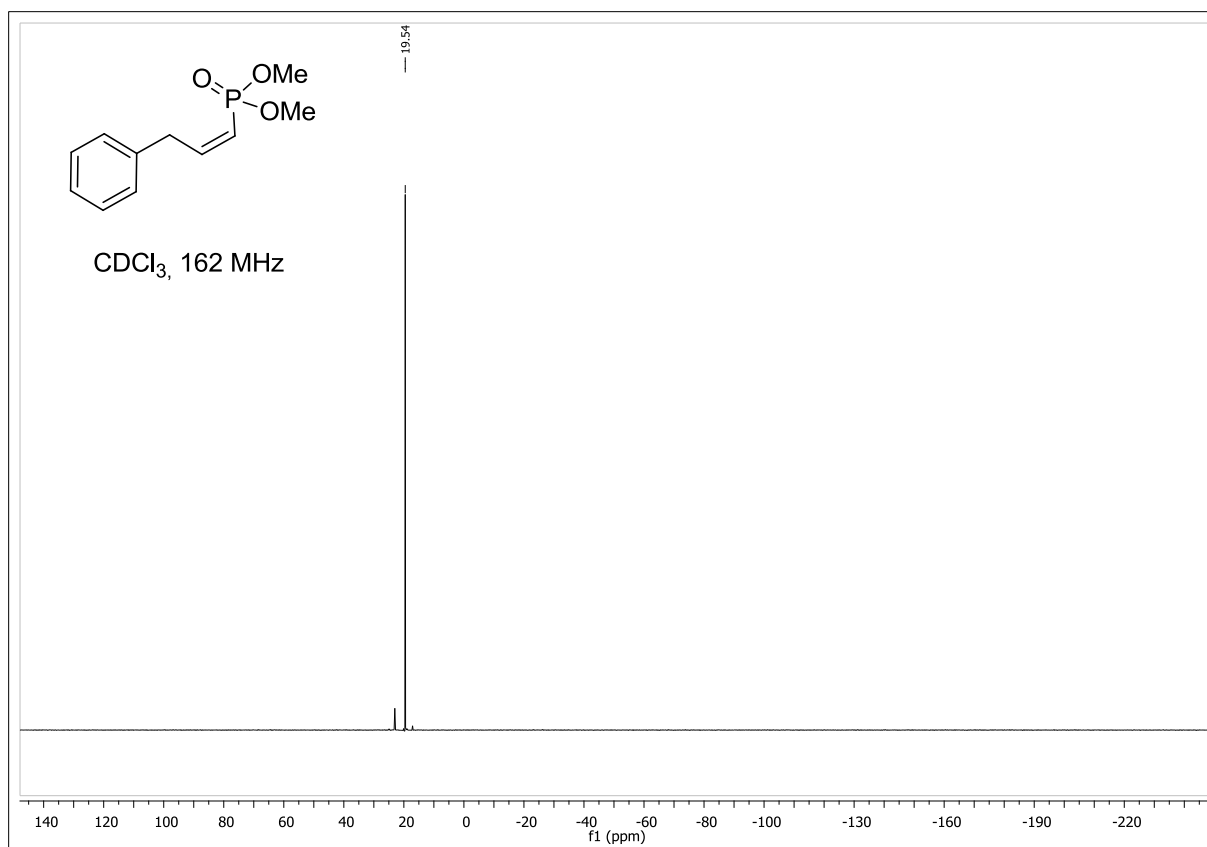


Table 2, Entry 4: ³¹P NMR spectrum

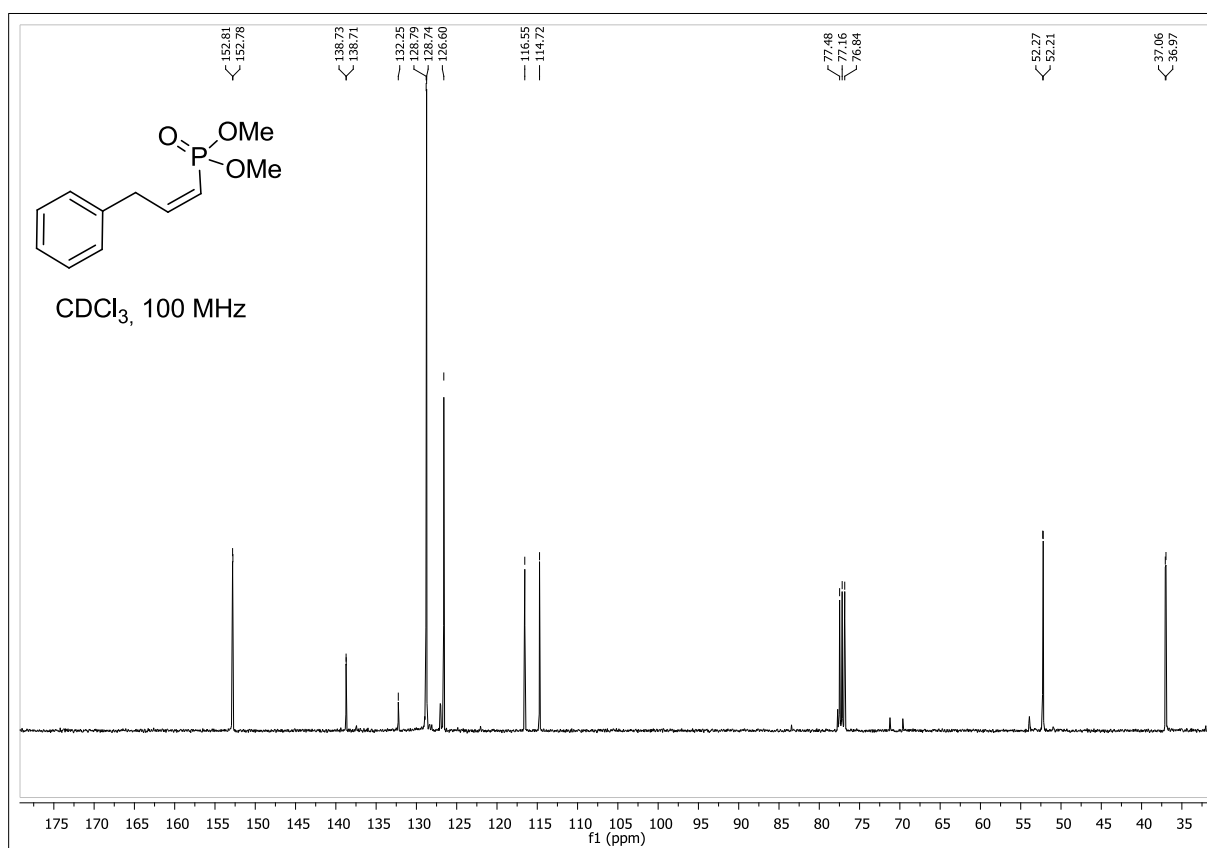


Table 2, Entry 4: ¹³C NMR spectrum

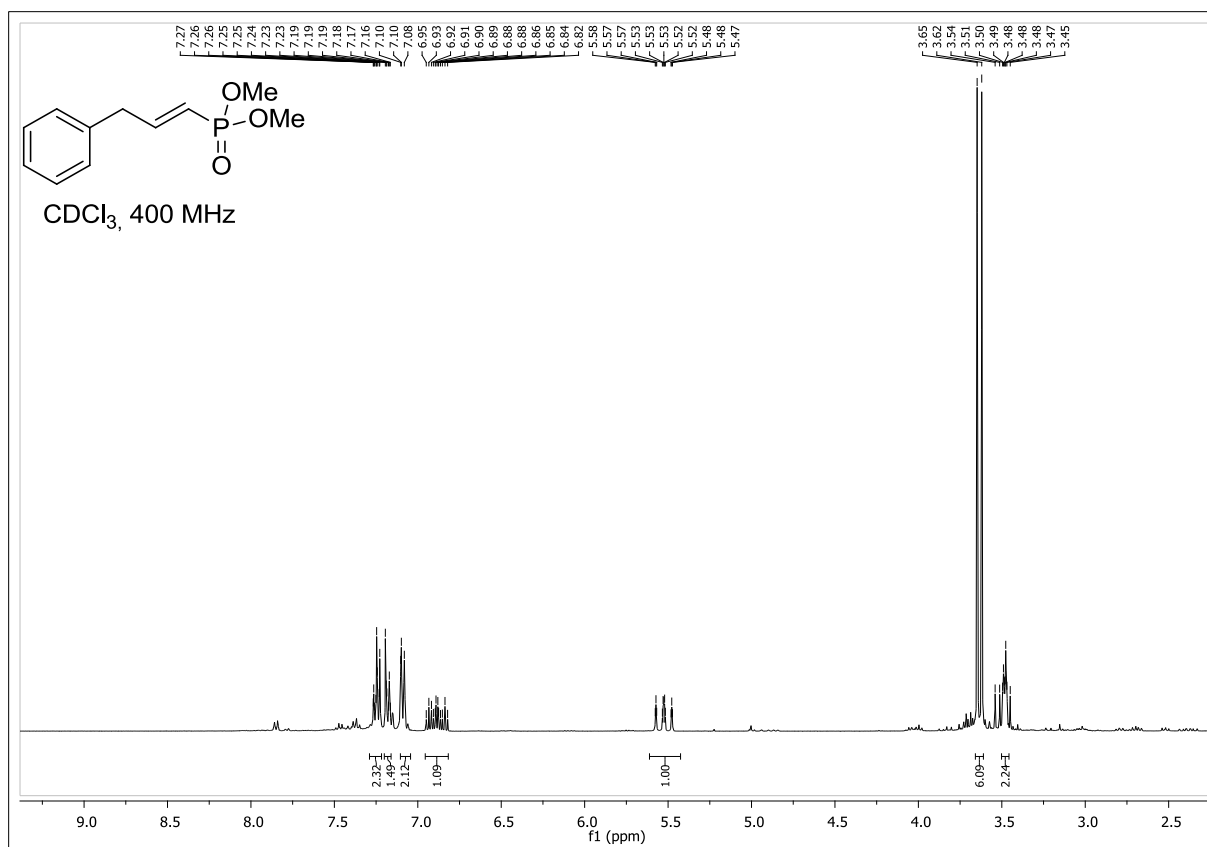


Table 2, Entry 4: ^1H NMR spectrum

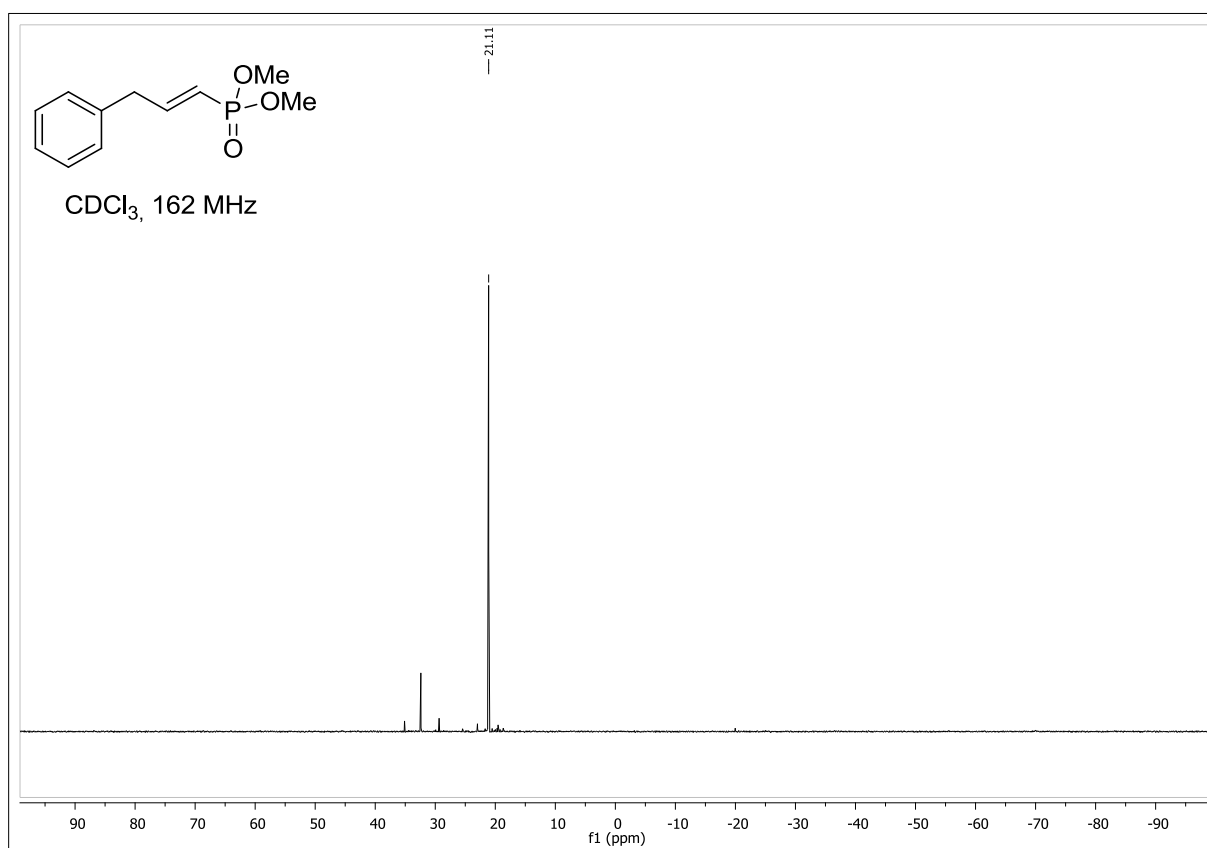


Table 2, Entry 4: ^{31}P NMR spectrum

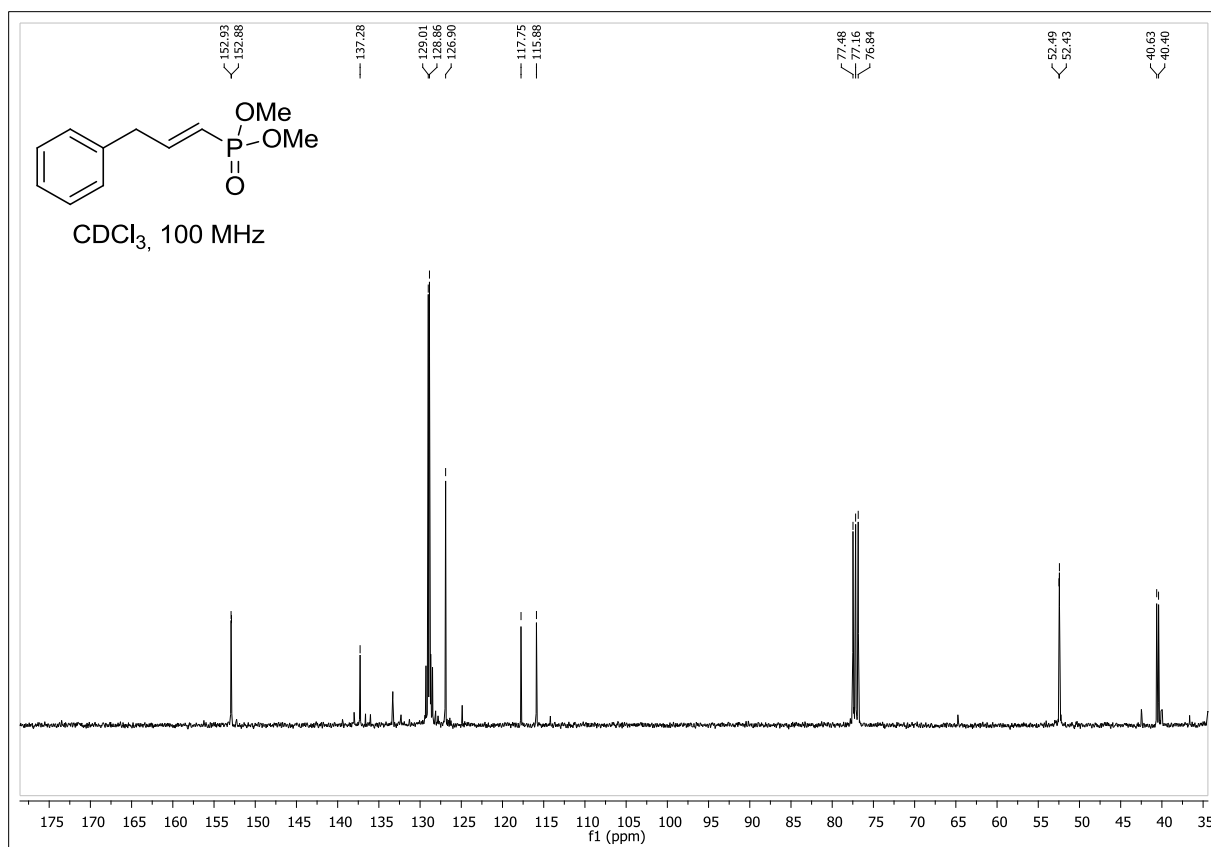


