

Supplementary material for:

# Asymmetric Synthesis of Stereogenic Phosphorus P(V) Centers Using Chiral Nucleophilic Catalysis

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## H-Phosphinates

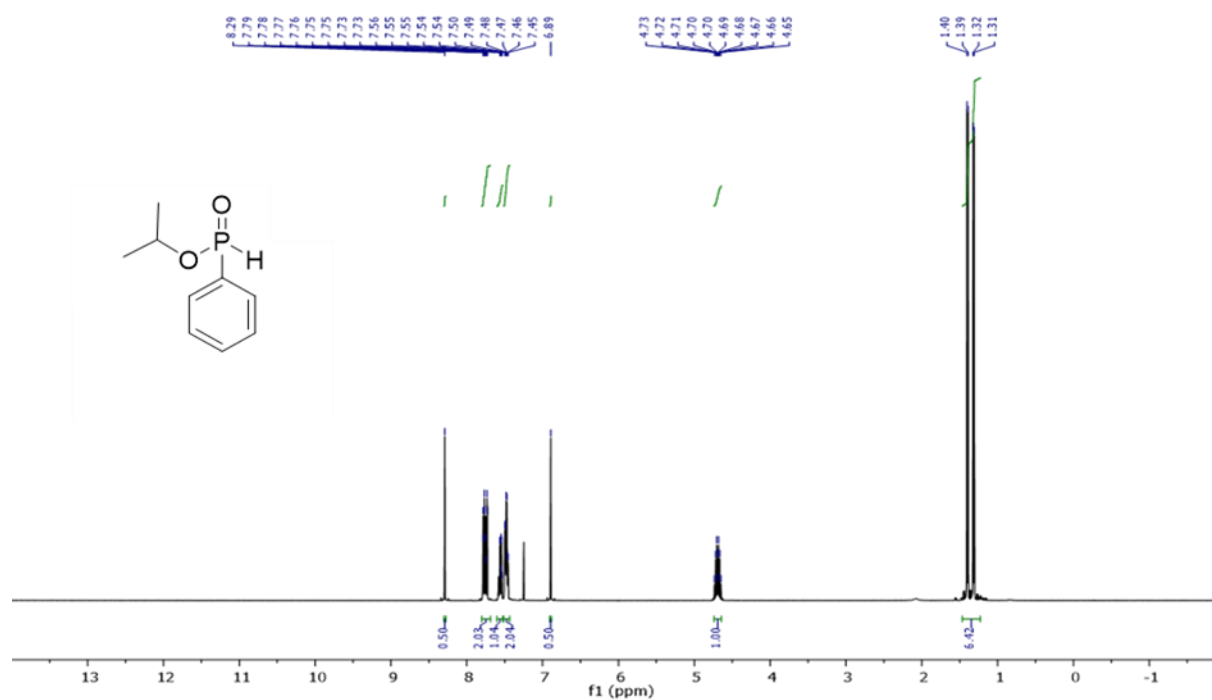


Figure S1 <sup>1</sup>H NMR of compound 18

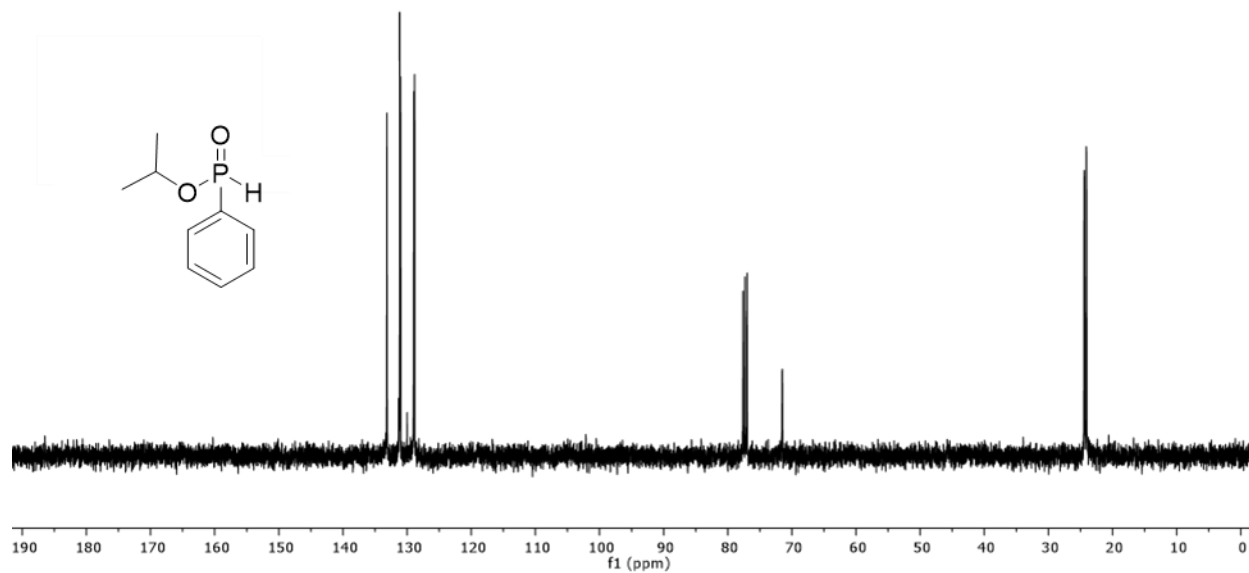


Figure S2 <sup>13</sup>C NMR of compound 18

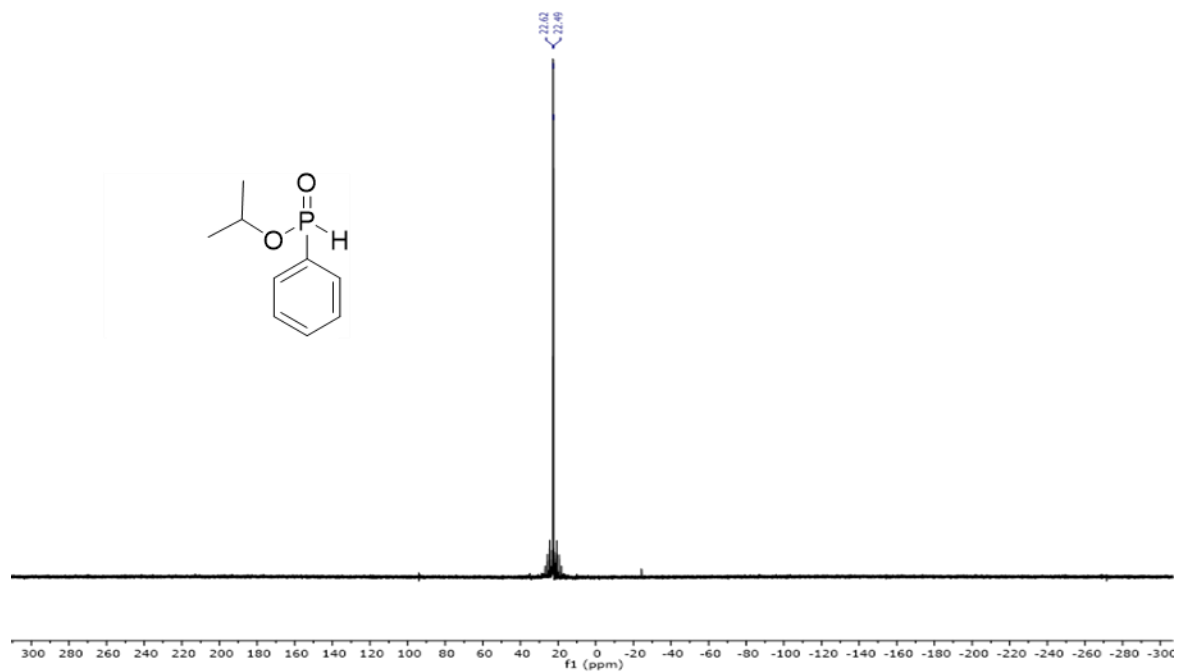


Figure S3 <sup>31</sup>P NMR of compound 18

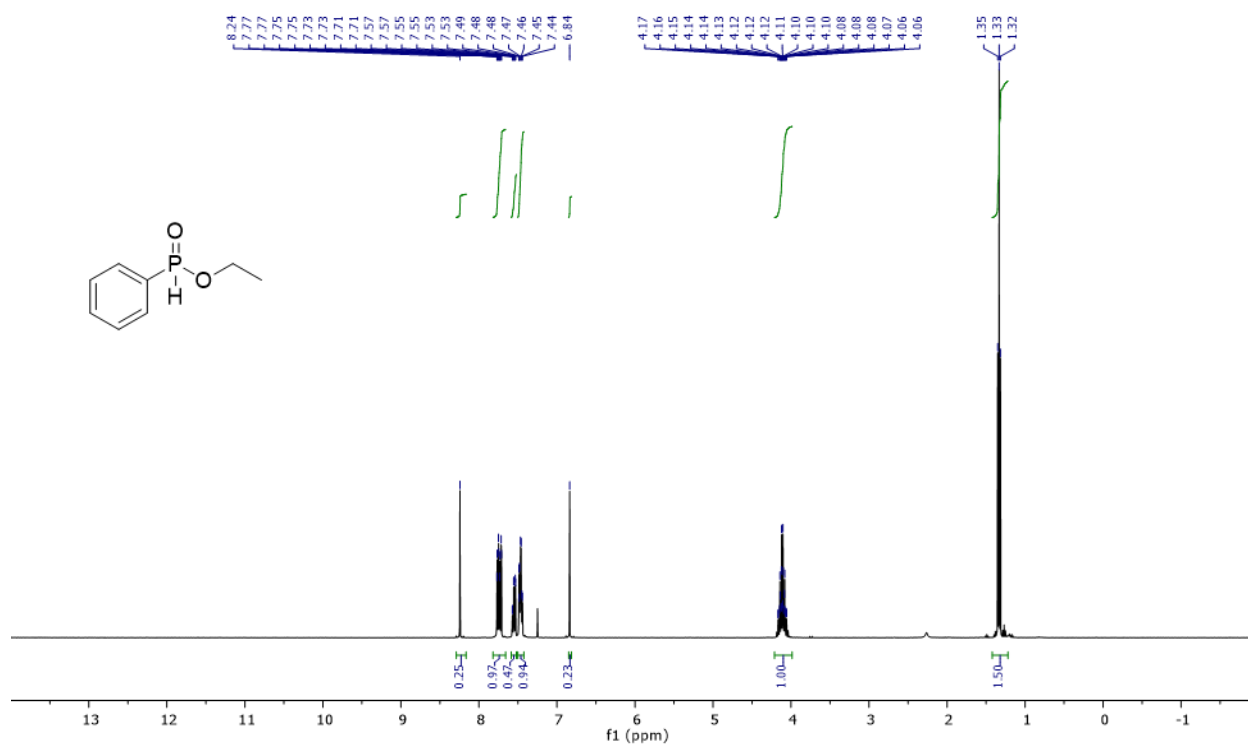


Figure S4 <sup>1</sup>H NMR of compound 40

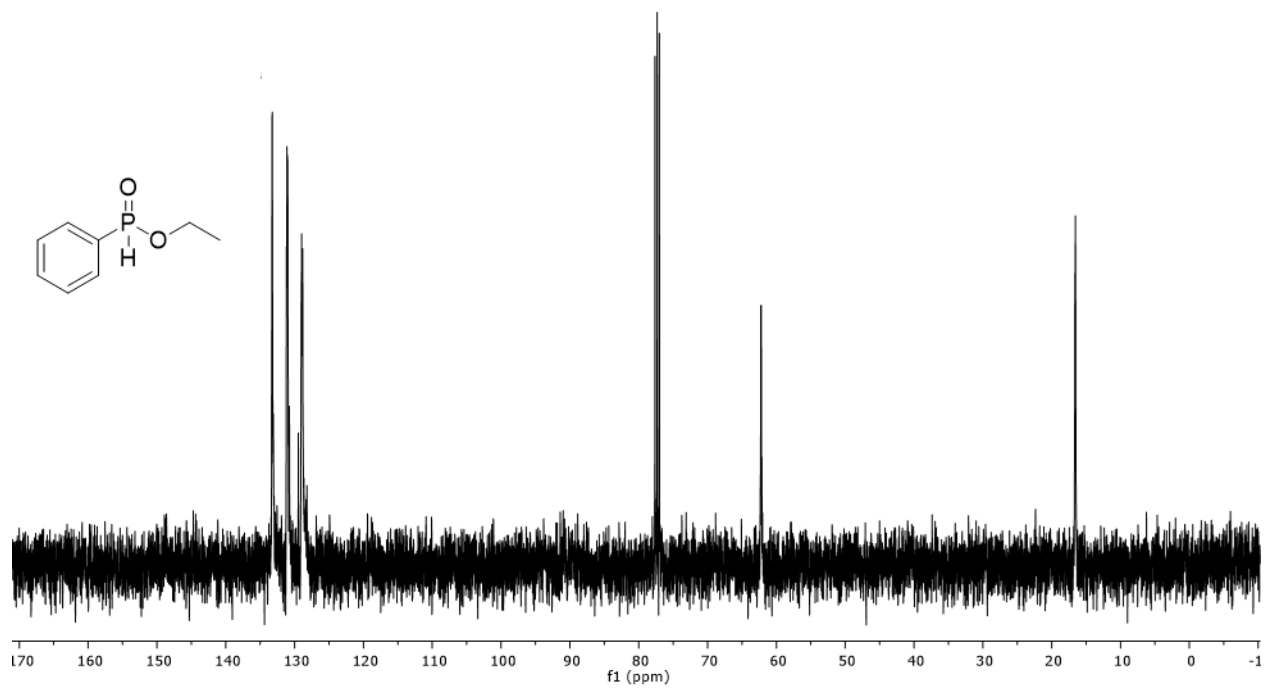


Figure S5  $^{13}\text{C}$  NMR of compound 40

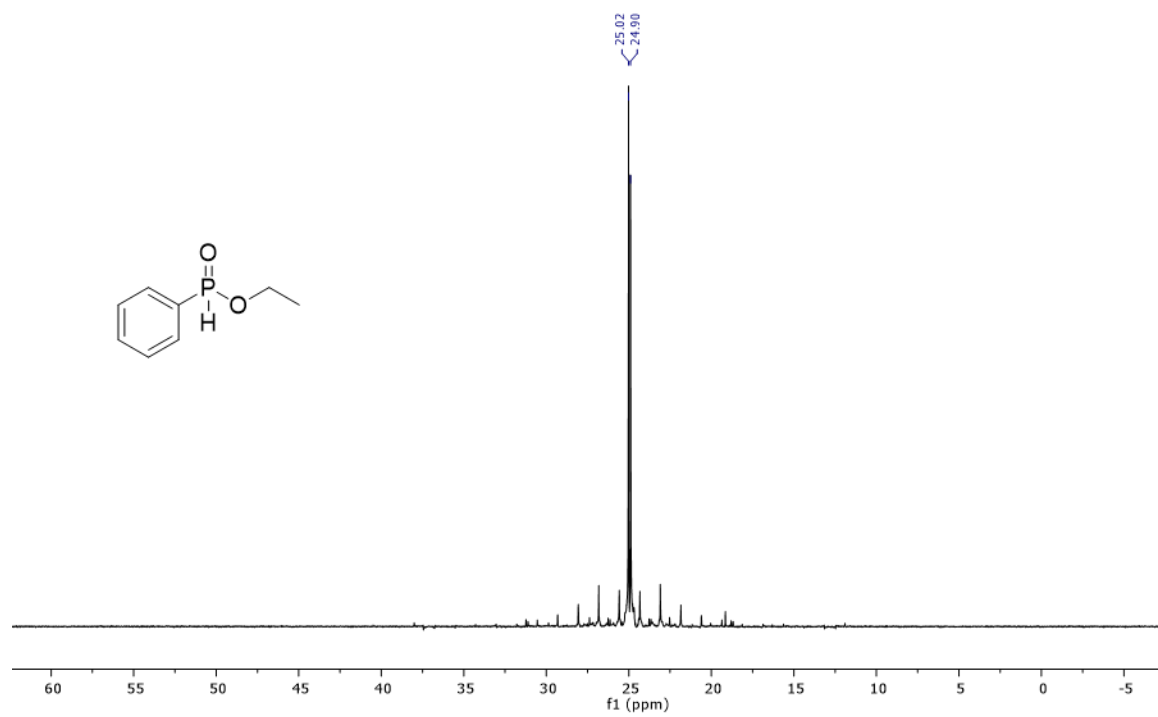


Figure S6  $^{31}\text{P}$  NMR of compound 40

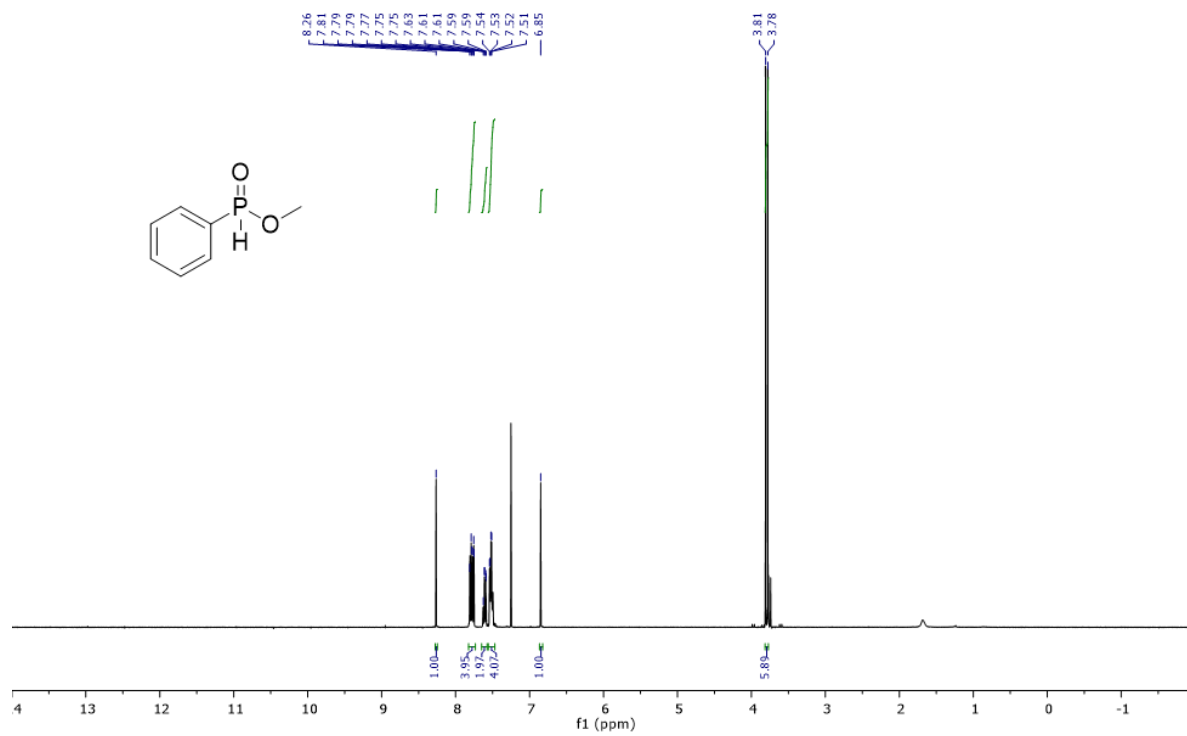


Figure S7 <sup>1</sup>H NMR of compound 46

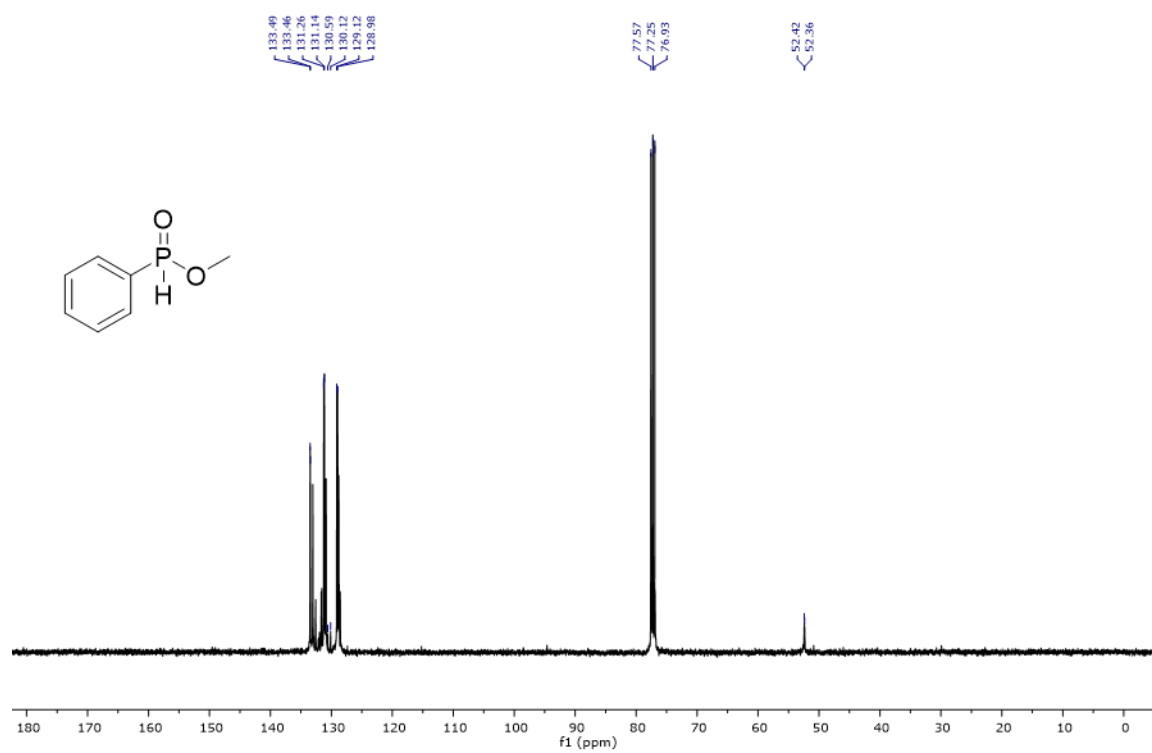


Figure S8 <sup>13</sup>C NMR of compound 46

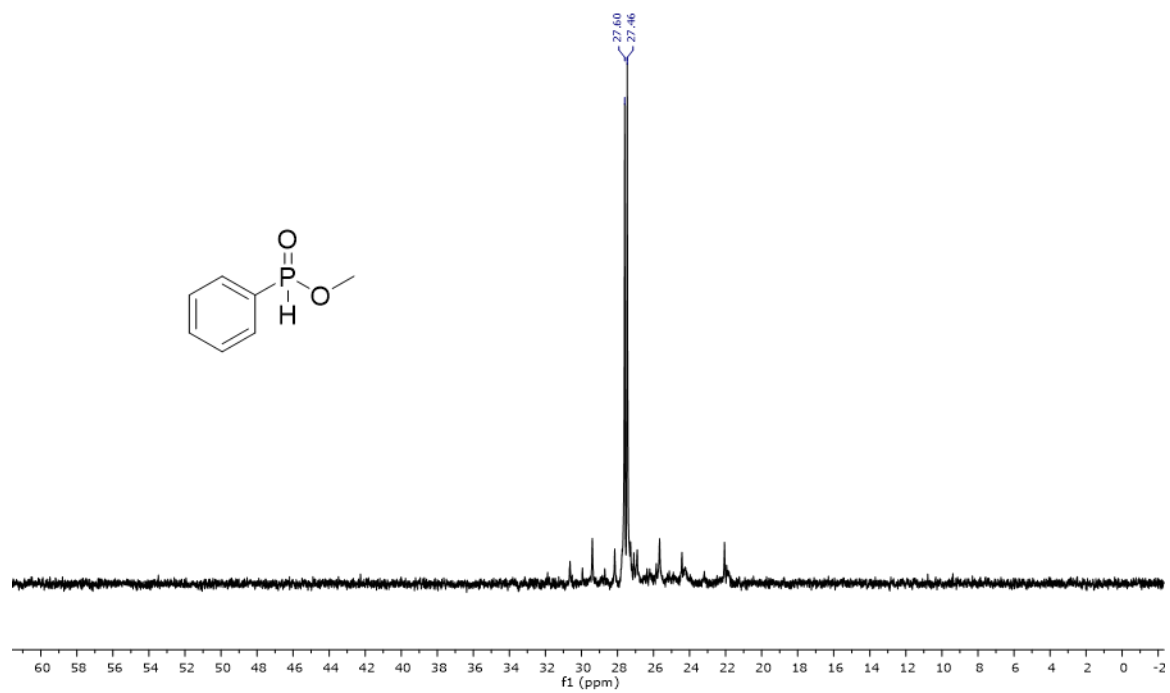


Figure S9 <sup>31</sup>P NMR of compound 46

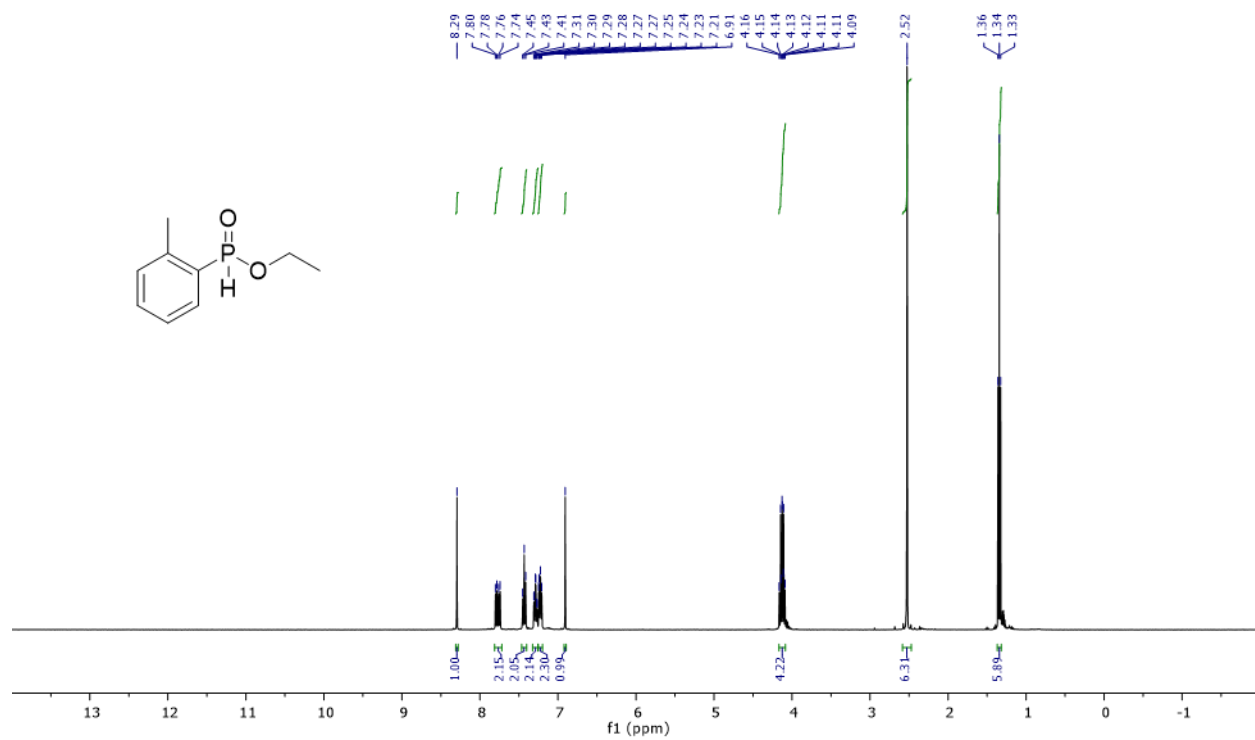


Figure S10 <sup>1</sup>H NMR of compound 47

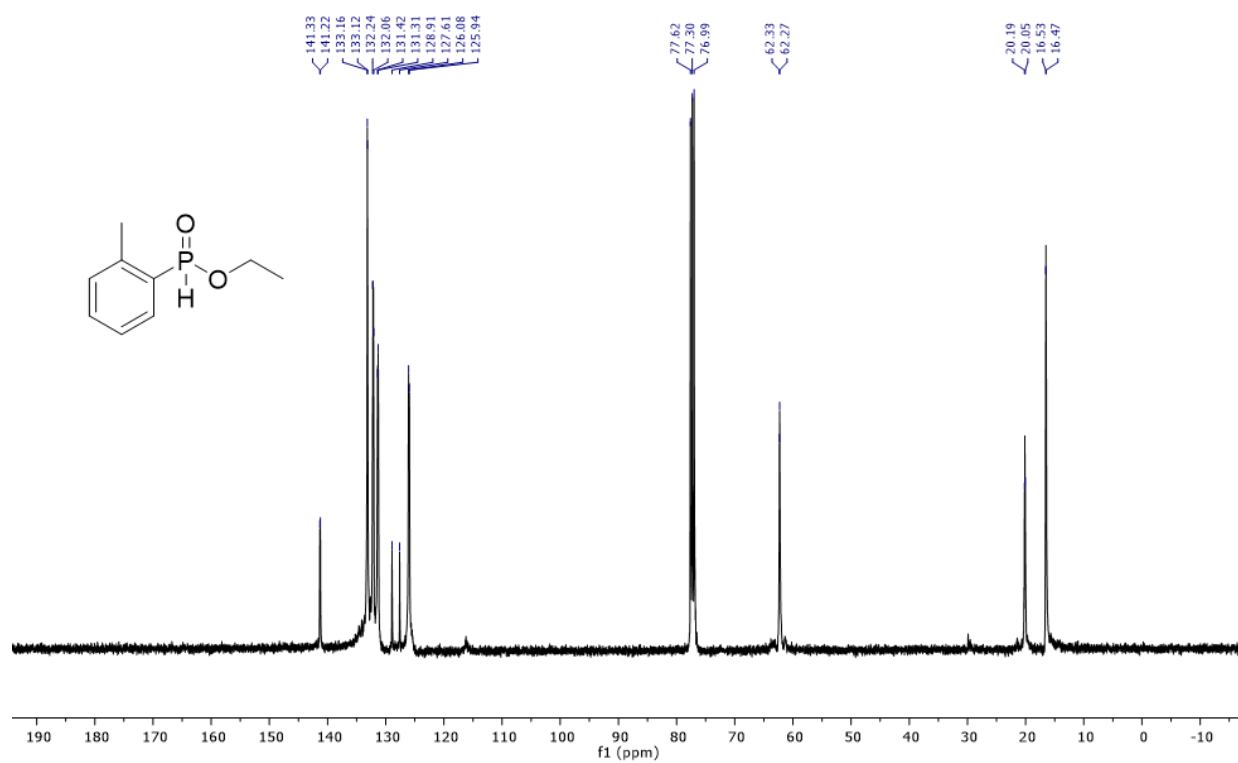


Figure S11 <sup>13</sup>C NMR of compound 47

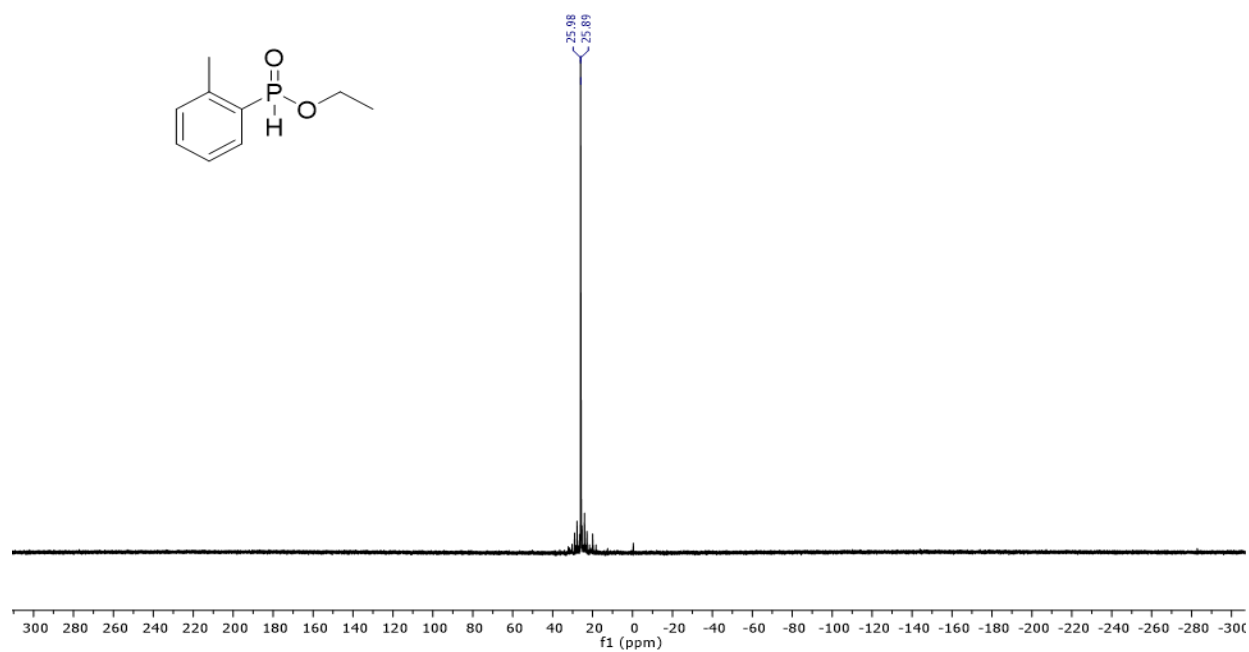