Table 2, Entry 4: ¹³C NMR spectrum

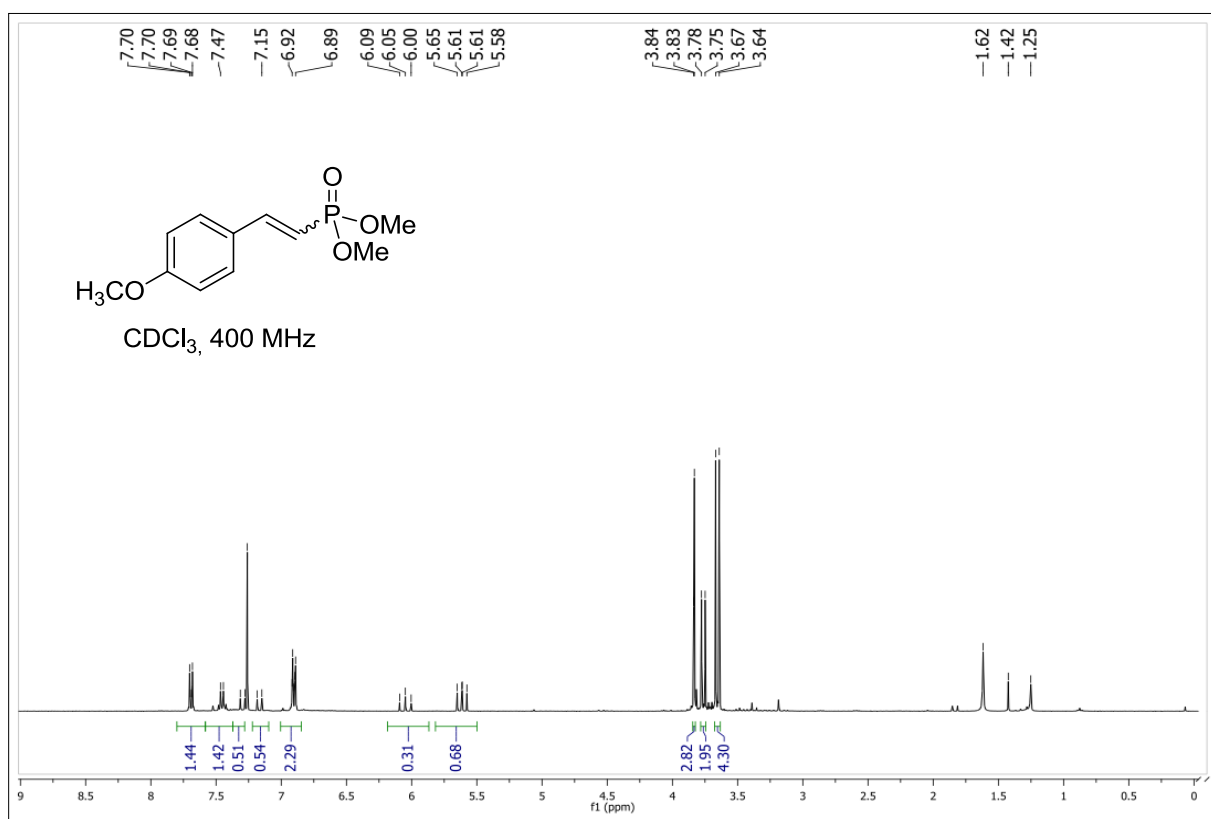


Table 2, Entry 5: ¹H NMR spectrum

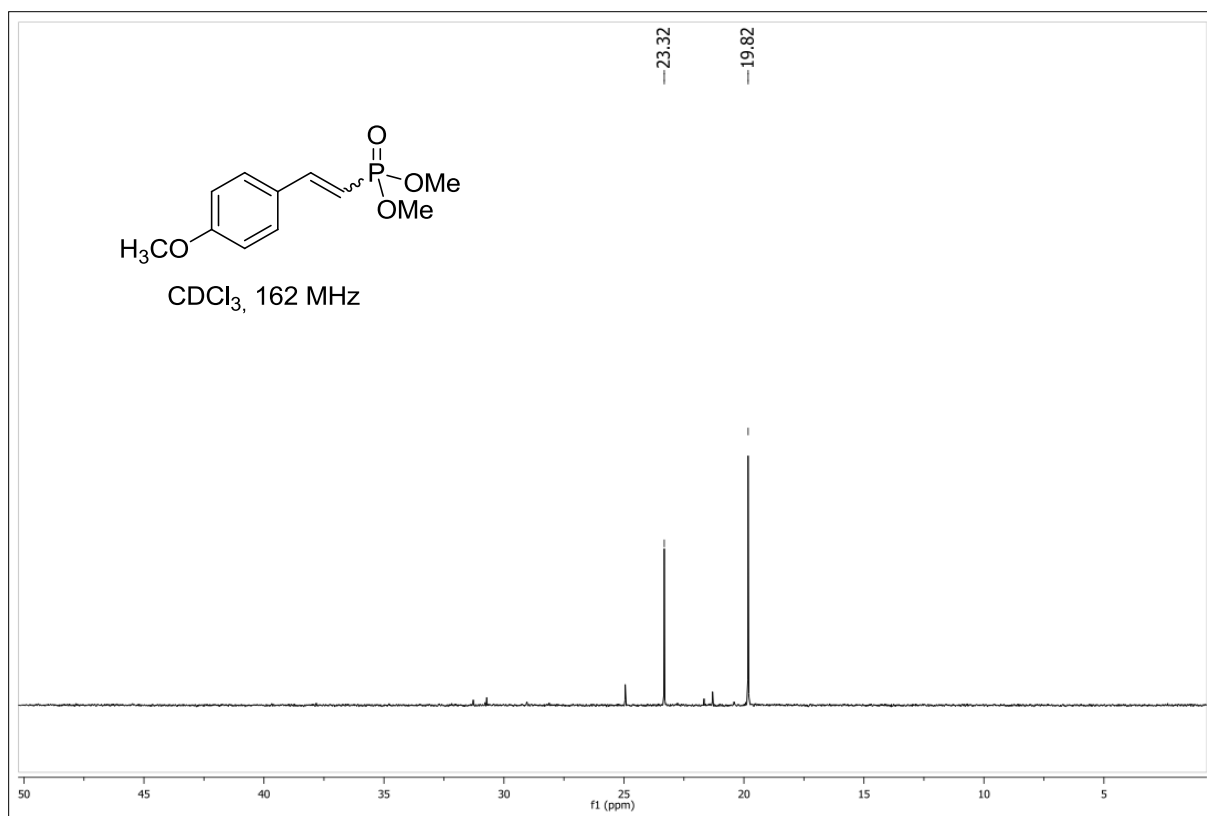


Table 2, Entry 5: ³¹P NMR spectrum

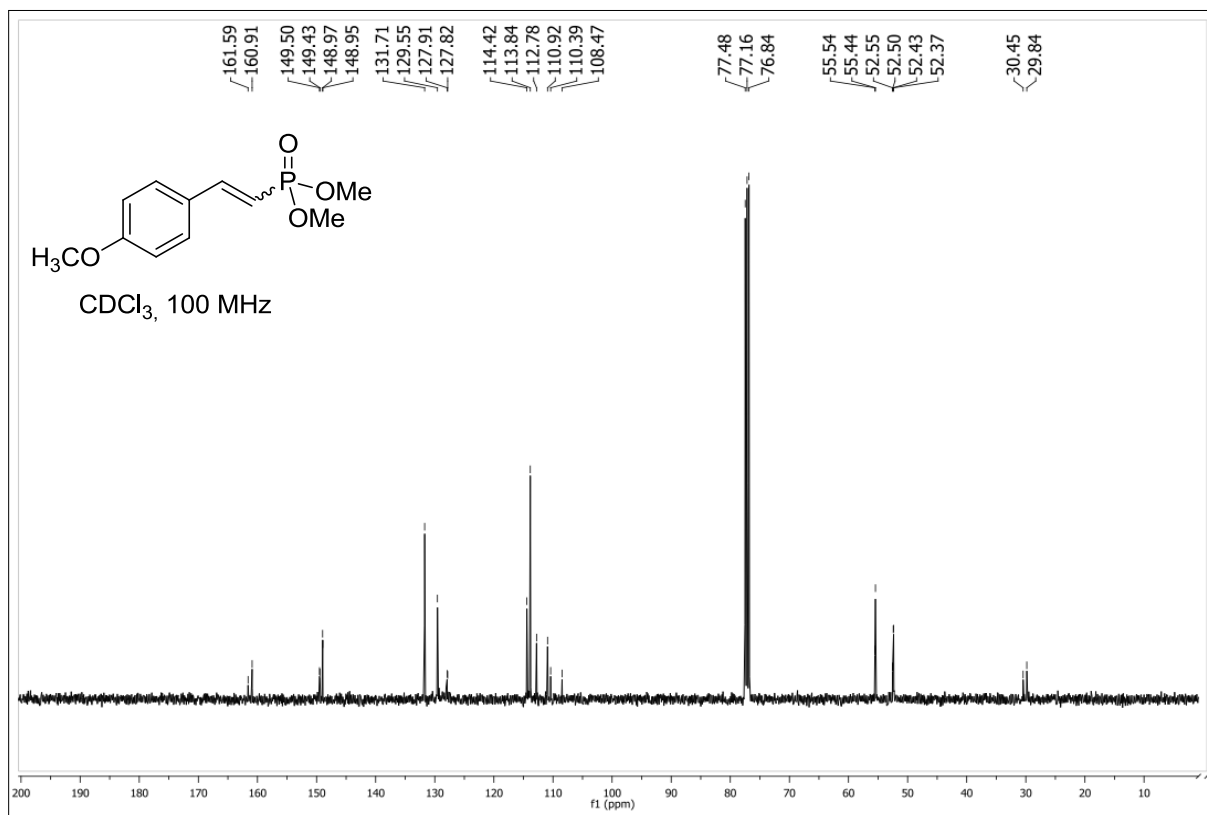


Table 2, Entry 5: ¹³C NMR spectrum

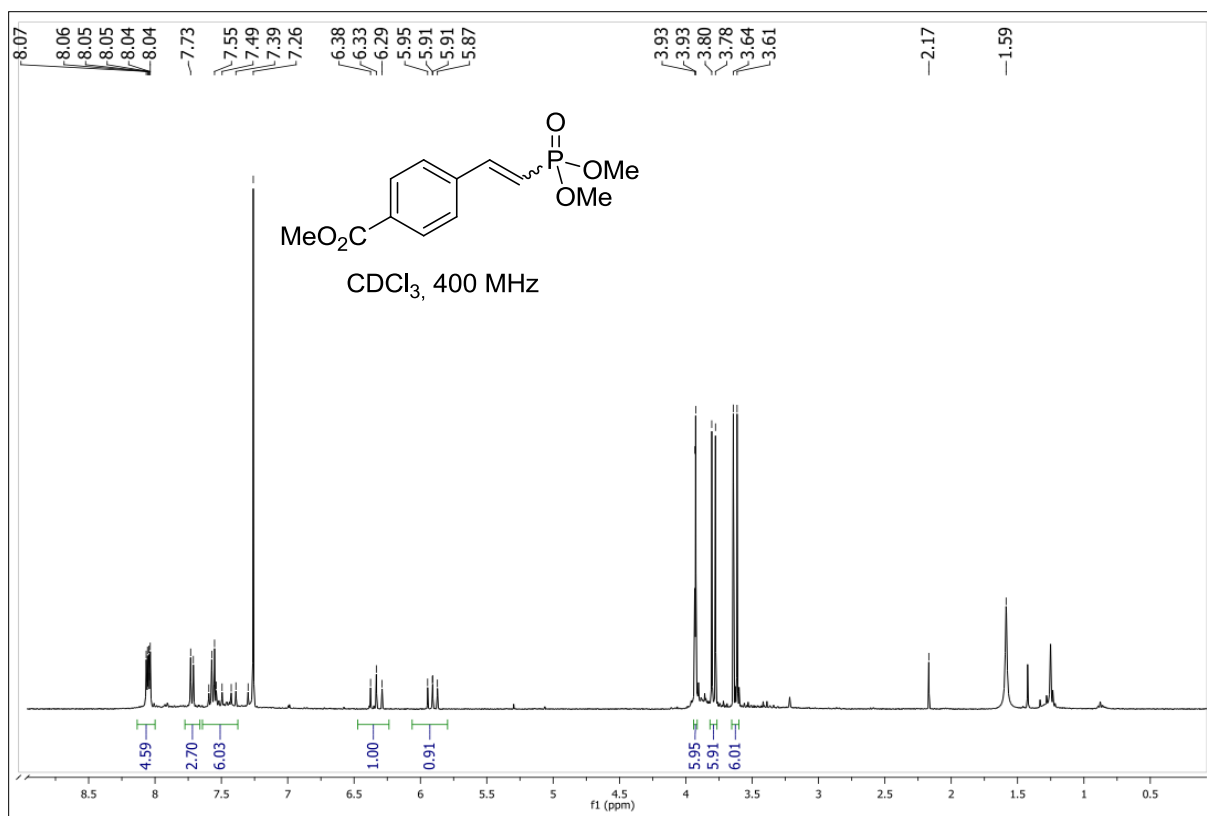