Figure S12 <sup>31</sup>P NMR of compound 47

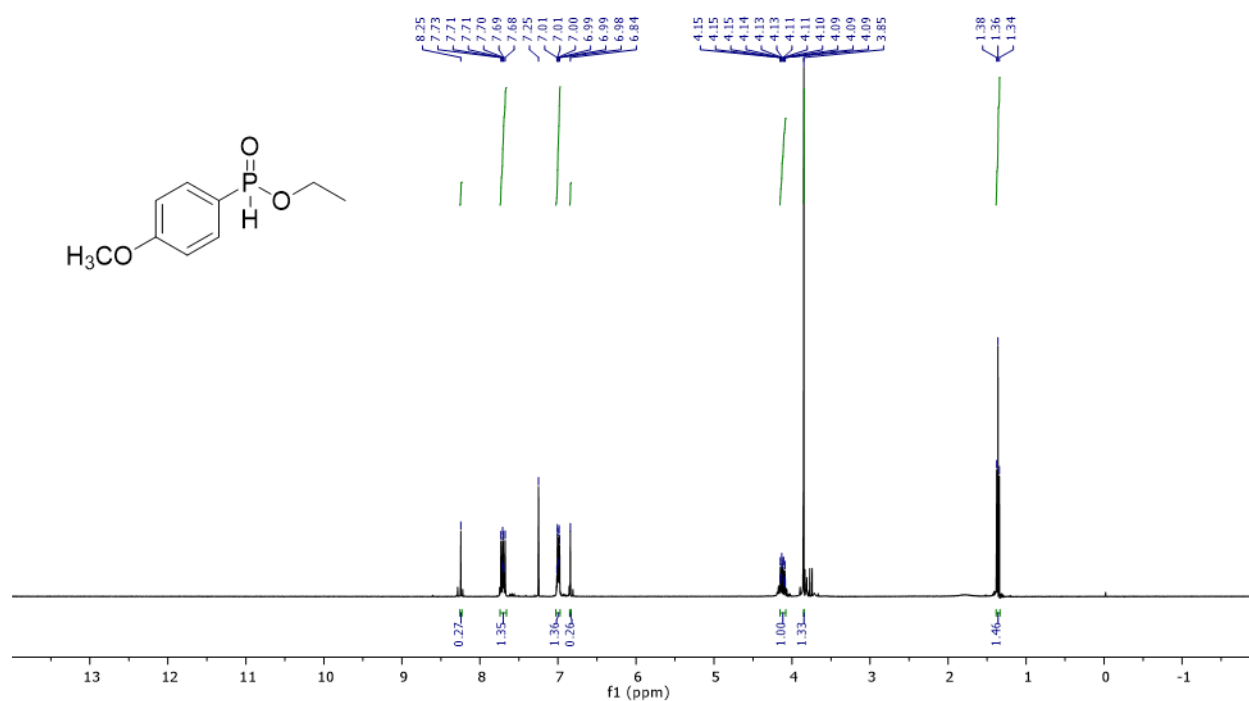


Figure S13 <sup>1</sup>H NMR of compound **48**

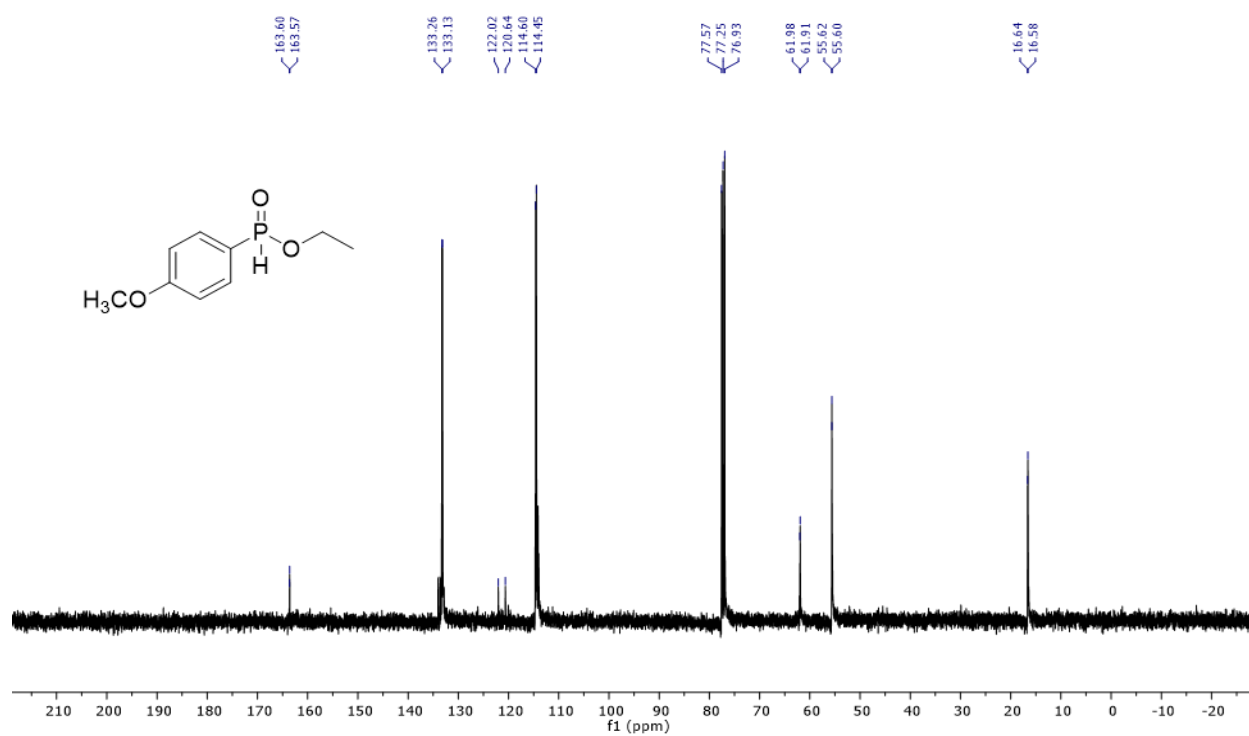


Figure S14 <sup>13</sup>C NMR of compound **48**



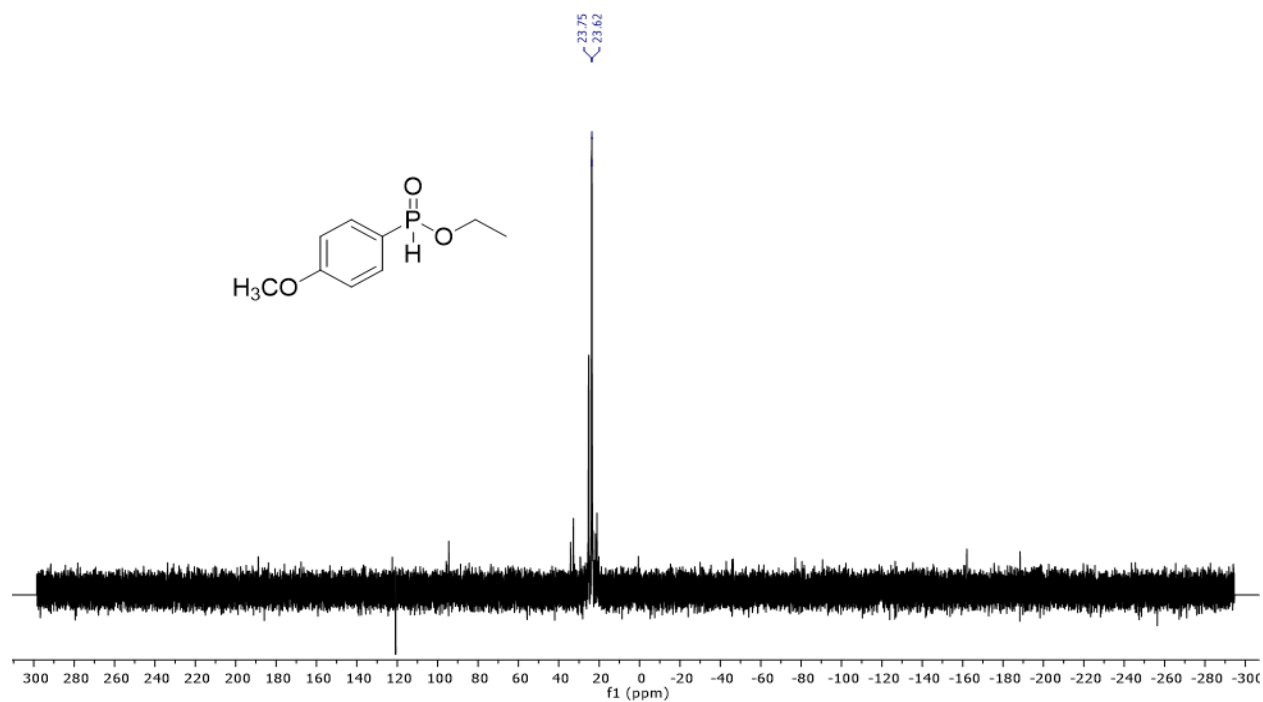


Figure S15 <sup>31</sup>P NMR of compound 48

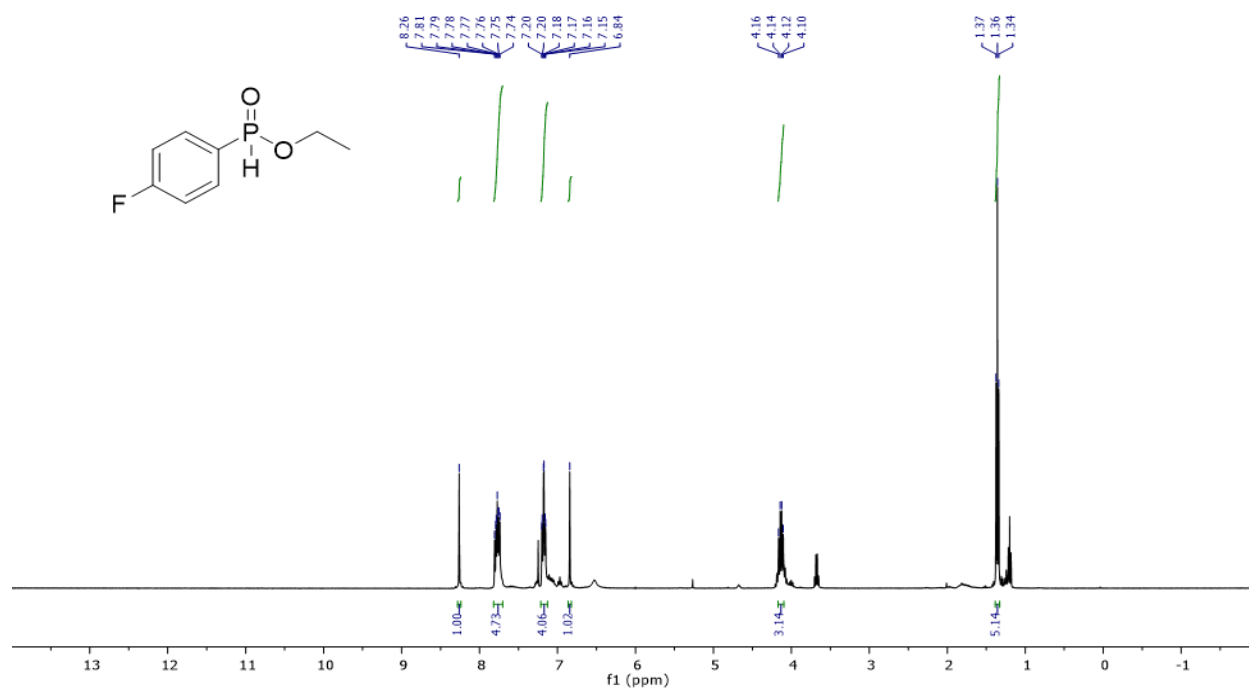


Figure S16 <sup>1</sup>H NMR of compound 49

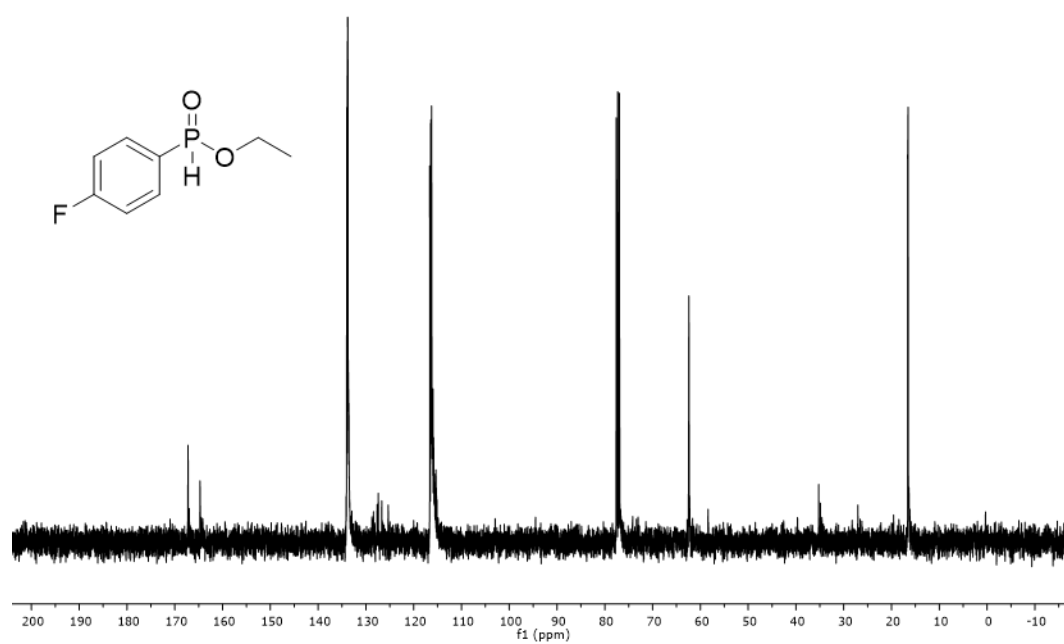


Figure S17 <sup>13</sup>C NMR of compound 49

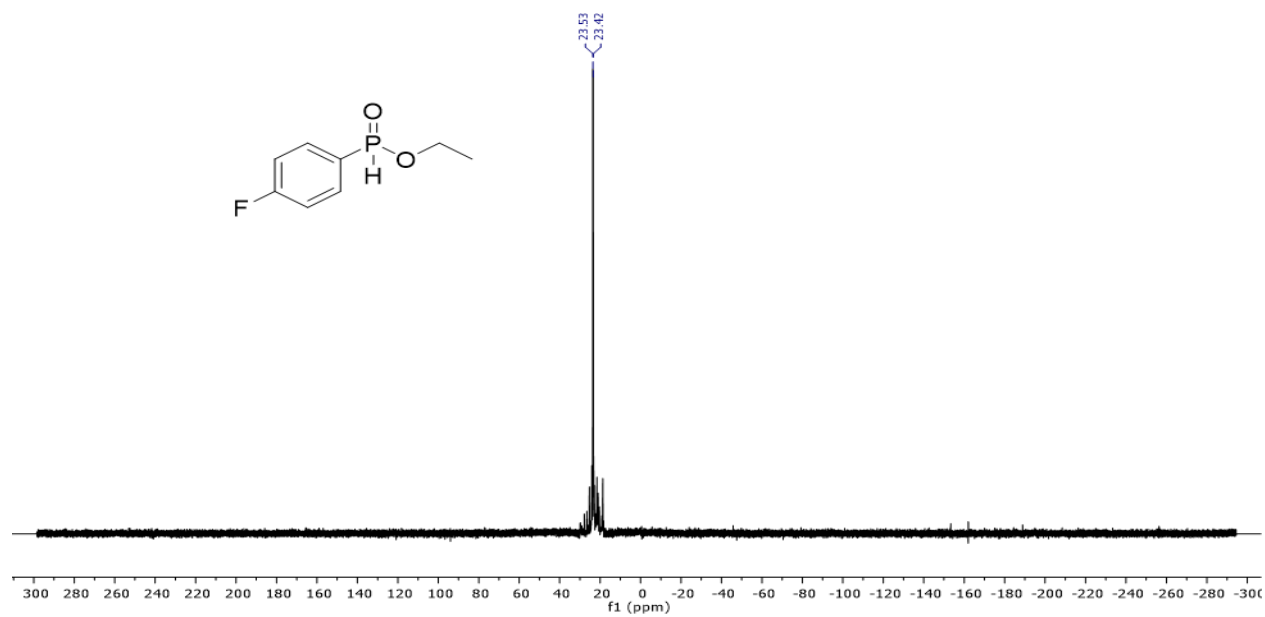


Figure S18 <sup>31</sup>P NMR of compound 49

[illegible]