Table 2, Entry 6: ¹H NMR spectrum

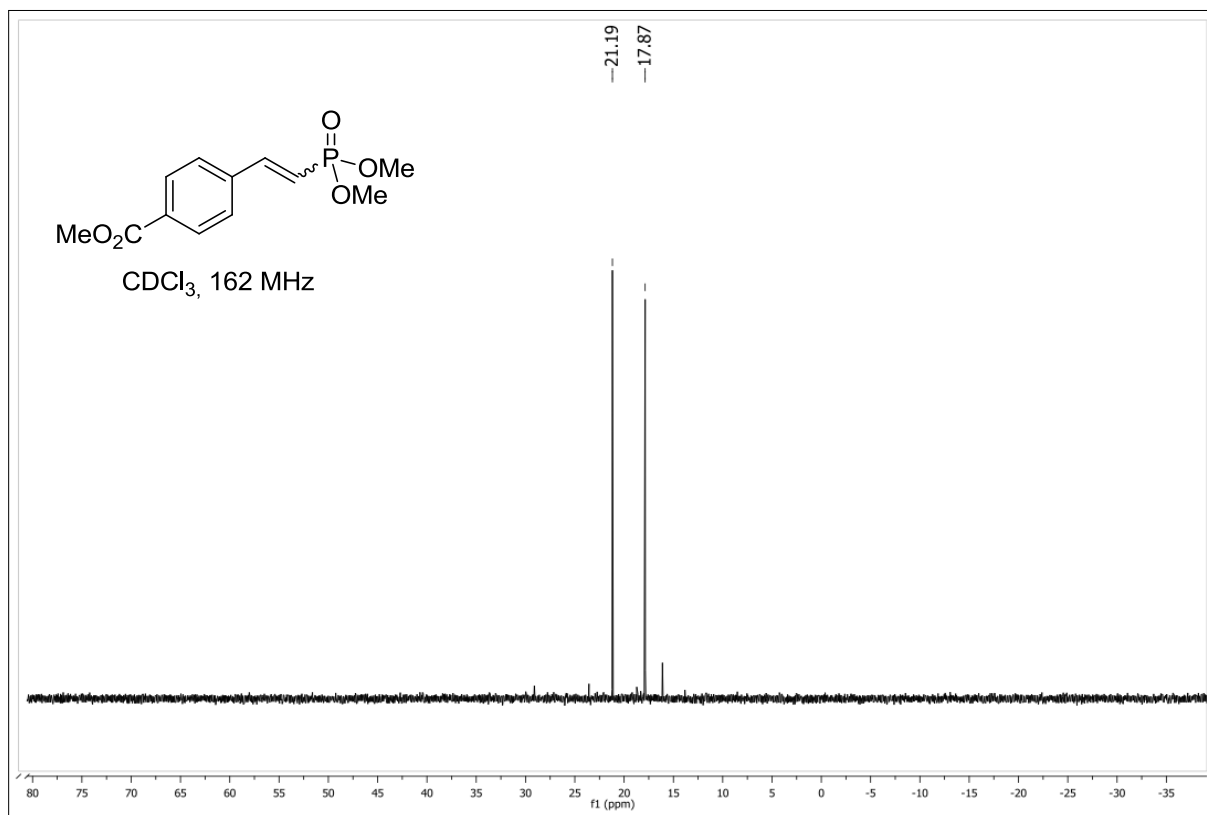


Table 2, Entry 6: ³¹P NMR spectrum

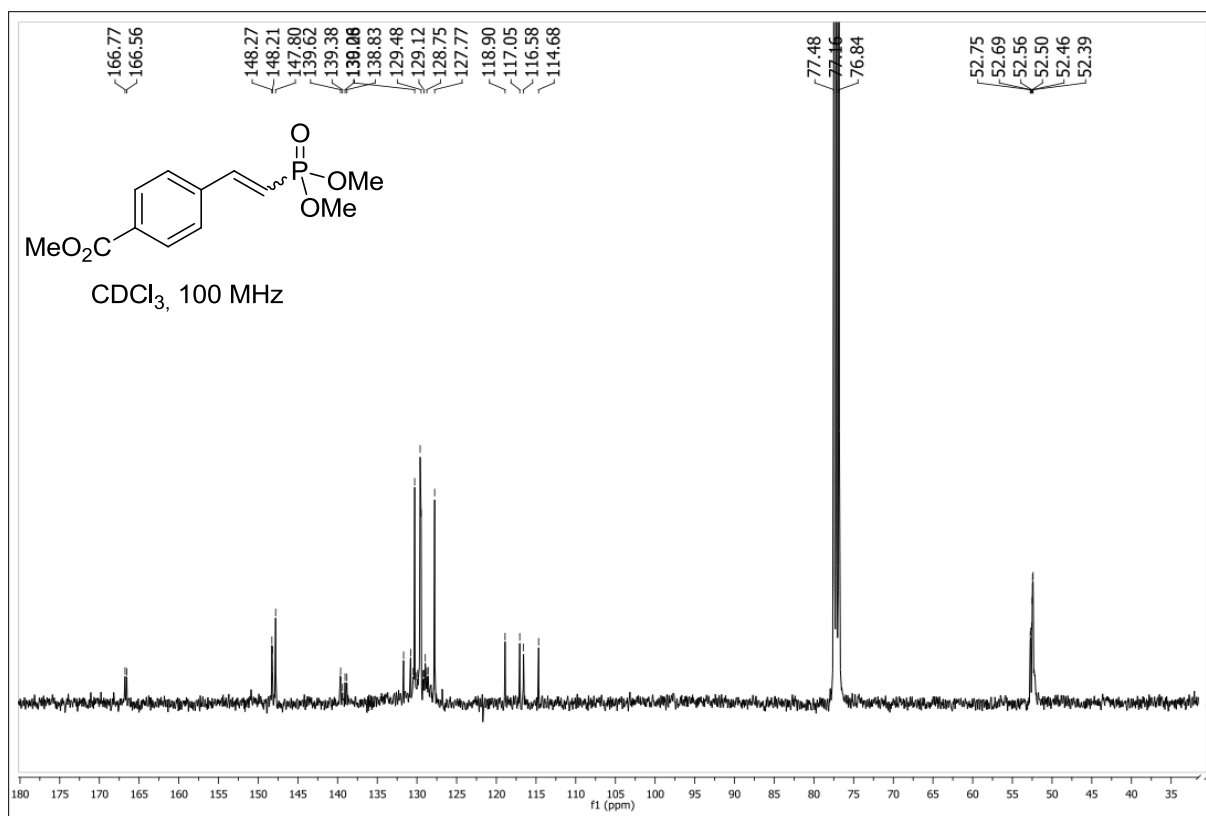


Table 2, Entry 6: ¹³C NMR spectrum

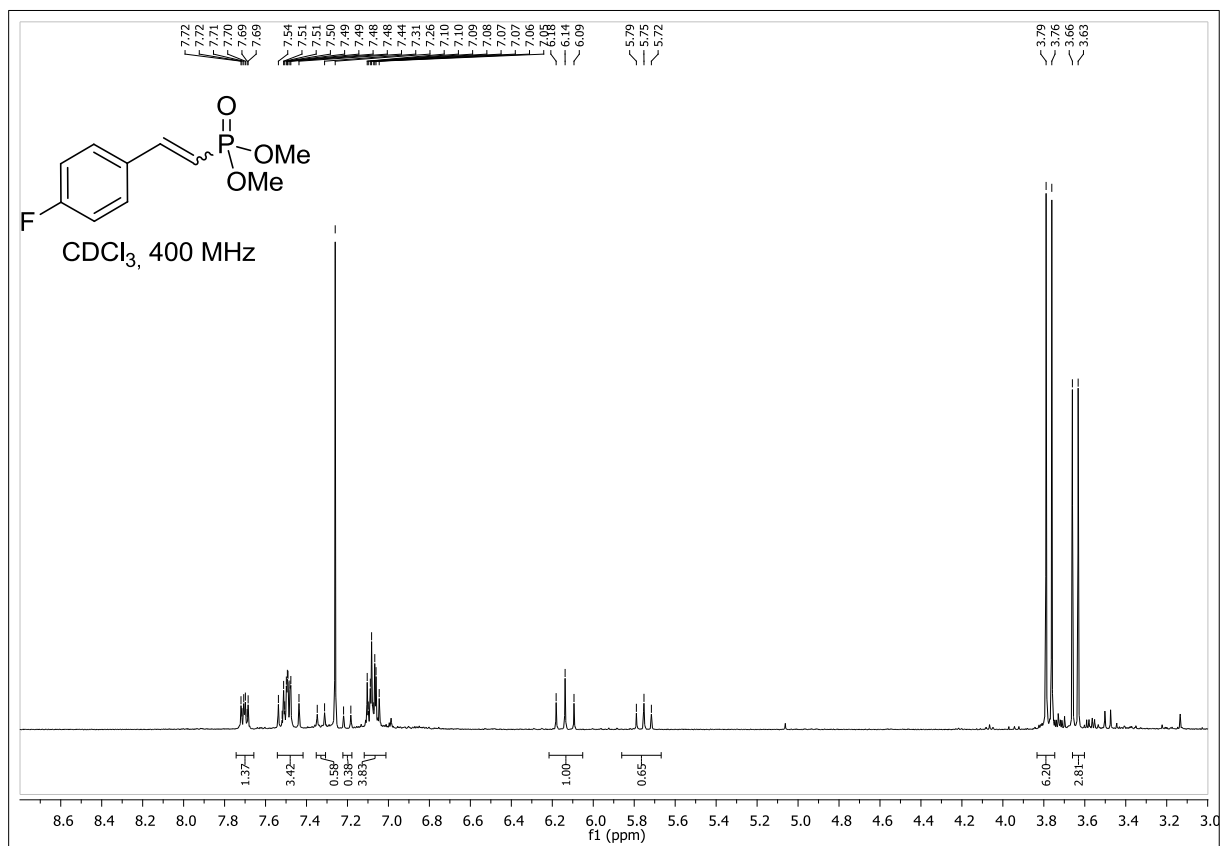


Table 2, Entry 7: ¹H NMR spectrum

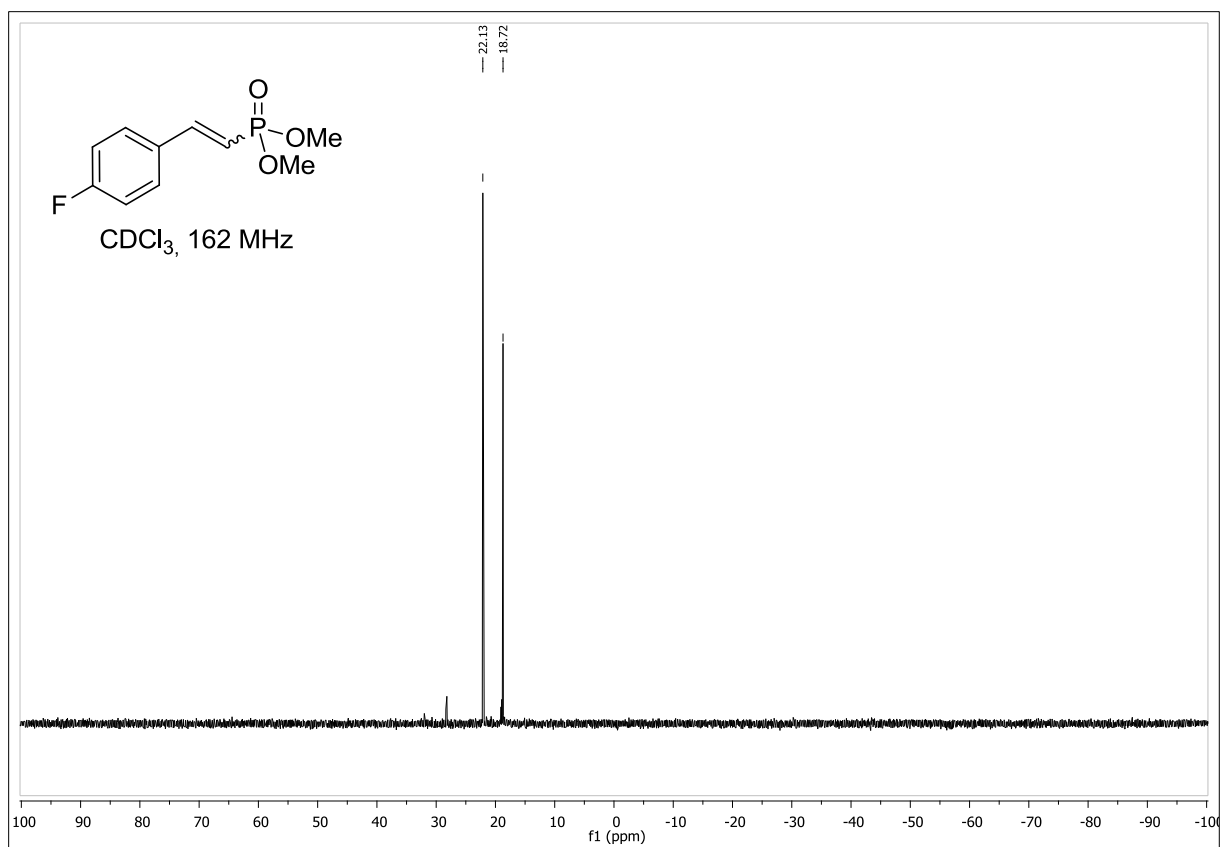


Table 2, Entry 7: ³¹P NMR spectrum