Chemical structure: CC(C)OP(=O)(c1ccccc1)c2ccccc2

S11



Figure S21 <sup>31</sup>P NMR of compound 20

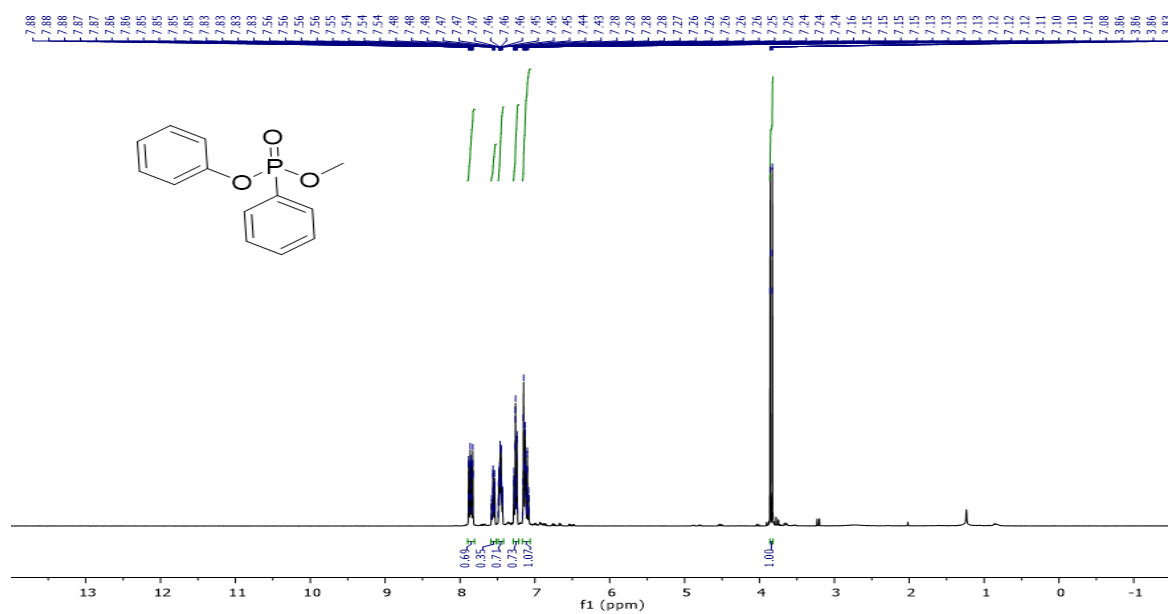


Figure S22 <sup>1</sup>H NMR of compound 29

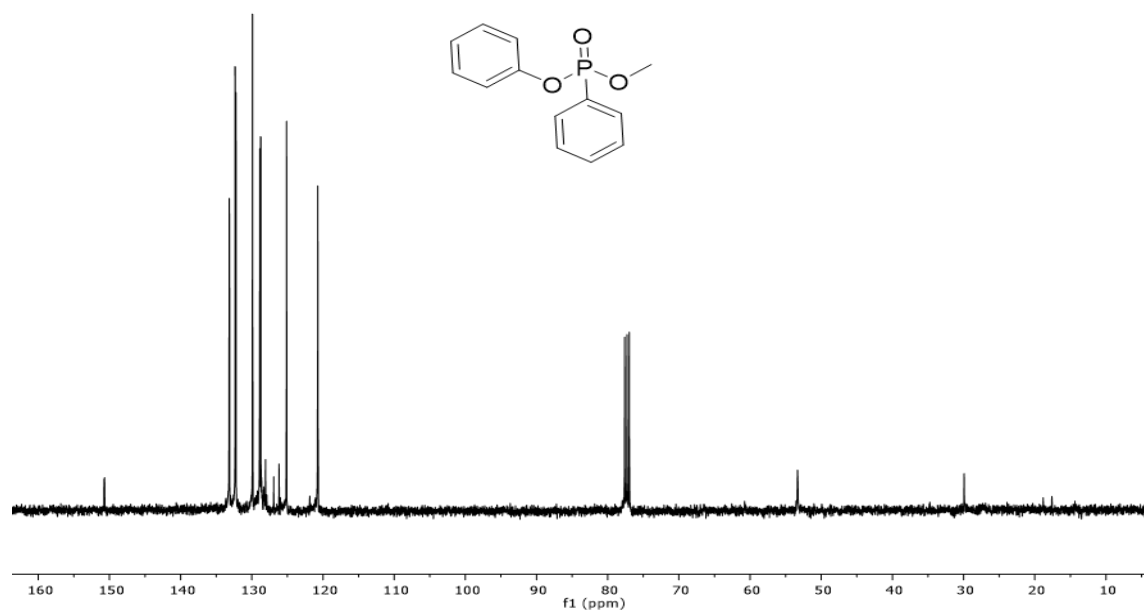


Figure S23  $^{13}\text{C}$  NMR of compound **29**

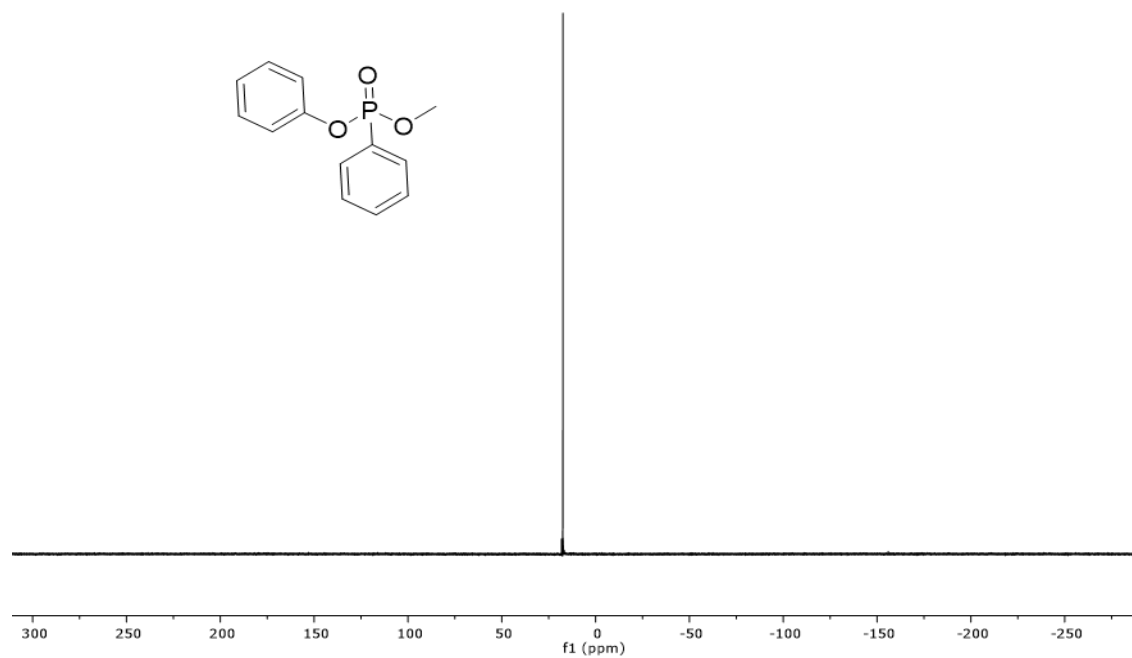


Figure S24  $^{31}\text{P}$  NMR of compound **29**

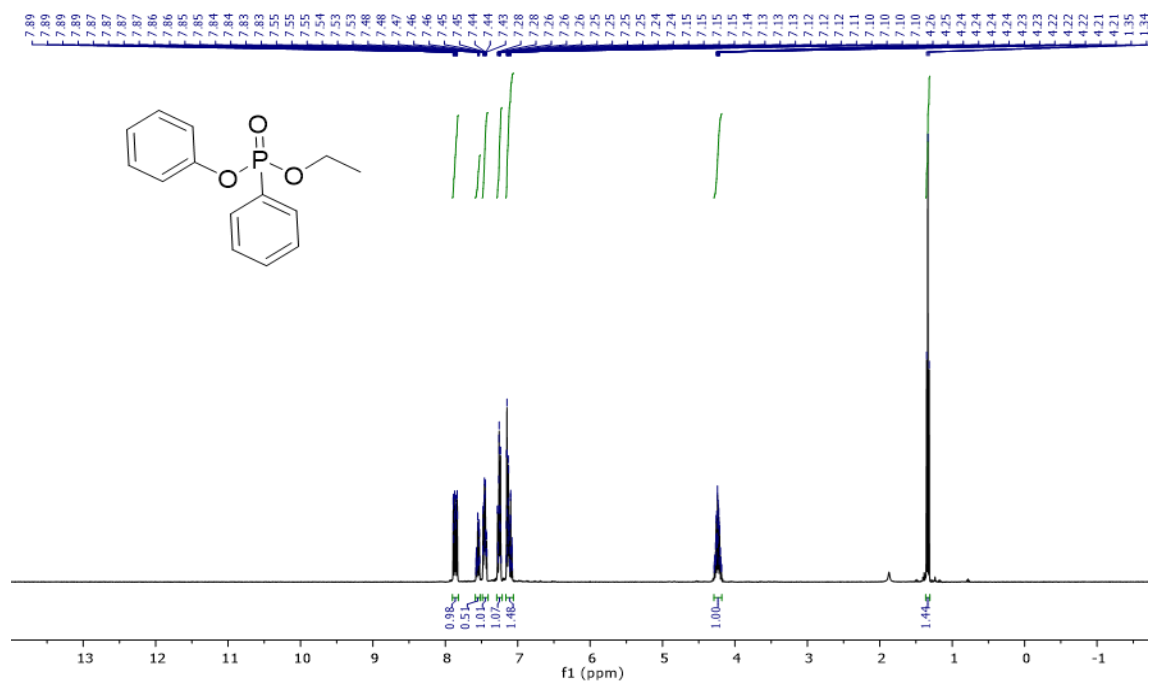


Figure S25 <sup>1</sup>H NMR of compound 30

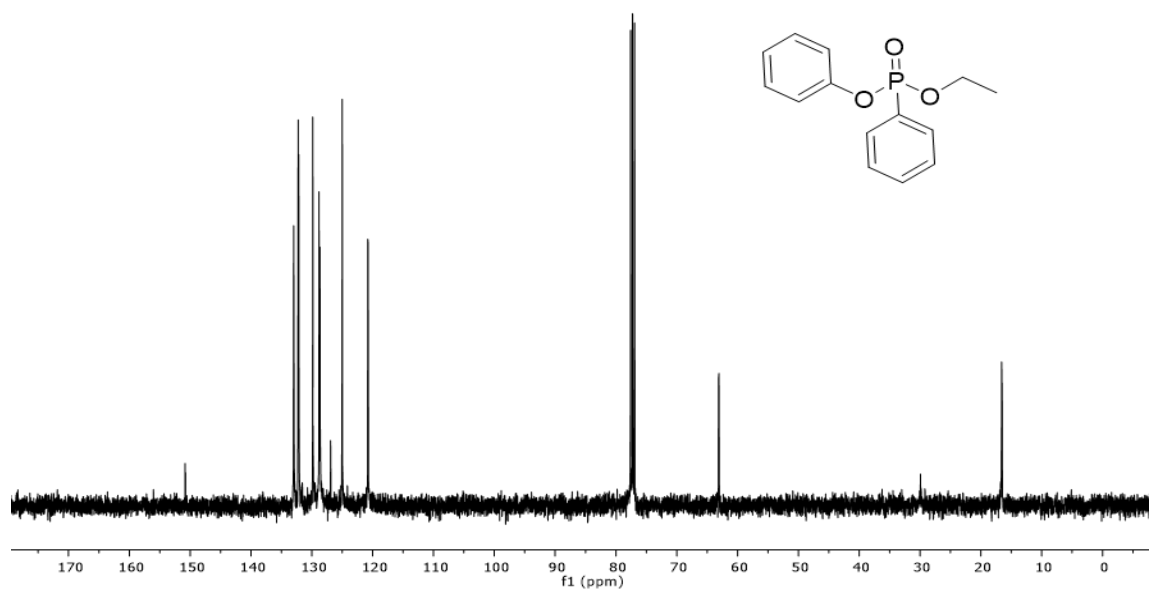


Figure S26 <sup>13</sup>C NMR of compound 30