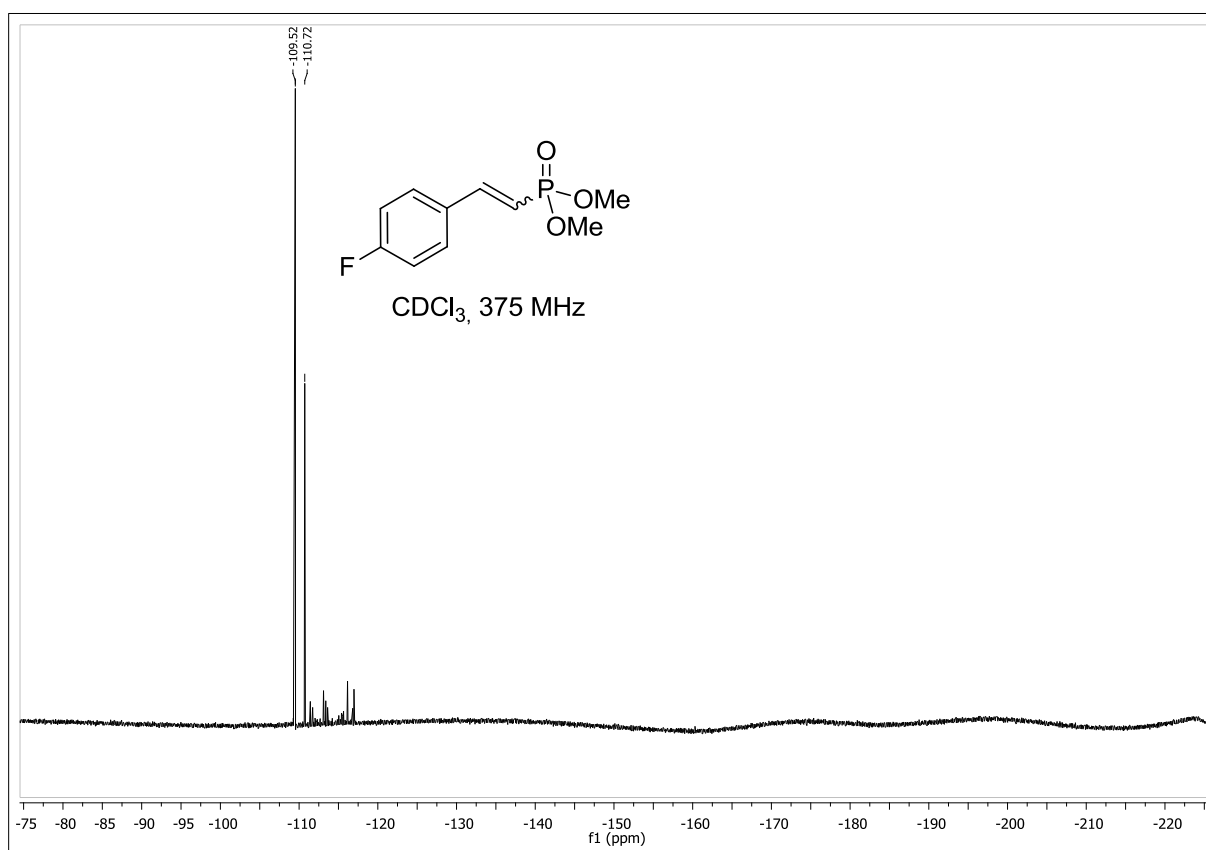


Table 2, Entry 7: ¹⁹F NMR spectrum

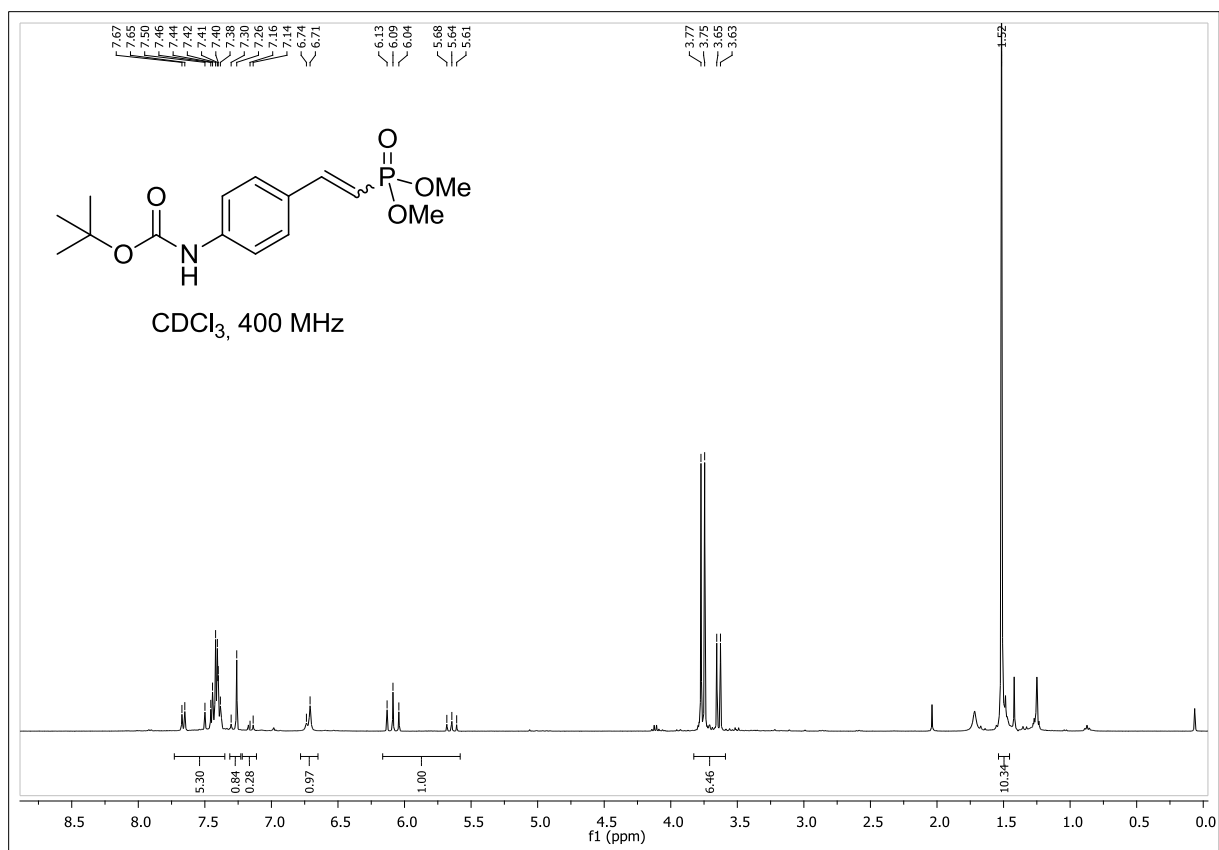


Table 2, Entry 10: ¹H NMR spectrum

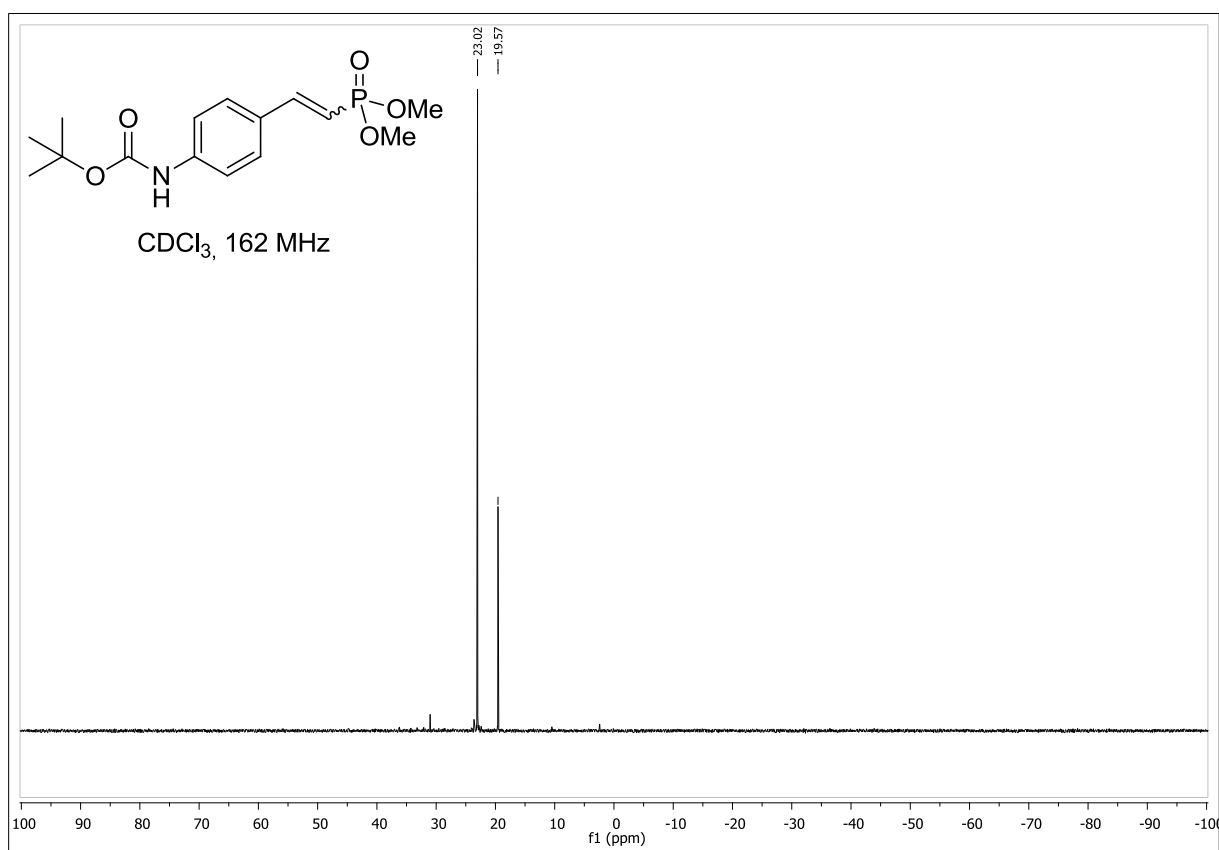


Table 2, Entry 10: ³¹P NMR spectrum

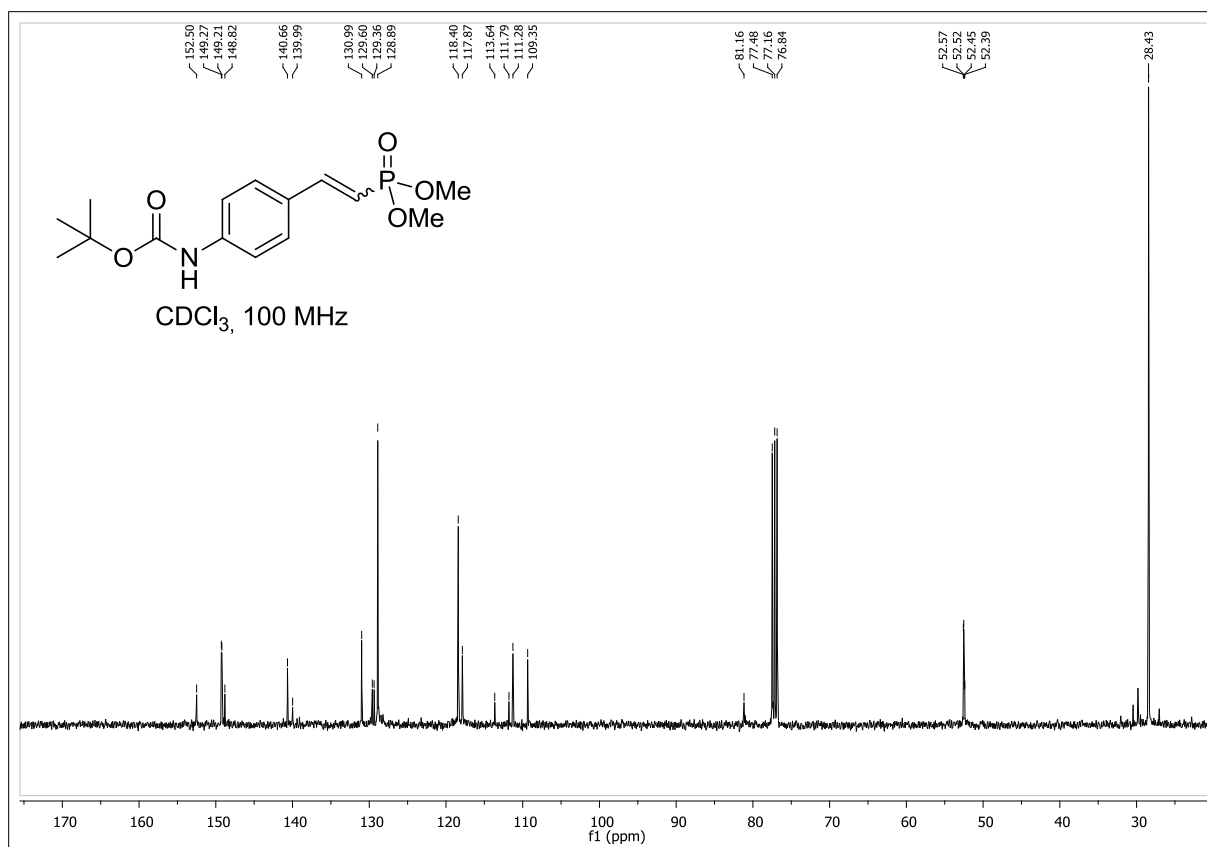


Table 2, Entry 10: ¹³C NMR spectrum

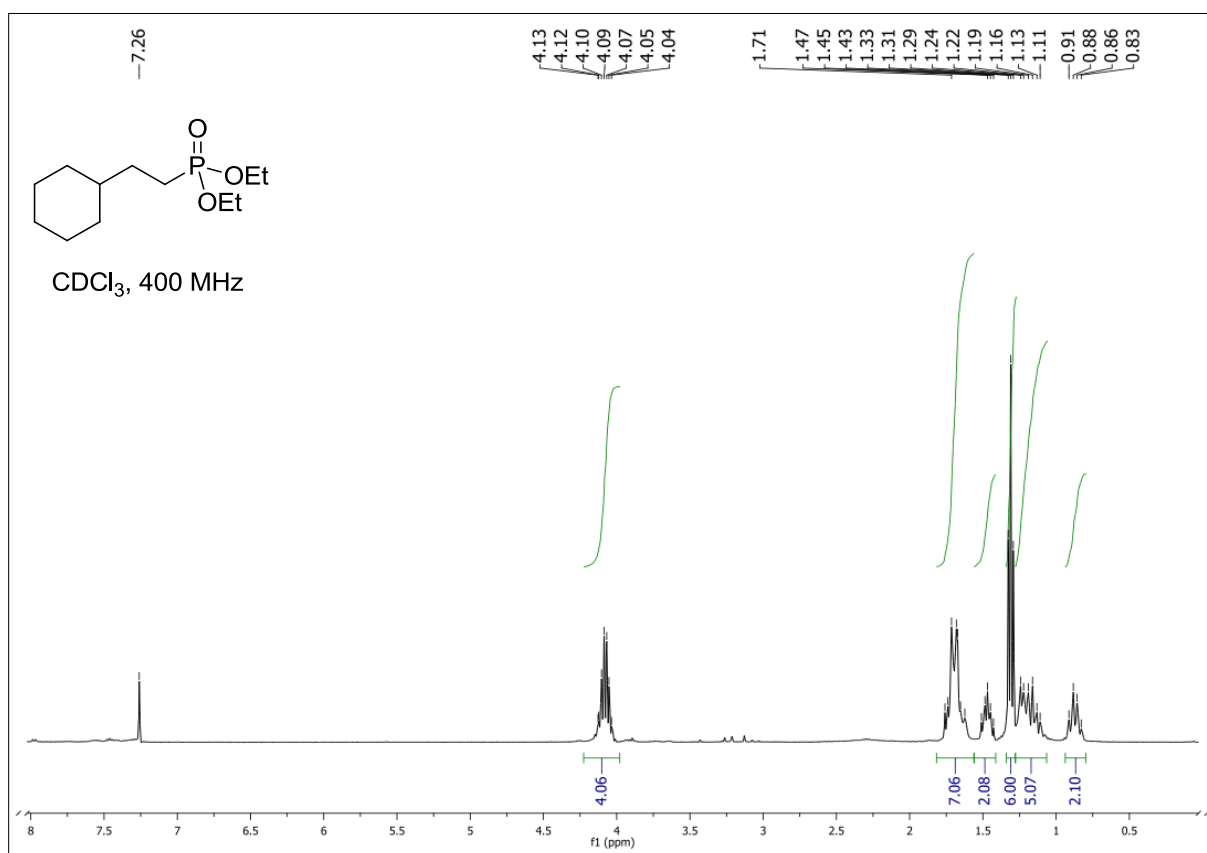


Table 3, Entry 2: ¹H NMR spectrum

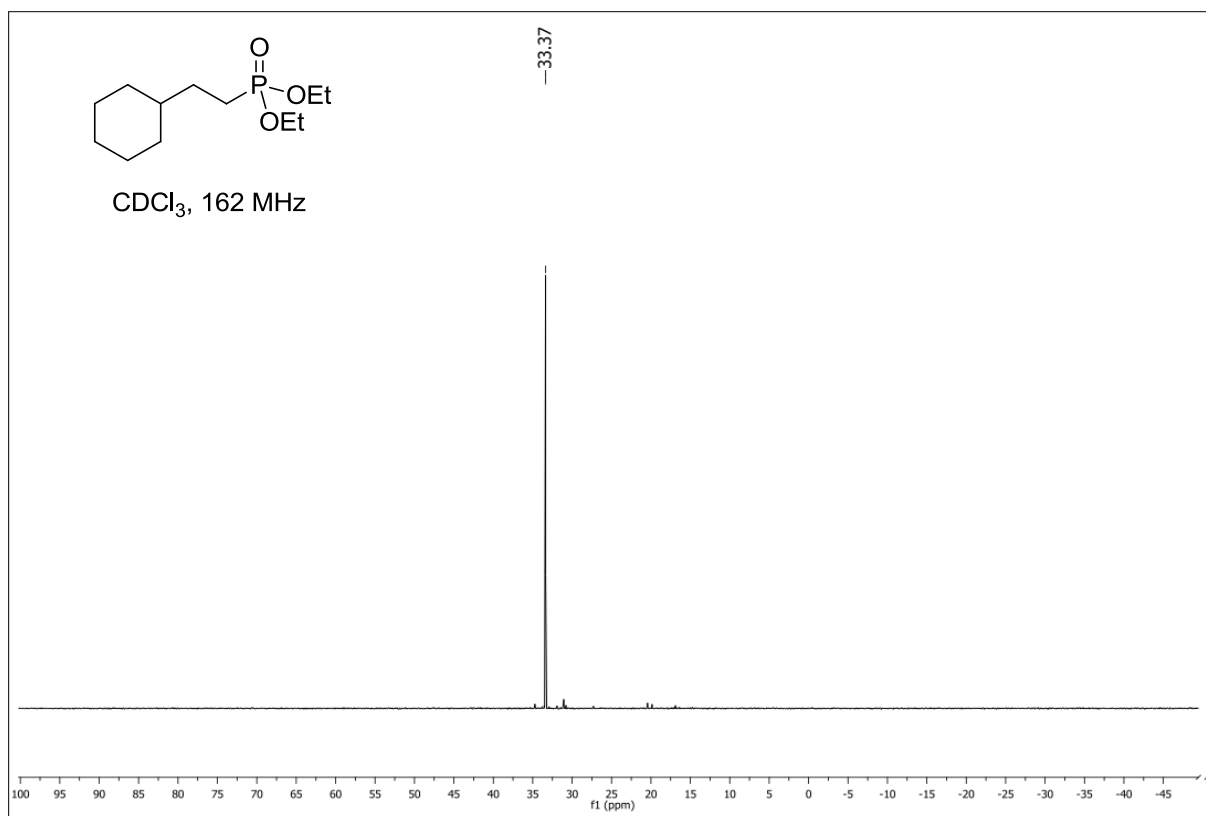


Table 3, Entry 2: ^{31}P NMR spectrum

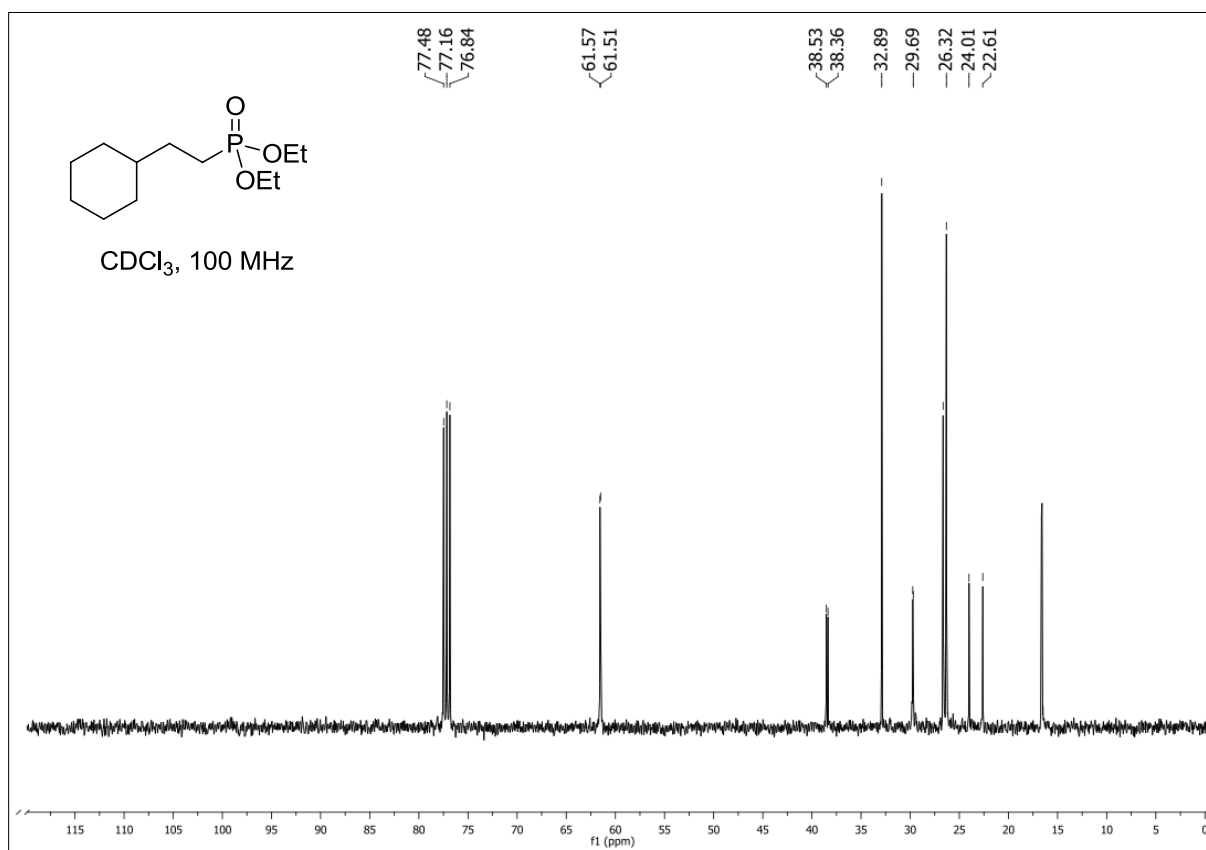


Table 3, Entry 2: ^{13}C NMR spectrum

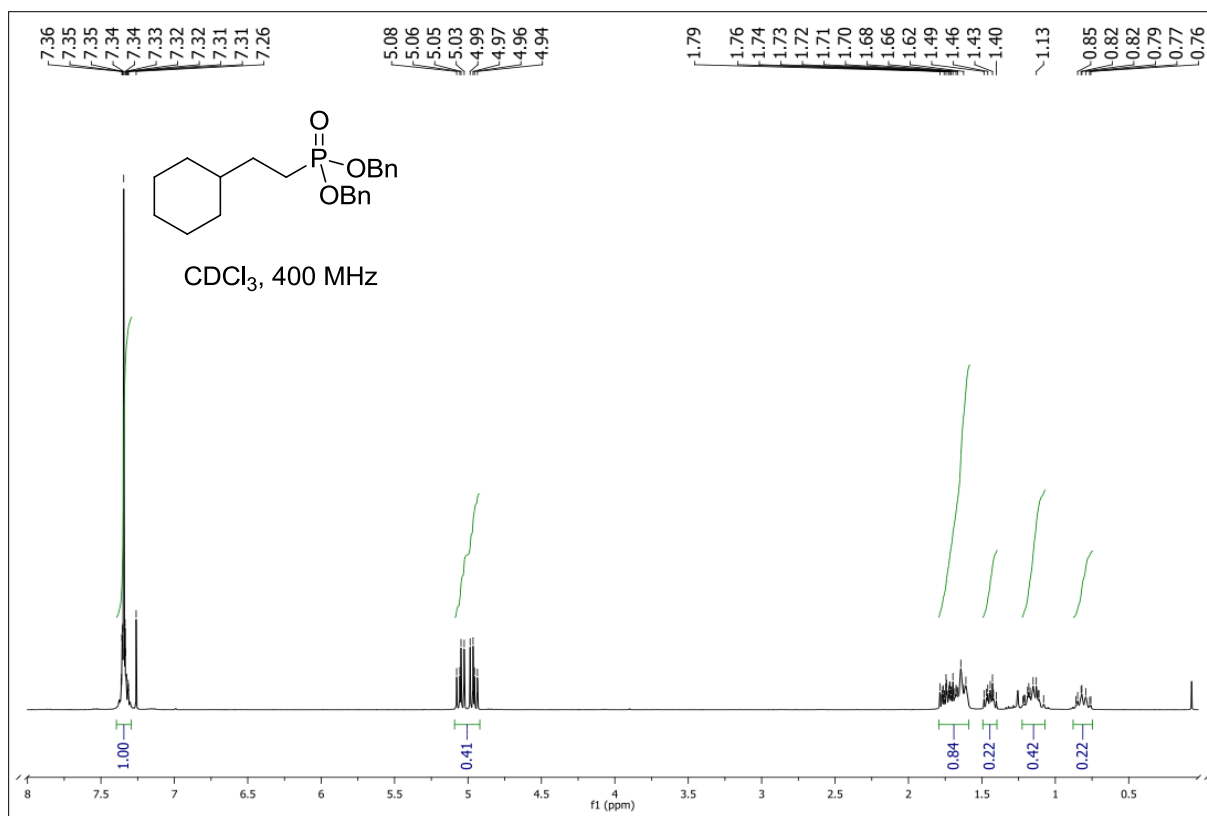


Table 3, Entry 4: ¹H NMR spectrum

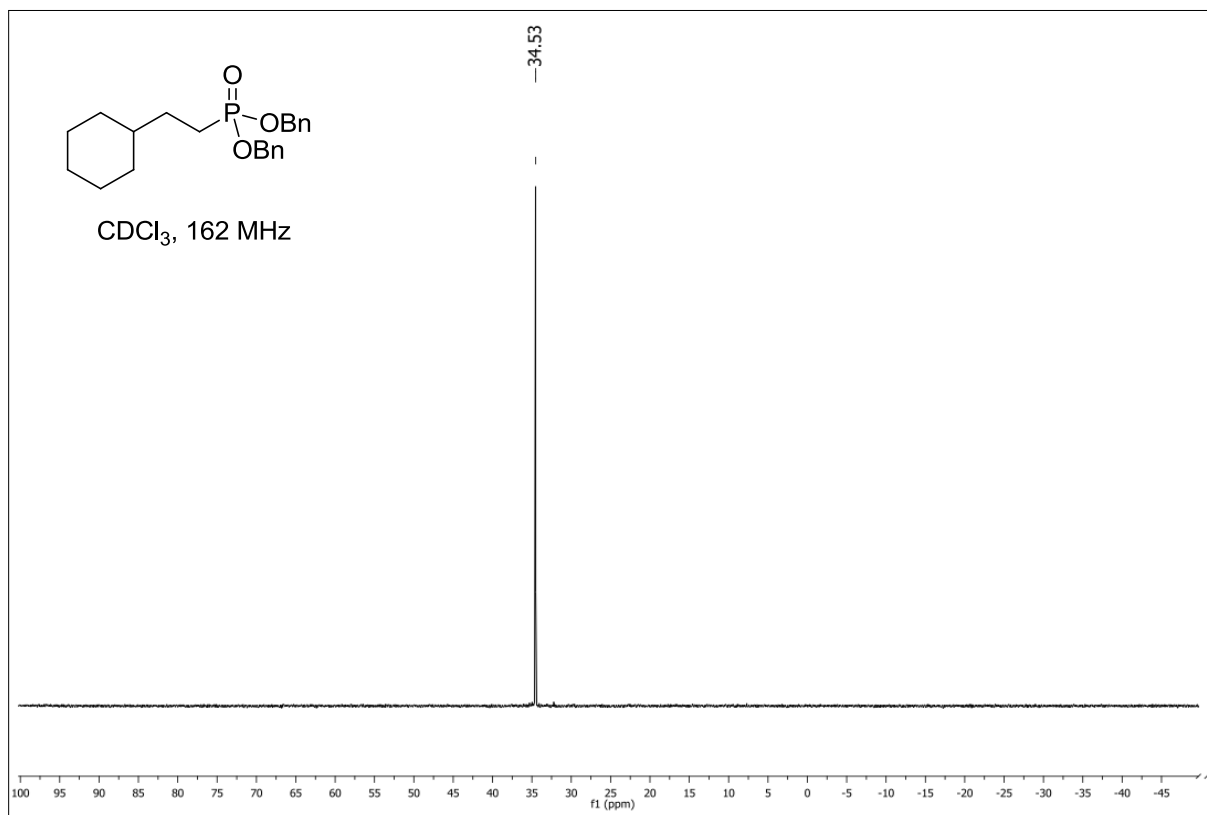