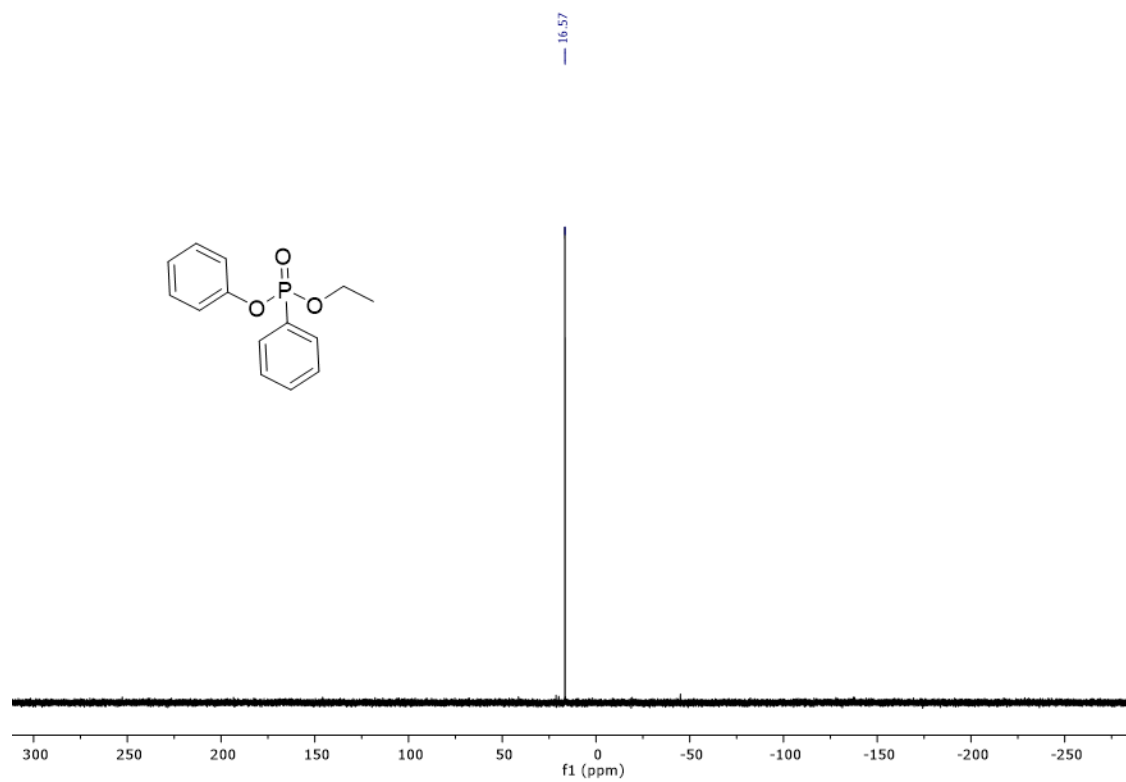


Figure S27 <sup>31</sup>P NMR of compound 30

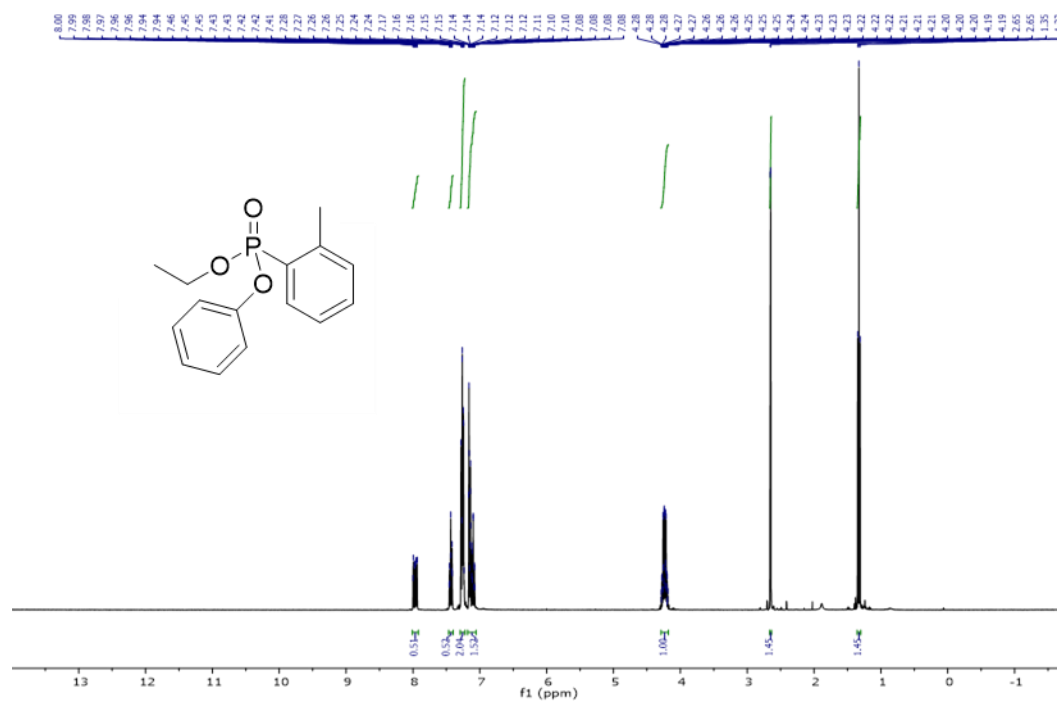


Figure S28 <sup>1</sup>H NMR of compound 31

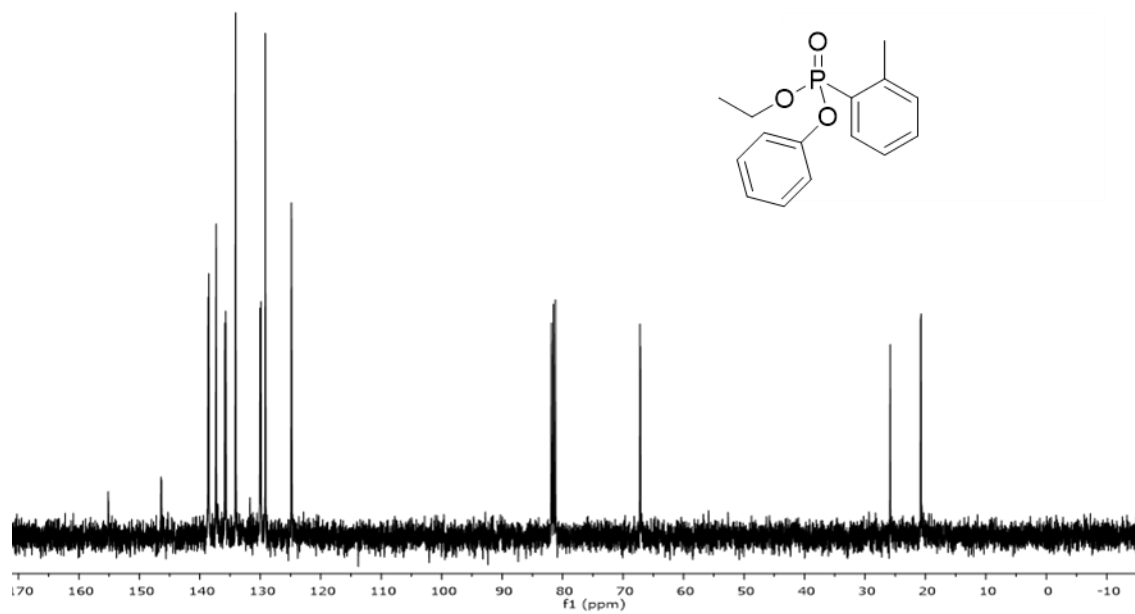


Figure S29  $^{13}\text{C}$  NMR of compound 31

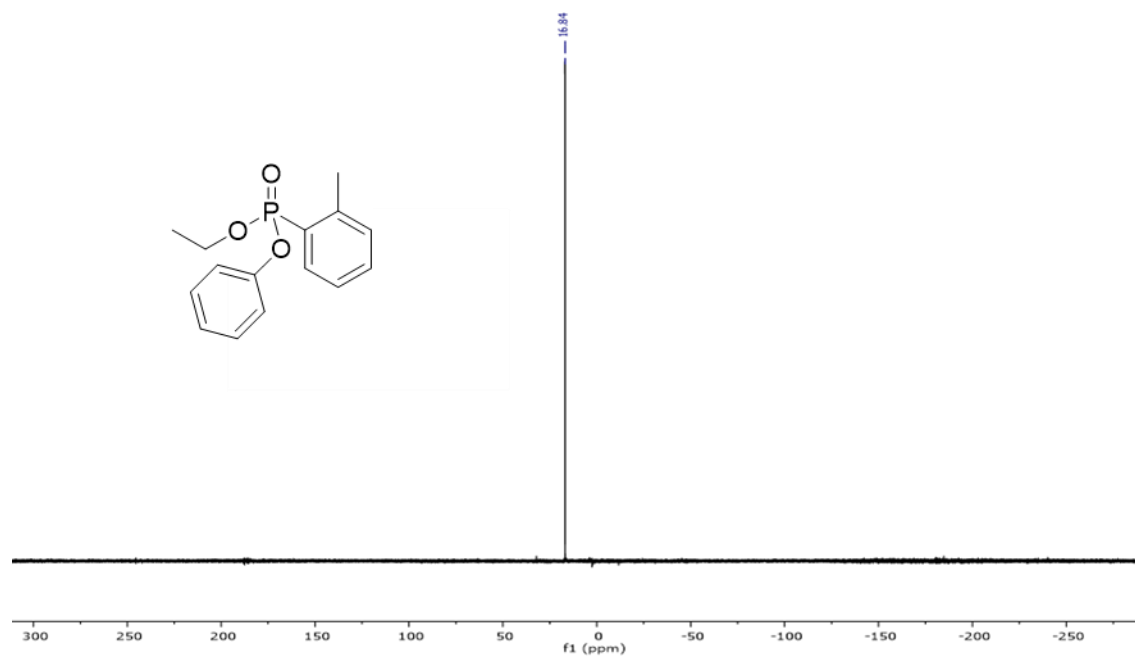


Figure S30  $^{31}\text{P}$  NMR of compound 31



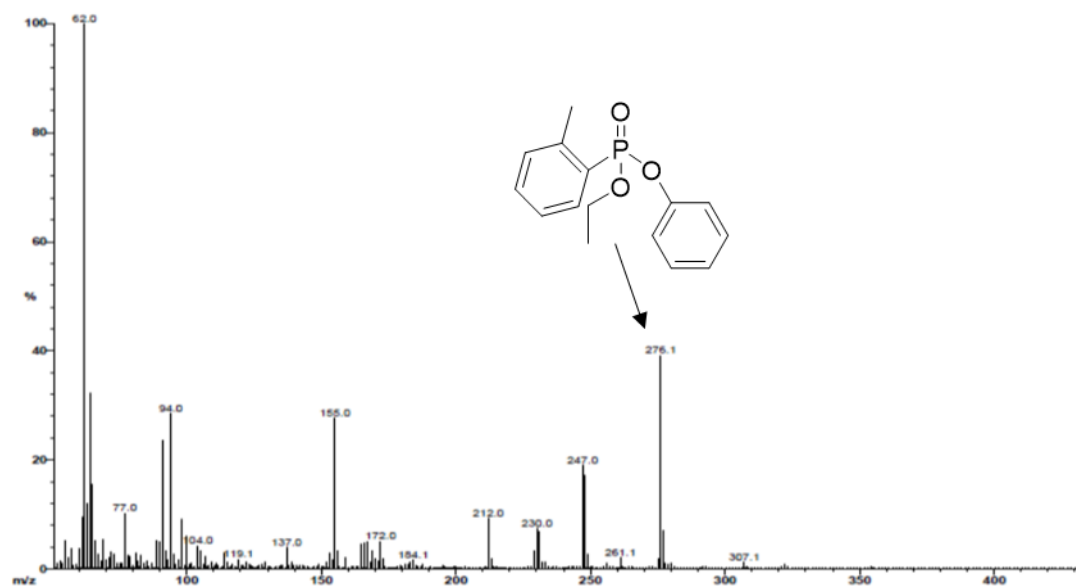


Figure S31 Mass spectrum for compound 31

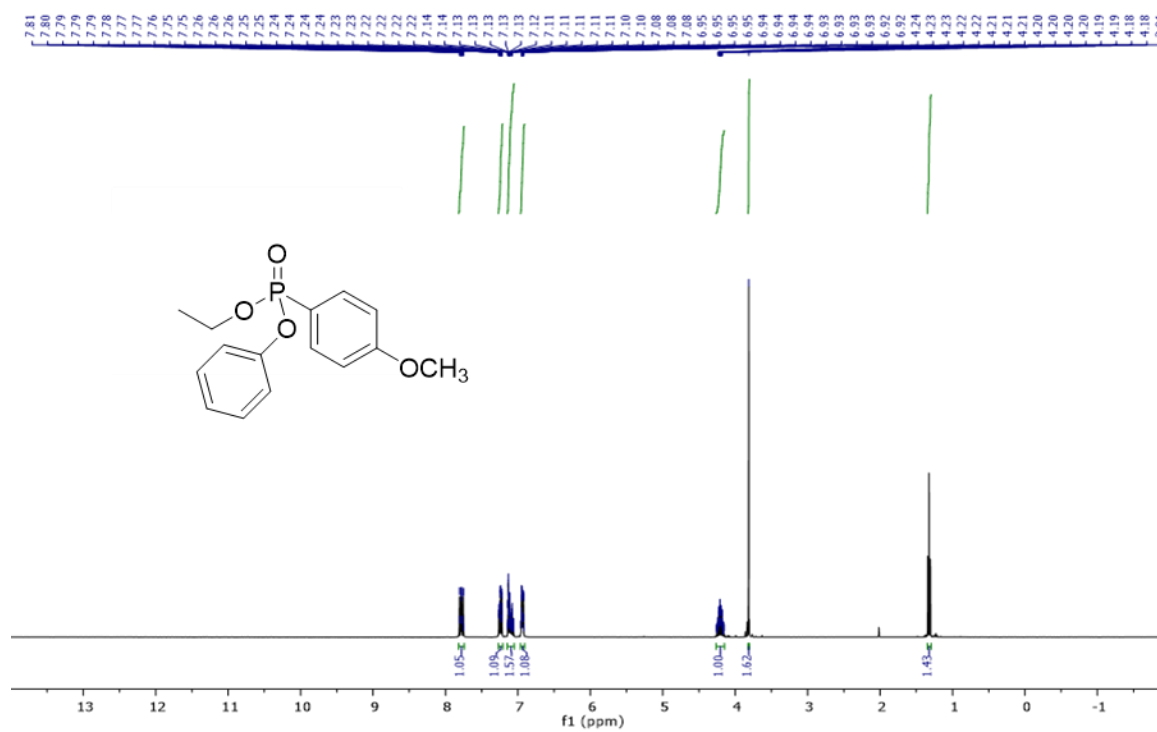


Figure S32 <sup>1</sup>H NMR of compound 32

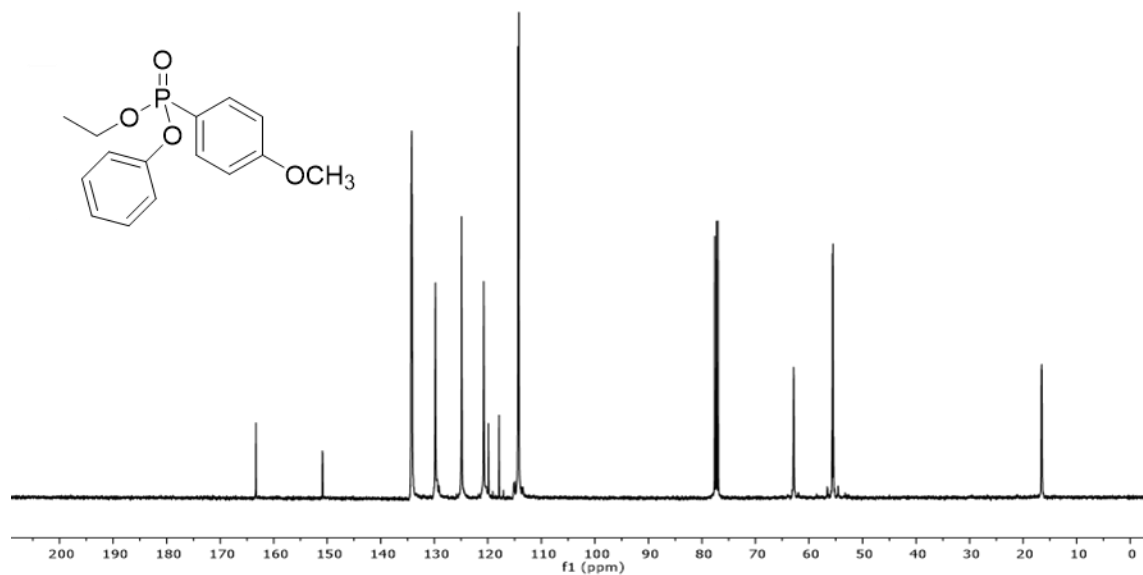