Table 3, Entry 4: ³¹P NMR spectrum

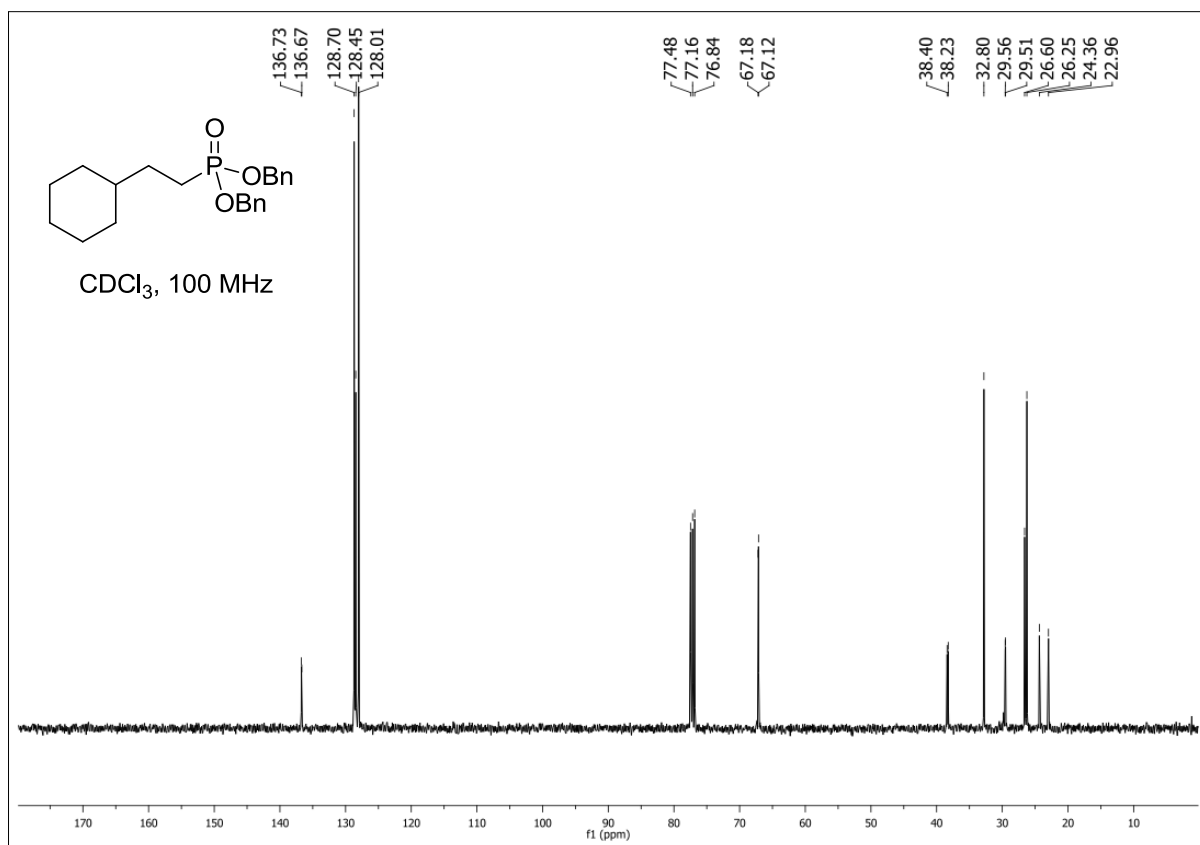


Table 3, Entry 4: ¹³C NMR spectrum

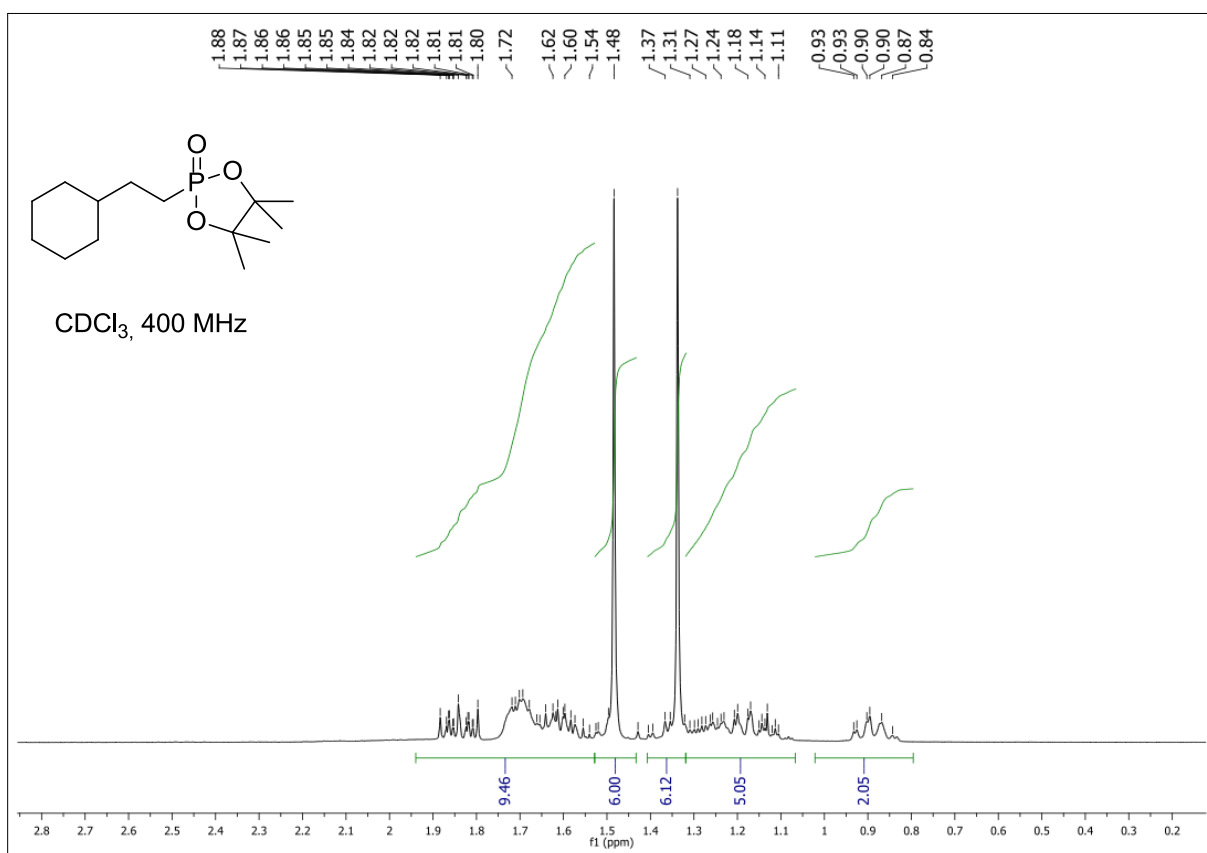


Table 3, Entry 5: ¹H NMR spectrum

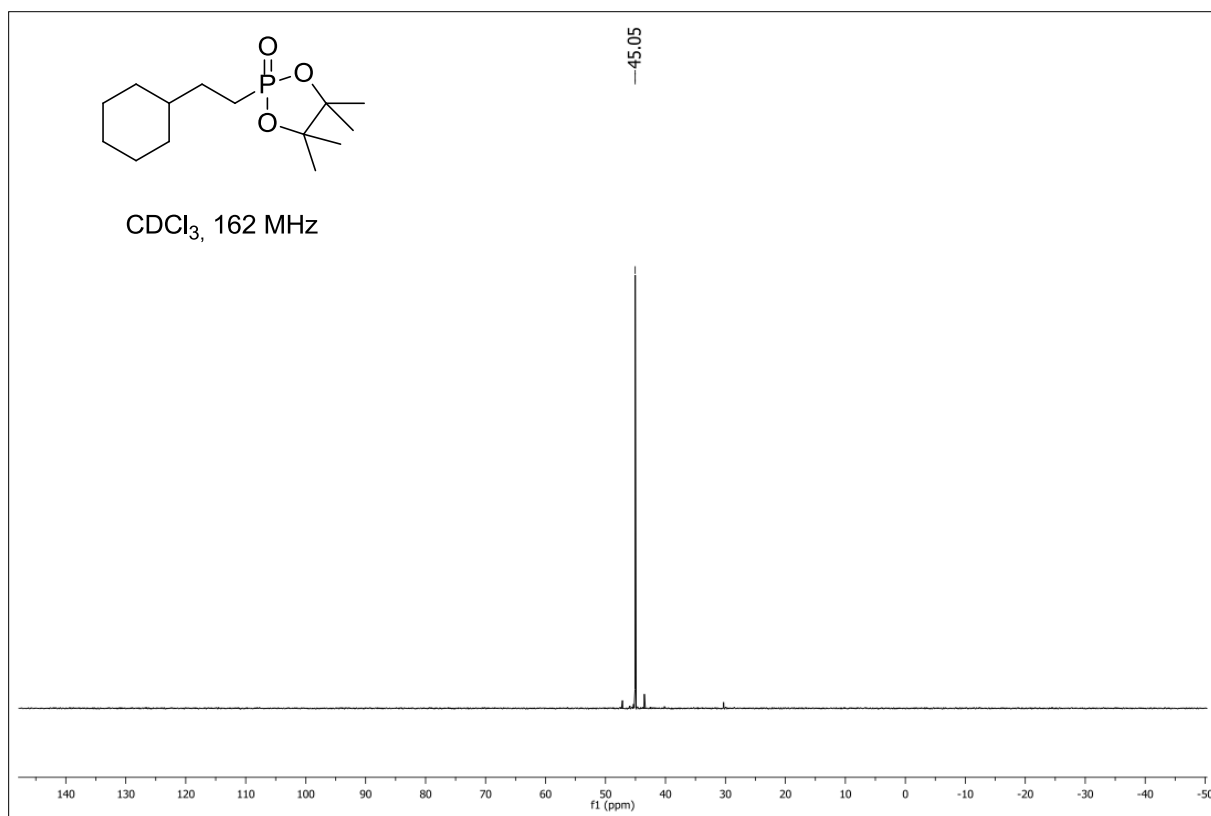


Table 3, Entry 5: ³¹P NMR spectrum

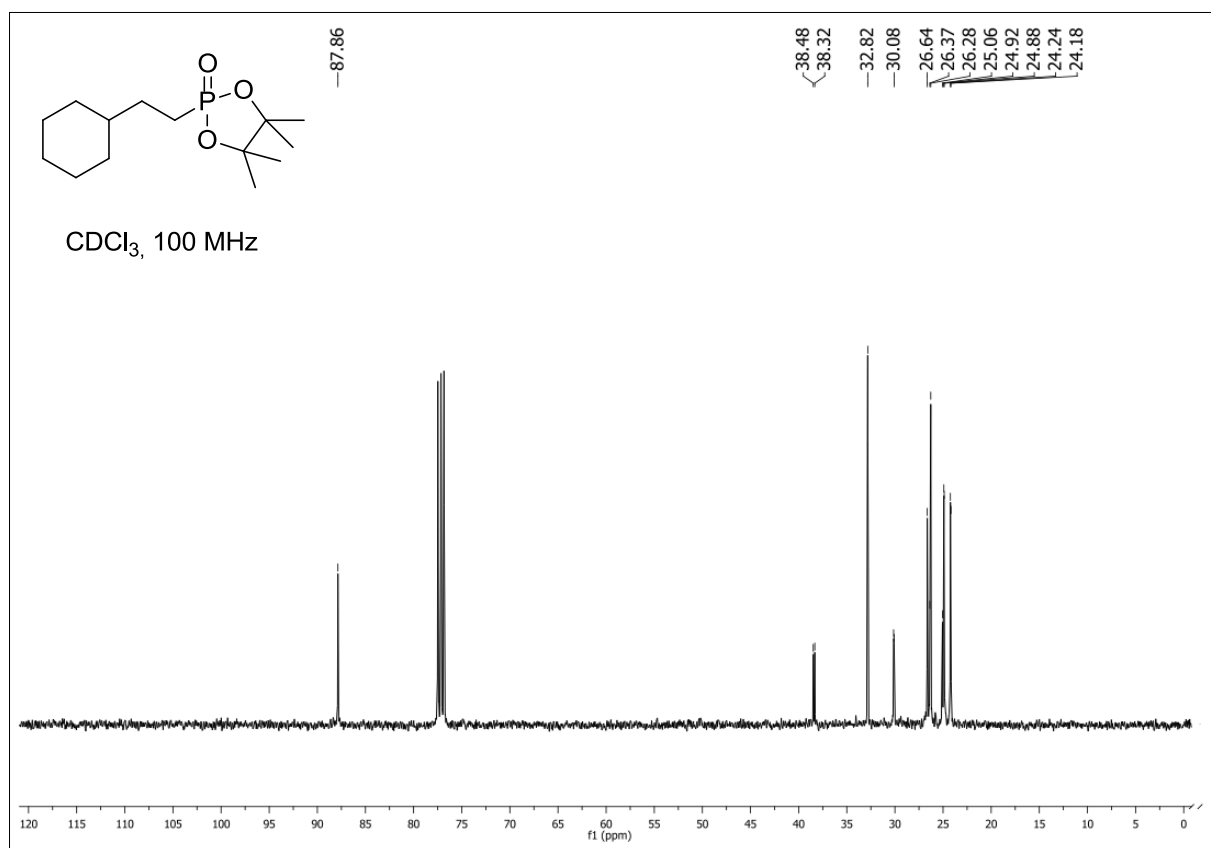


Table 3, Entry 5: ¹³C NMR spectrum

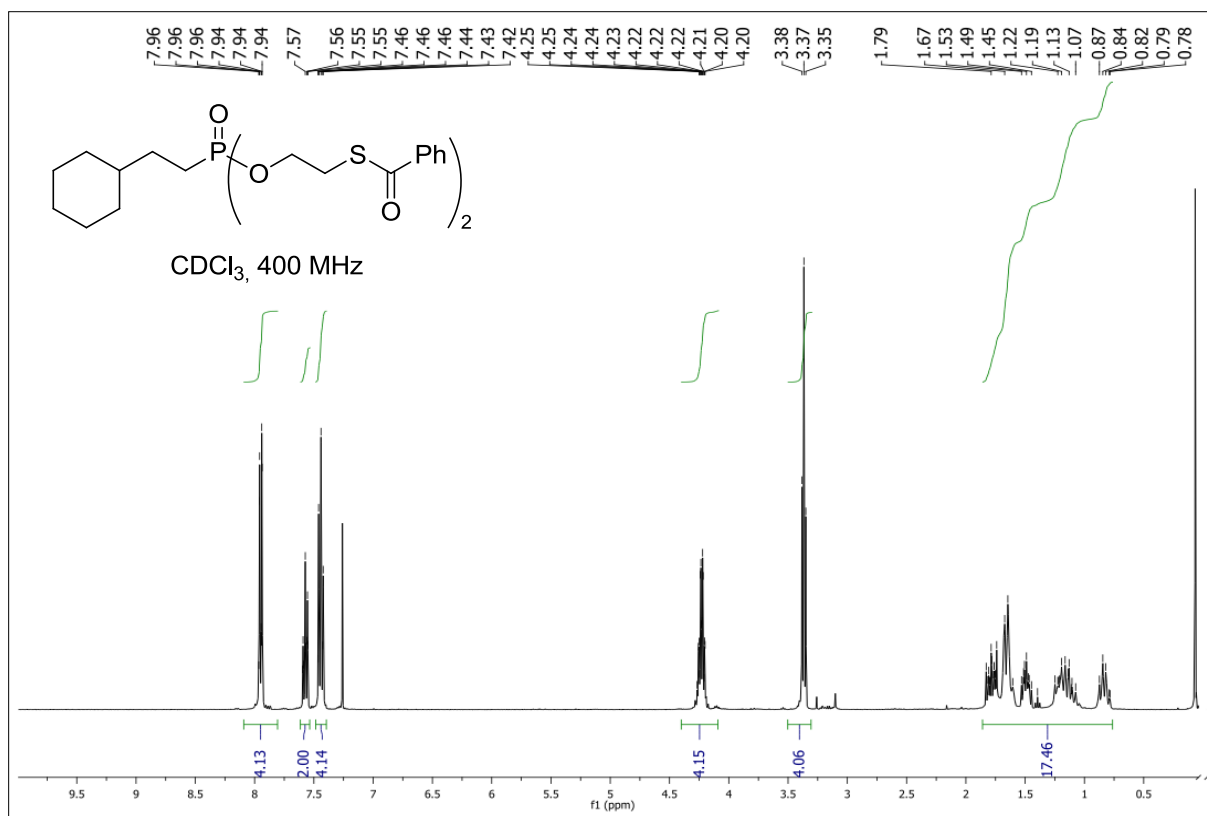


Table 3, Entry 6: ¹H NMR spectrum

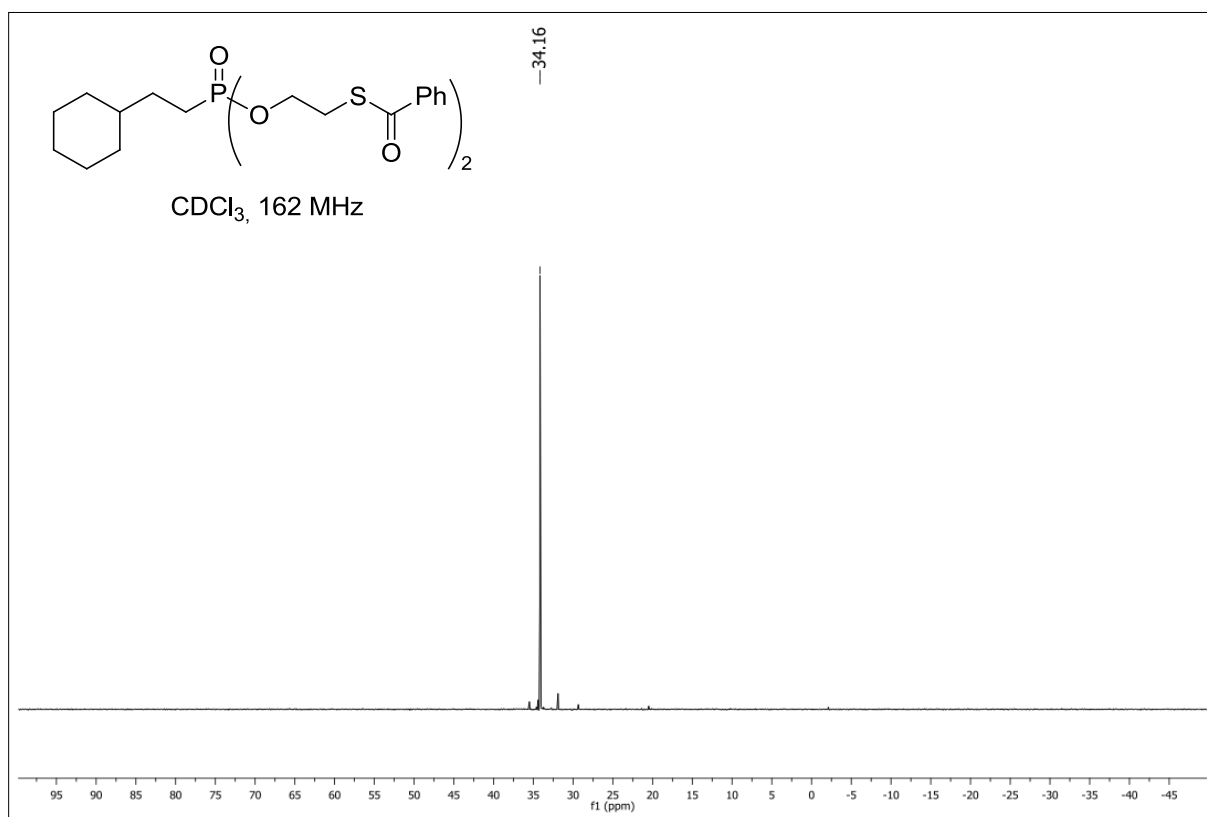


Table 3, Entry 6: ³¹P NMR spectrum

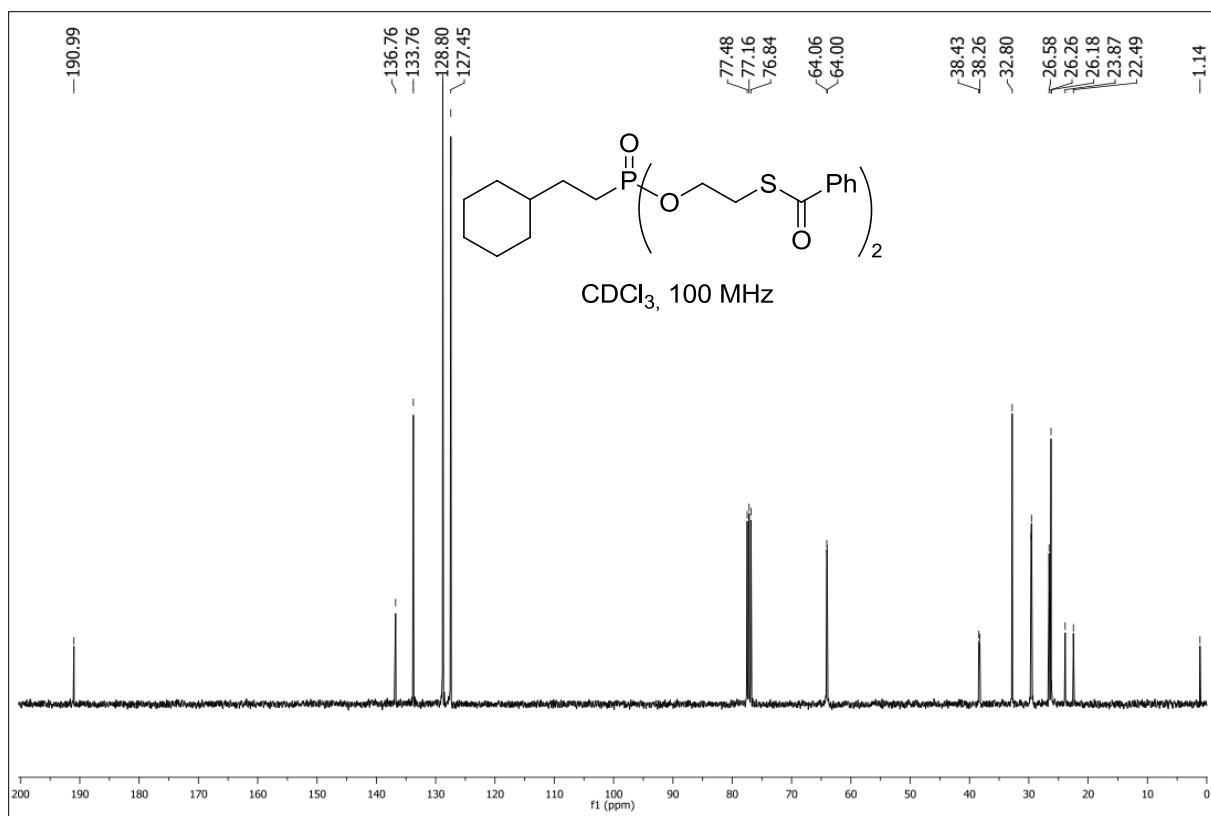
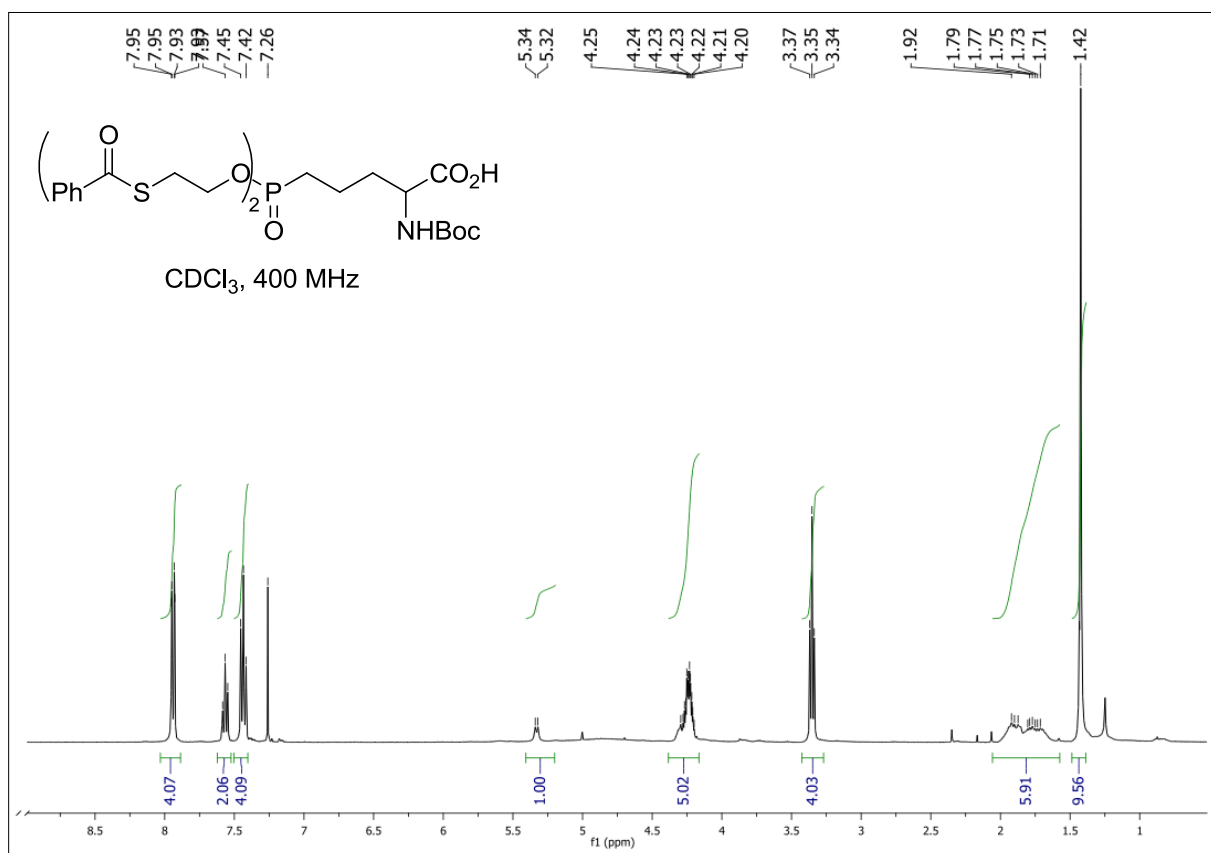
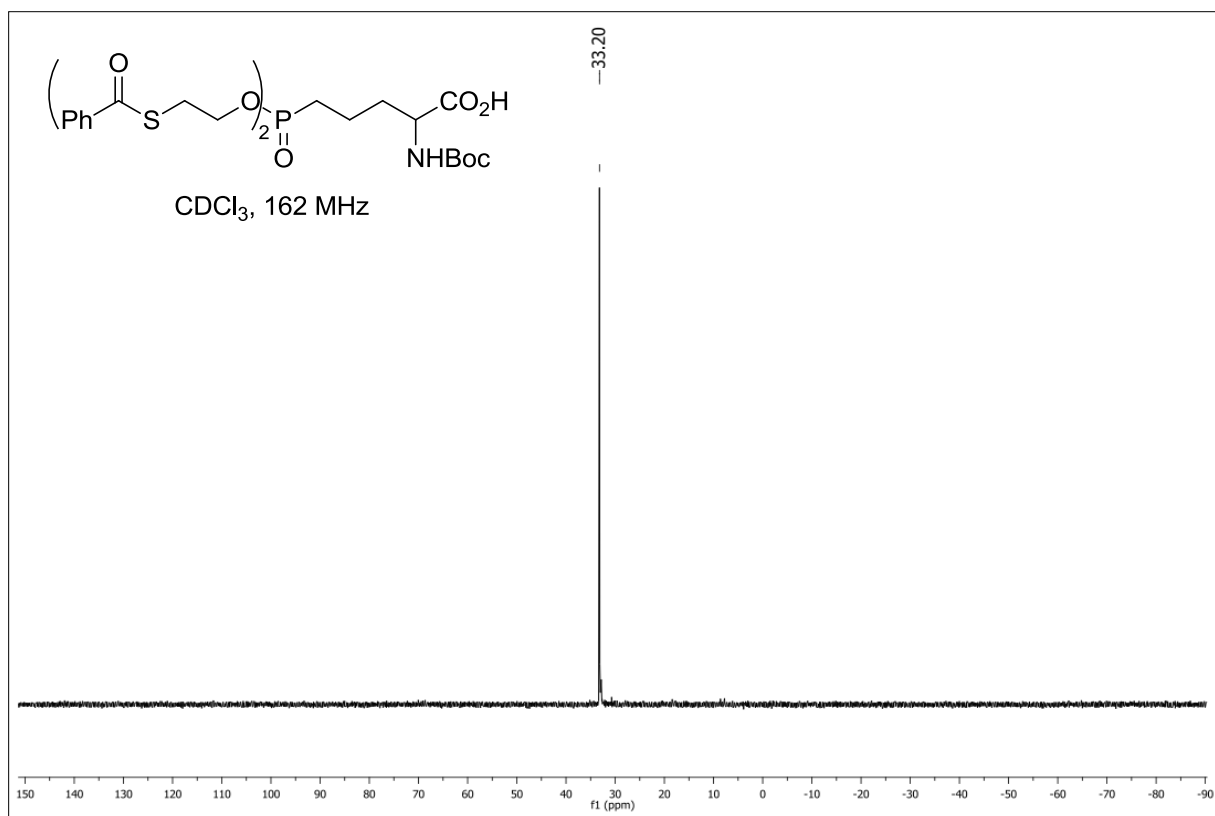


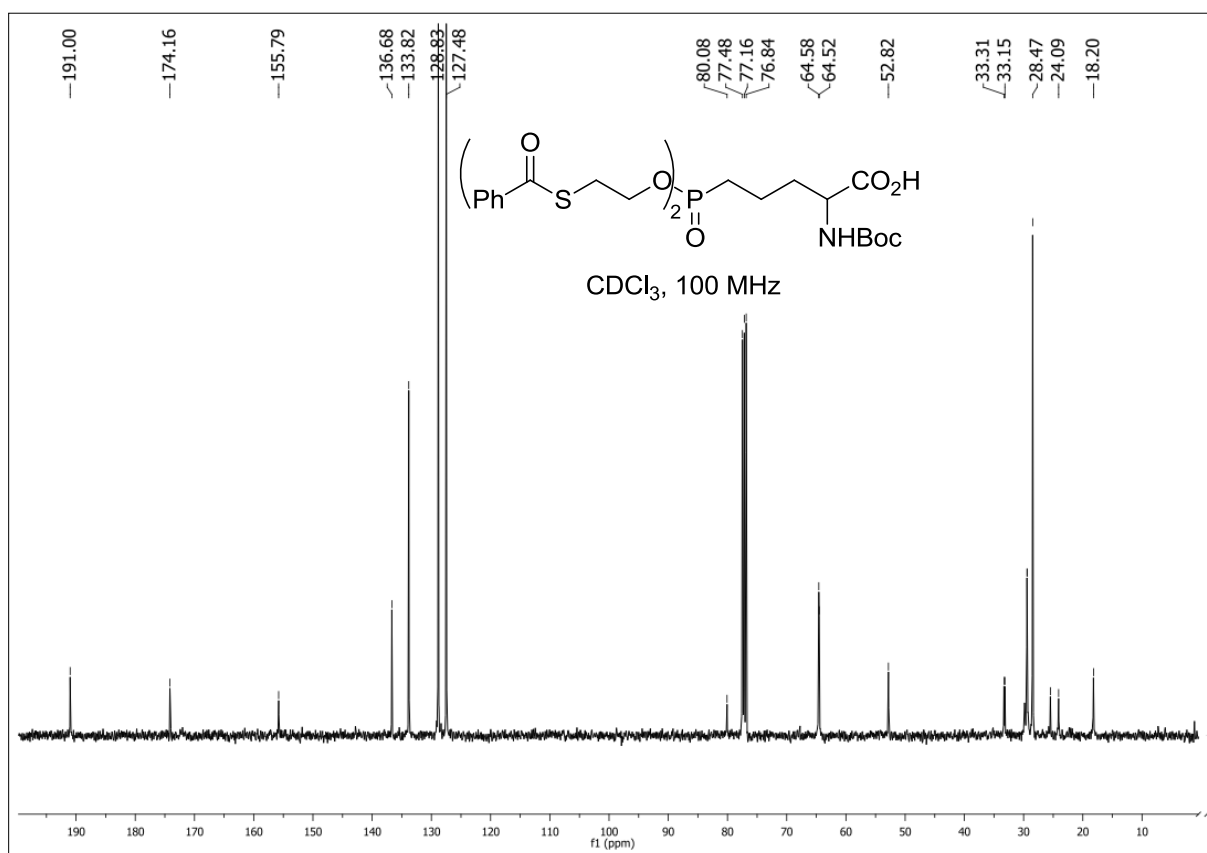
Table 3, Entry 6: ¹³C NMR spectrum



5-(bis(2-(benzoylthio)ethoxy)phosphoryl)-2-((tert-butoxycarbonyl)amino)pentanoic acid: ¹H NMR spectrum



5-(bis(2-(benzoylthio)ethoxy)phosphoryl)-2-((tert-butoxycarbonyl)amino)pentanoic acid: ³¹P NMR spectrum



5-(bis(2-(benzoylthio)ethoxy)phosphoryl)-2-((tert-butoxycarbonyl)amino)pentanoic acid: ¹³C NMR spectrum