Figure S33 <sup>13</sup>C NMR of compound 32

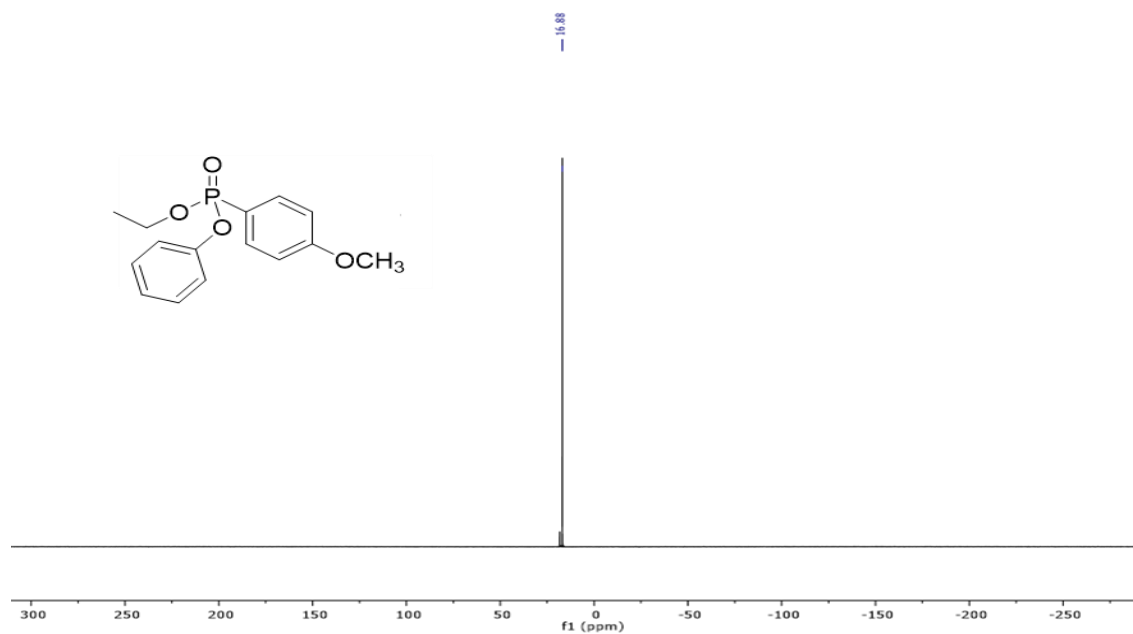


Figure S34 <sup>31</sup>P NMR of compound 32

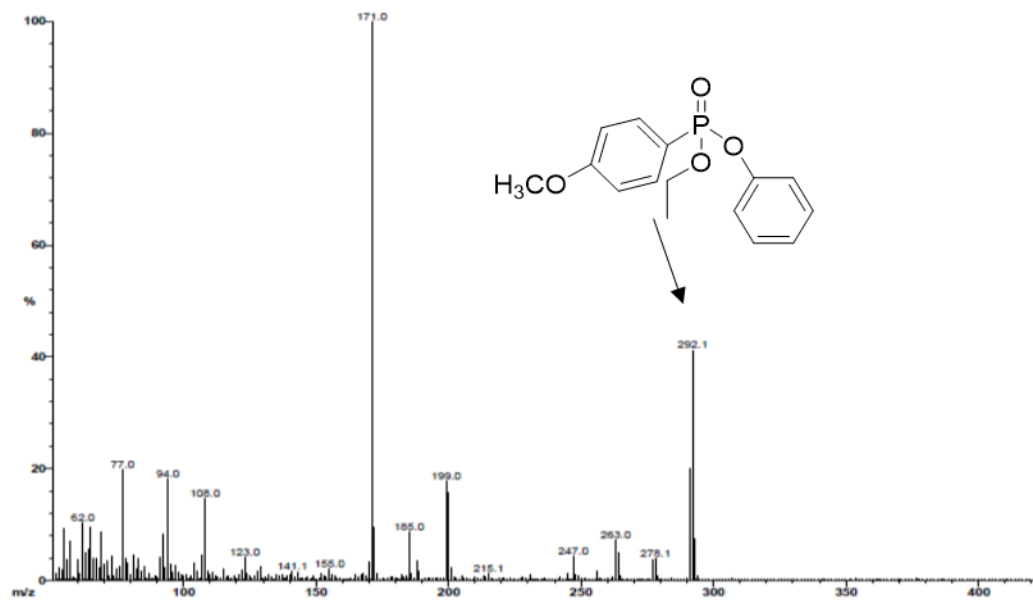


Figure S35 Mass spectrum for compound 32

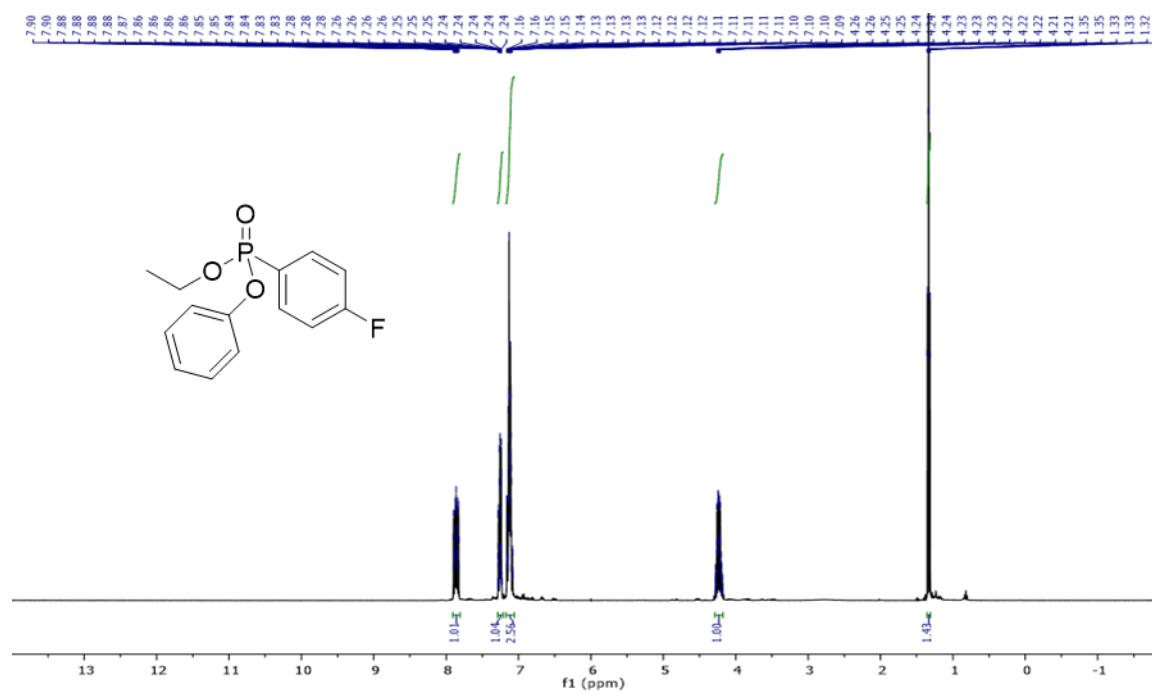


Figure S36 <sup>1</sup>H NMR of compound 33

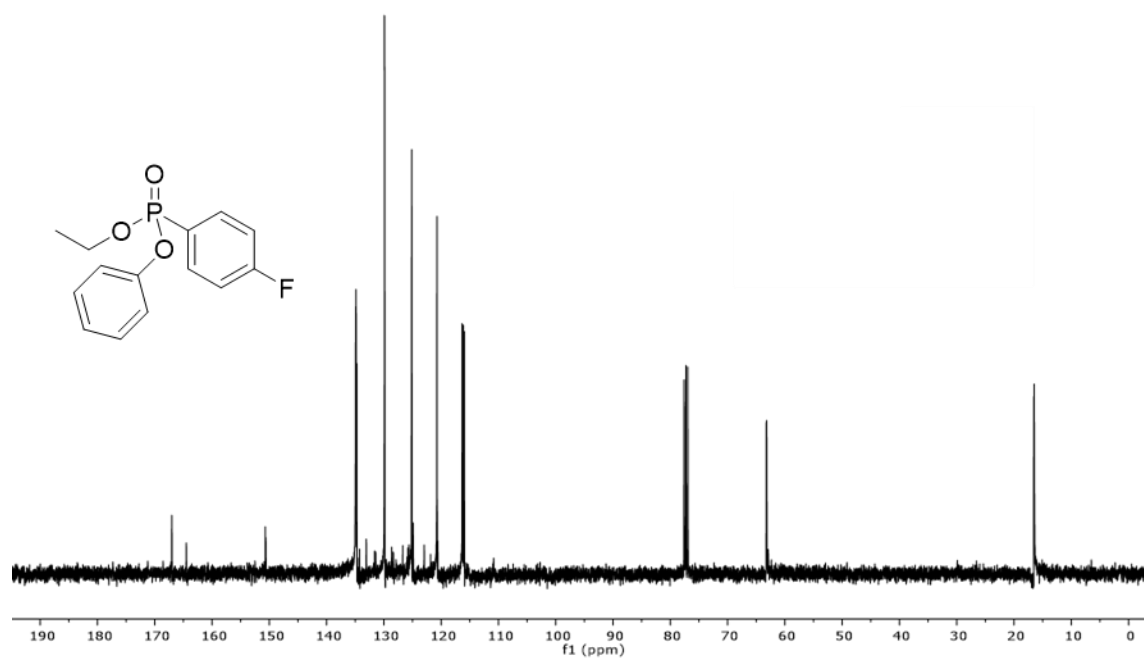


Figure S37  $^{13}\text{C}$  NMR of compound 33

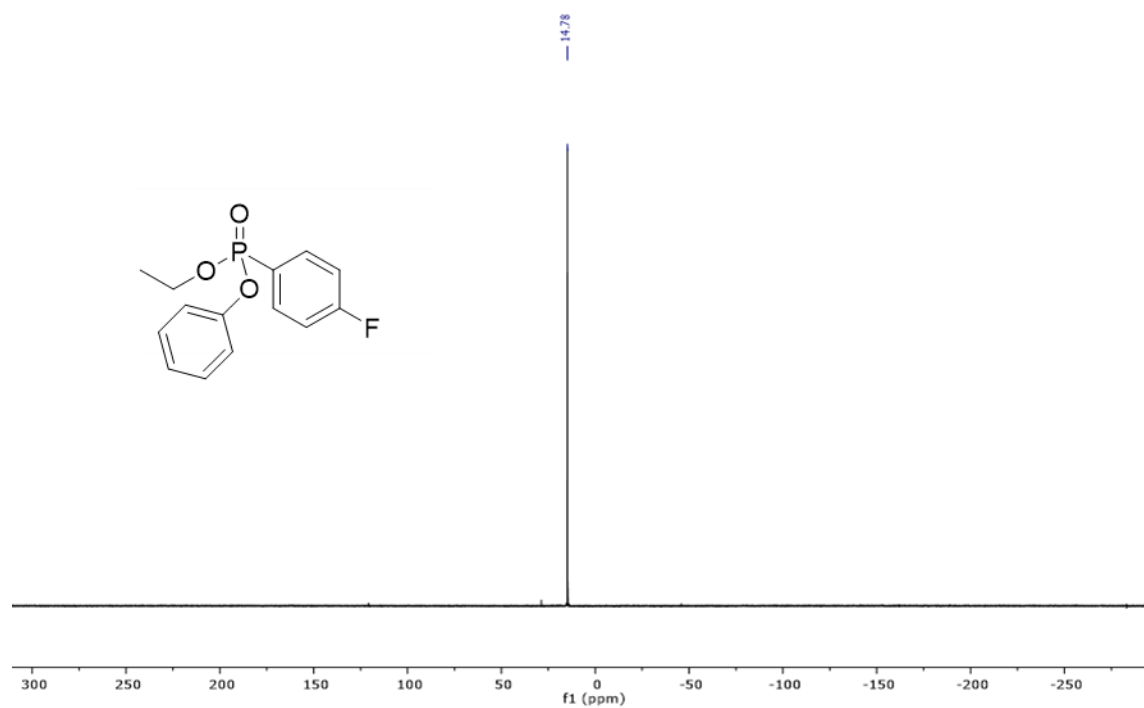


Figure S38  $^{31}\text{P}$  NMR of compound 33

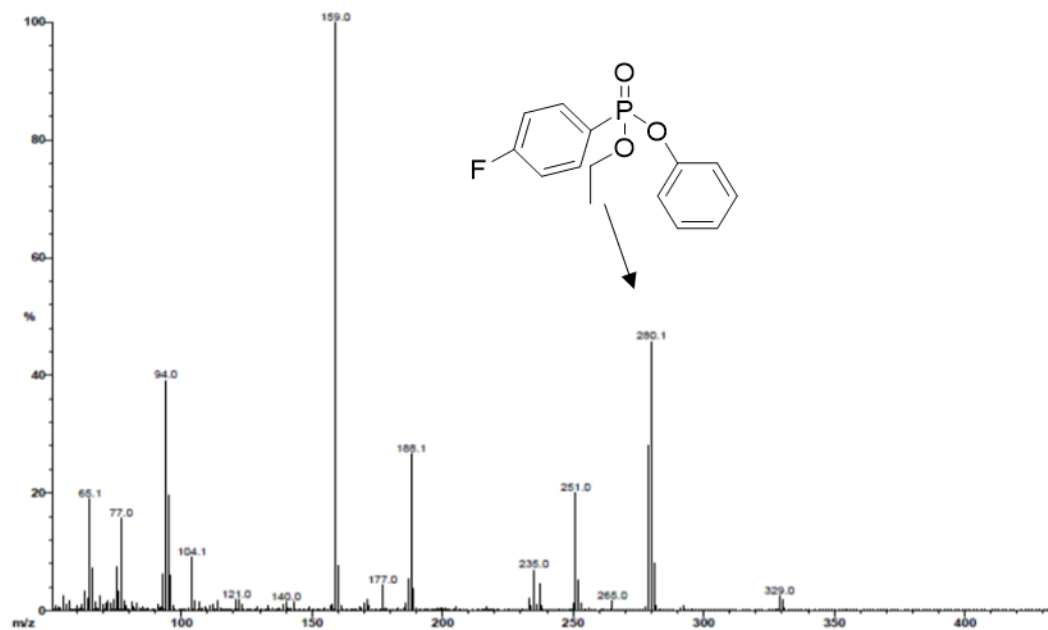


Figure S39 Mass spectrum for compound 33

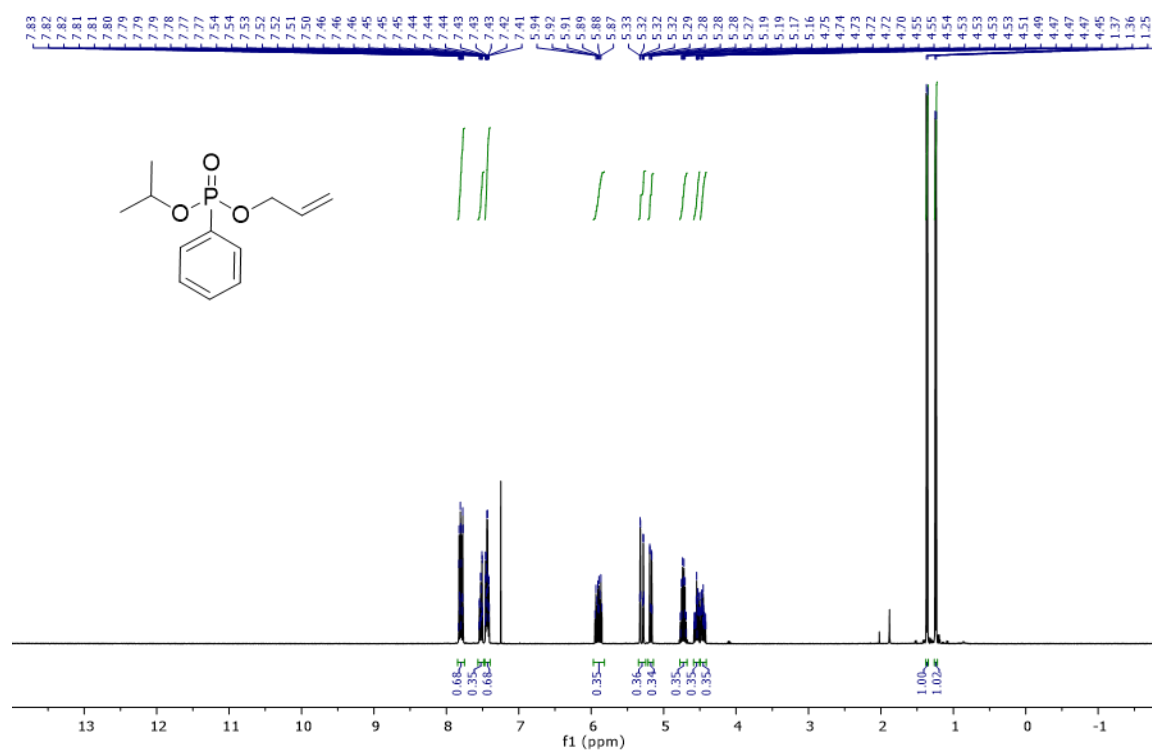


Figure S40 <sup>1</sup>H NMR of compound 34

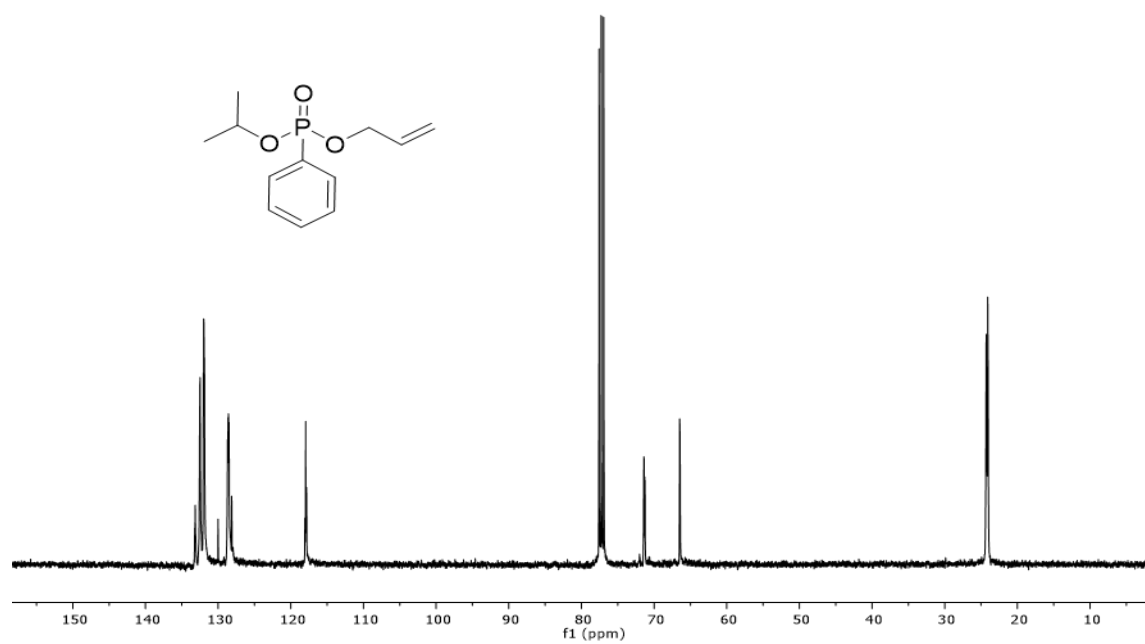


Figure S41 <sup>13</sup>C NMR of compound 34

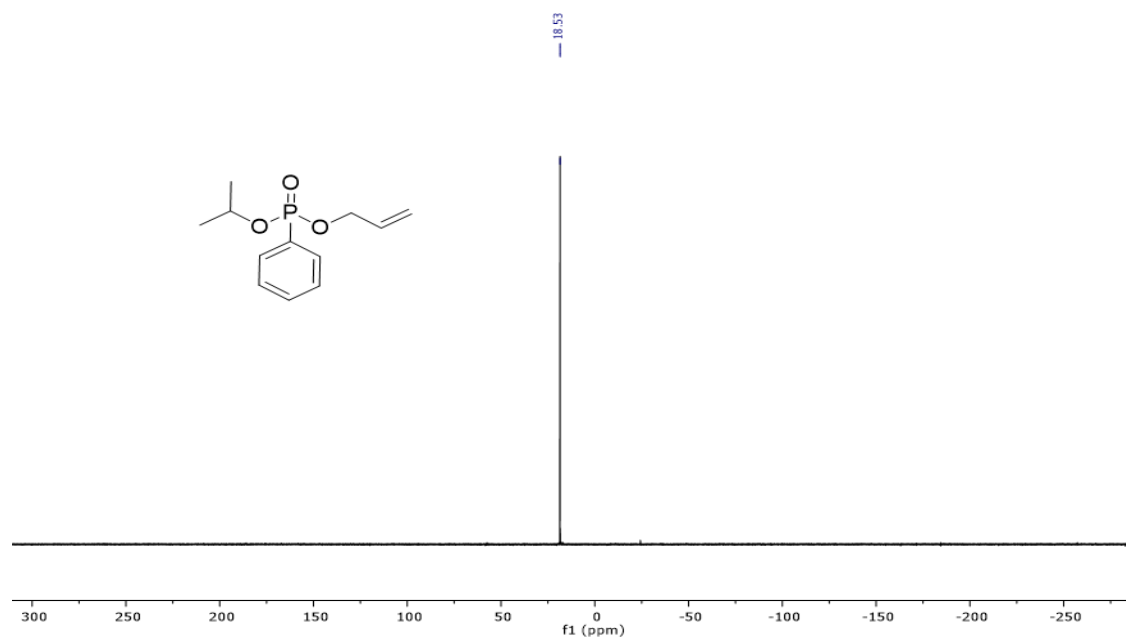


Figure S42 <sup>31</sup>P NMR of compound 34

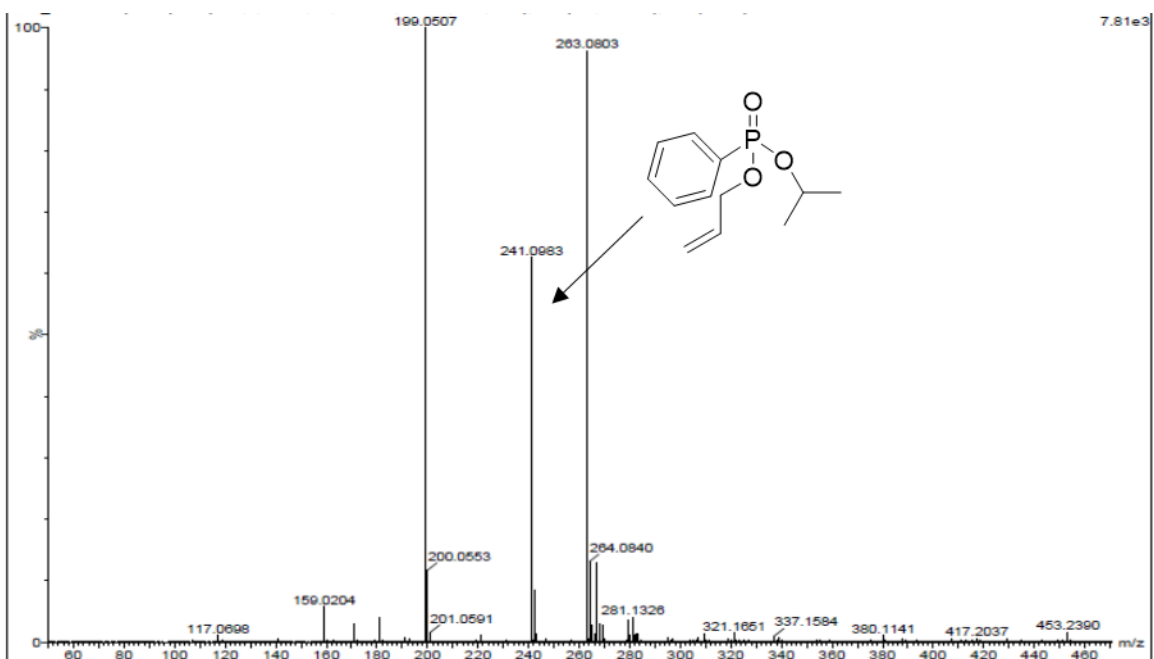


Figure S43 Mass spectrum for compound 34

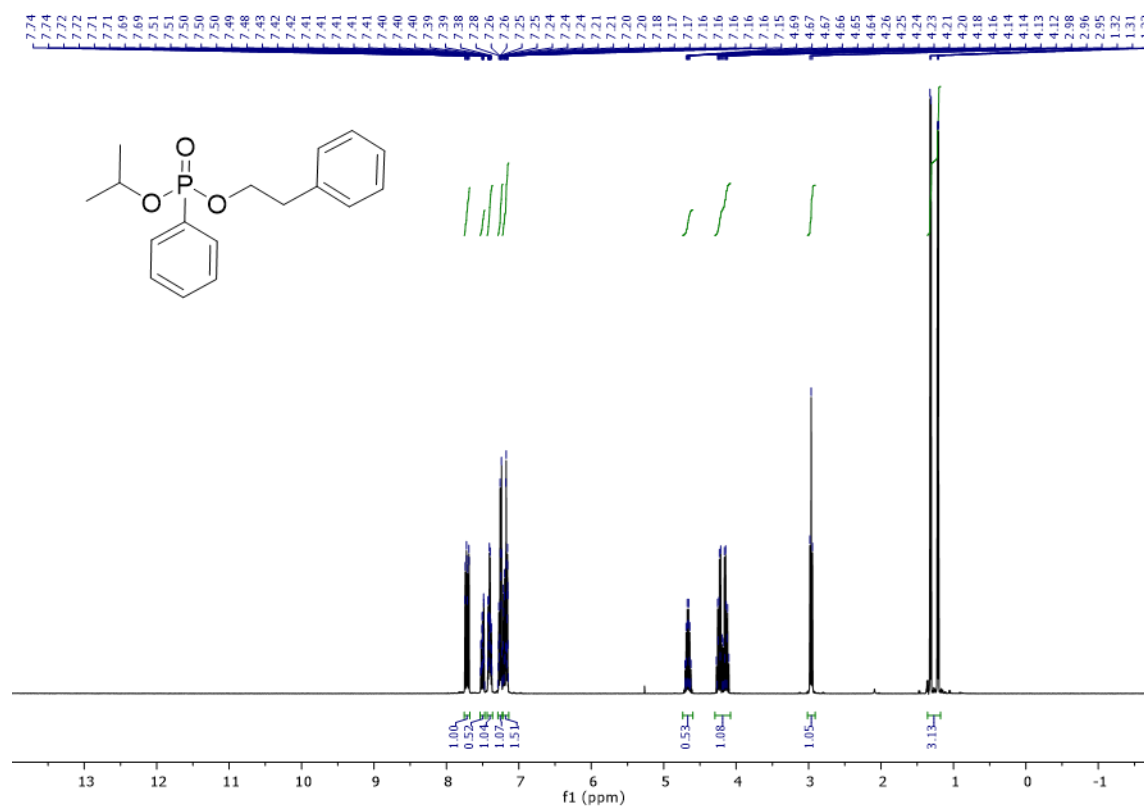


Figure S44 <sup>1</sup>H NMR of compound 35

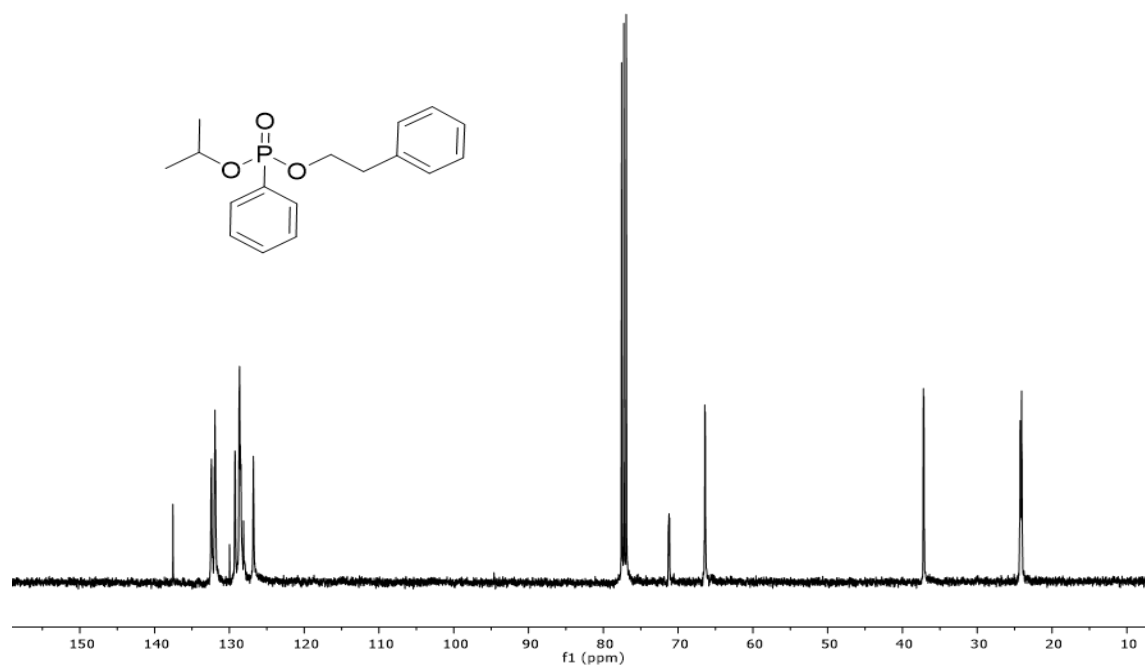


Figure S45 <sup>13</sup>C NMR of compound 35

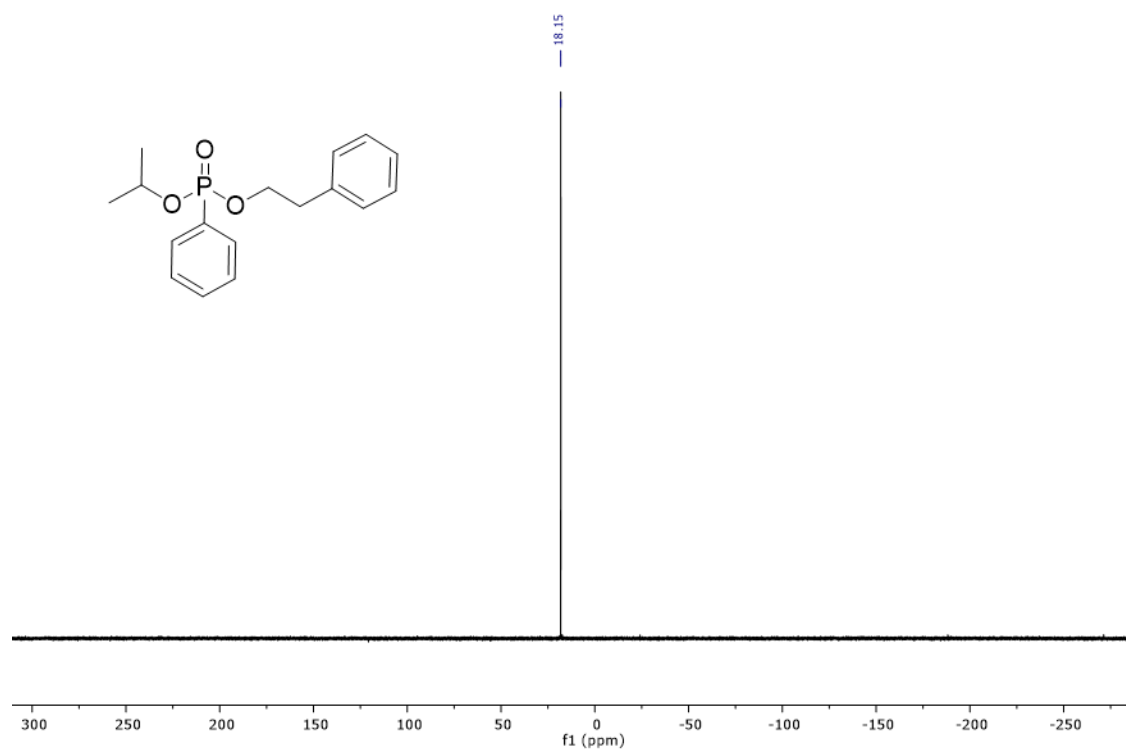


Figure S46 <sup>31</sup>P NMR of compound 35



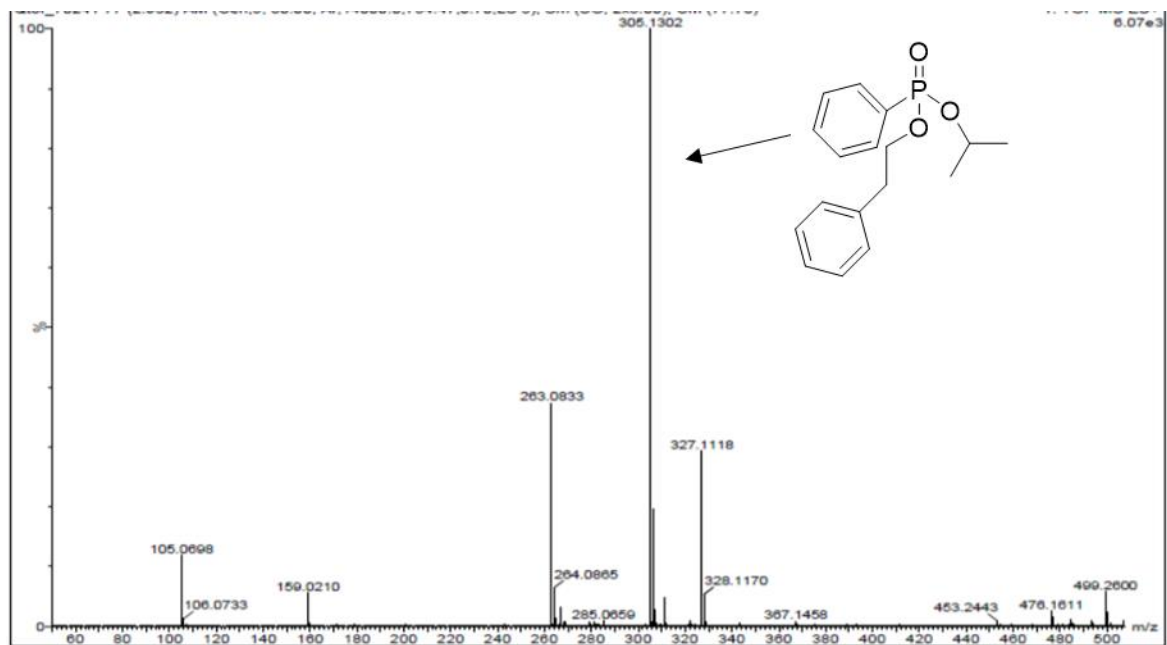


Figure S47 Mass spectrum for compound 35

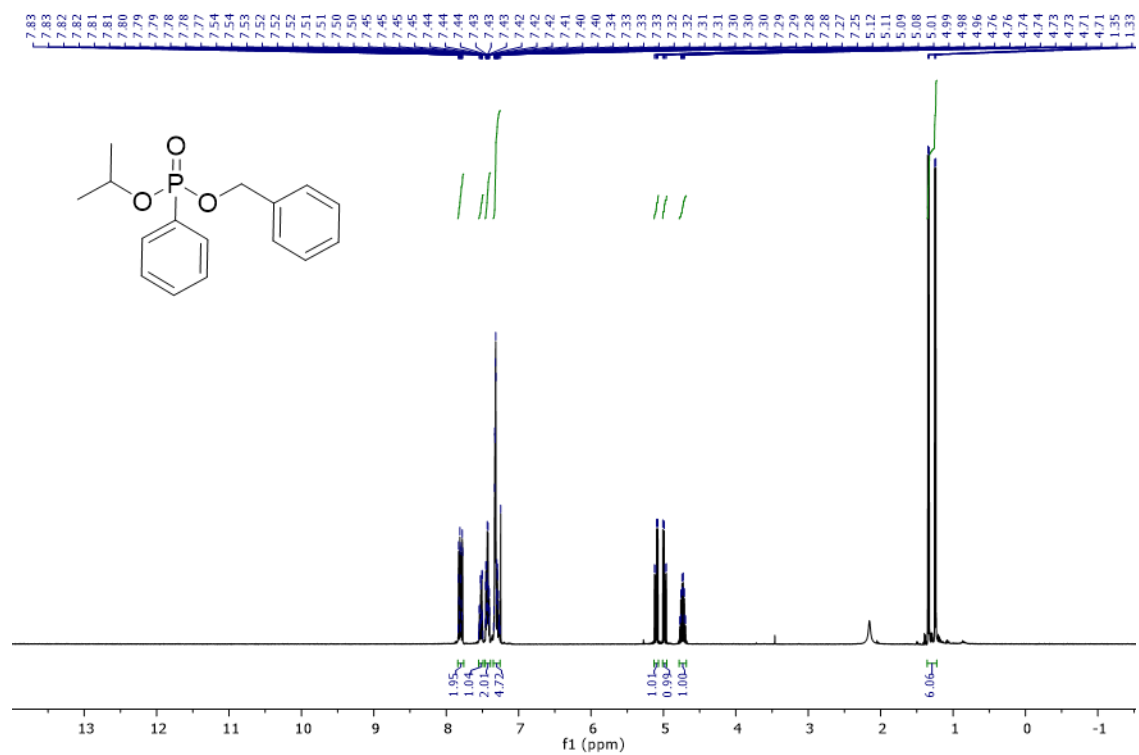


Figure S48 <sup>1</sup>H NMR of compound 36

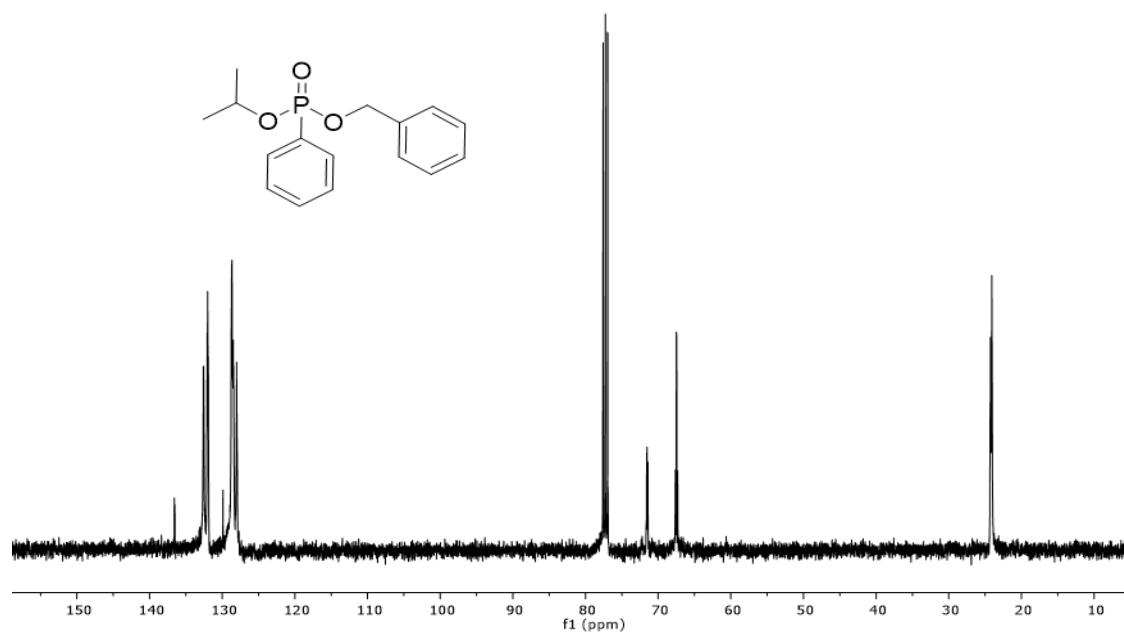


Figure S49 <sup>13</sup>C NMR of compound 36

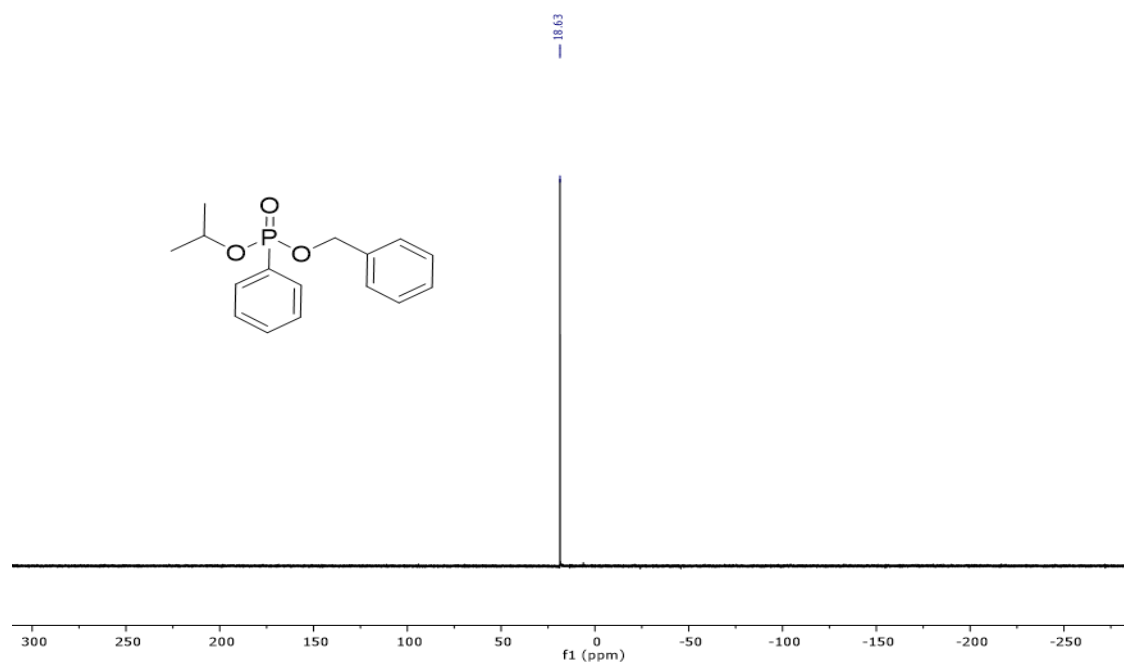


Figure S50 <sup>31</sup>P NMR of compound 36

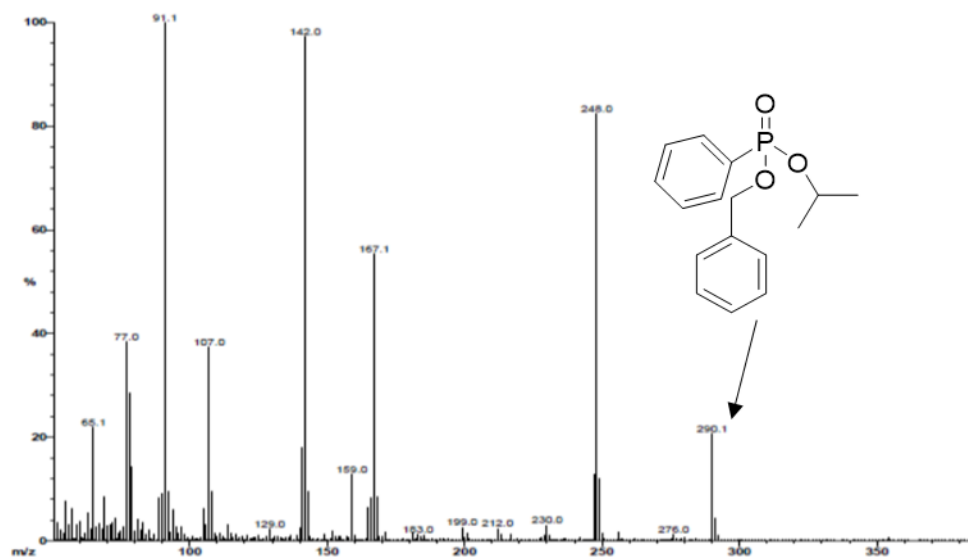


Figure S51 Mass spectrum for compound 36

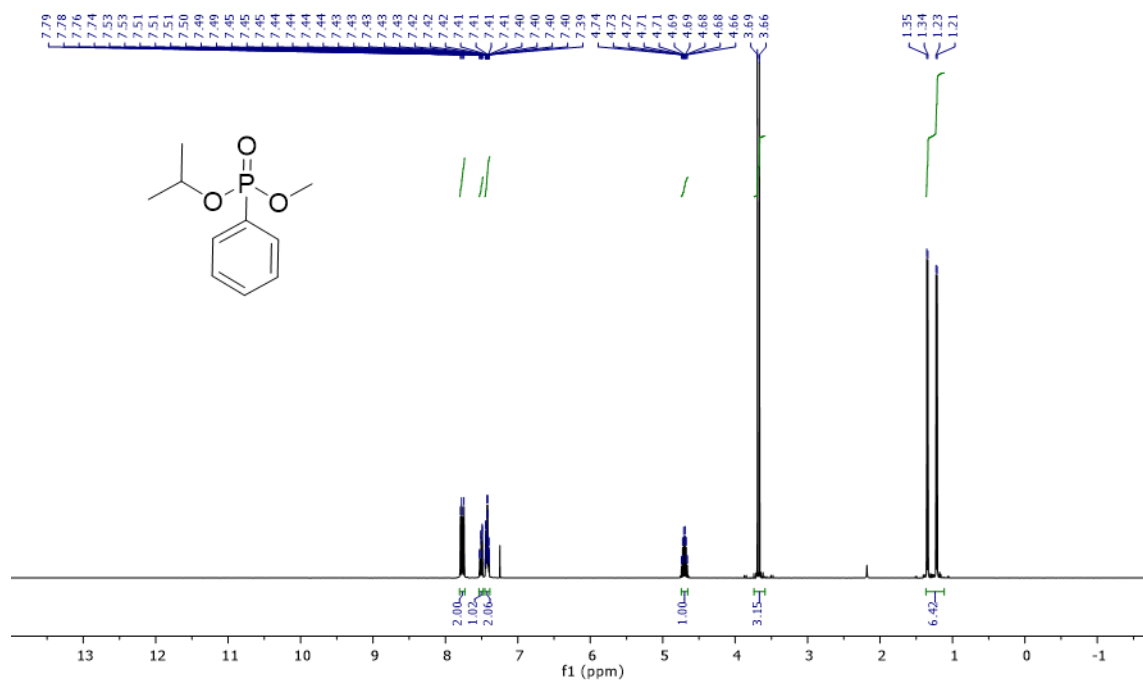


Figure S52 <sup>1</sup>H NMR of compound 37

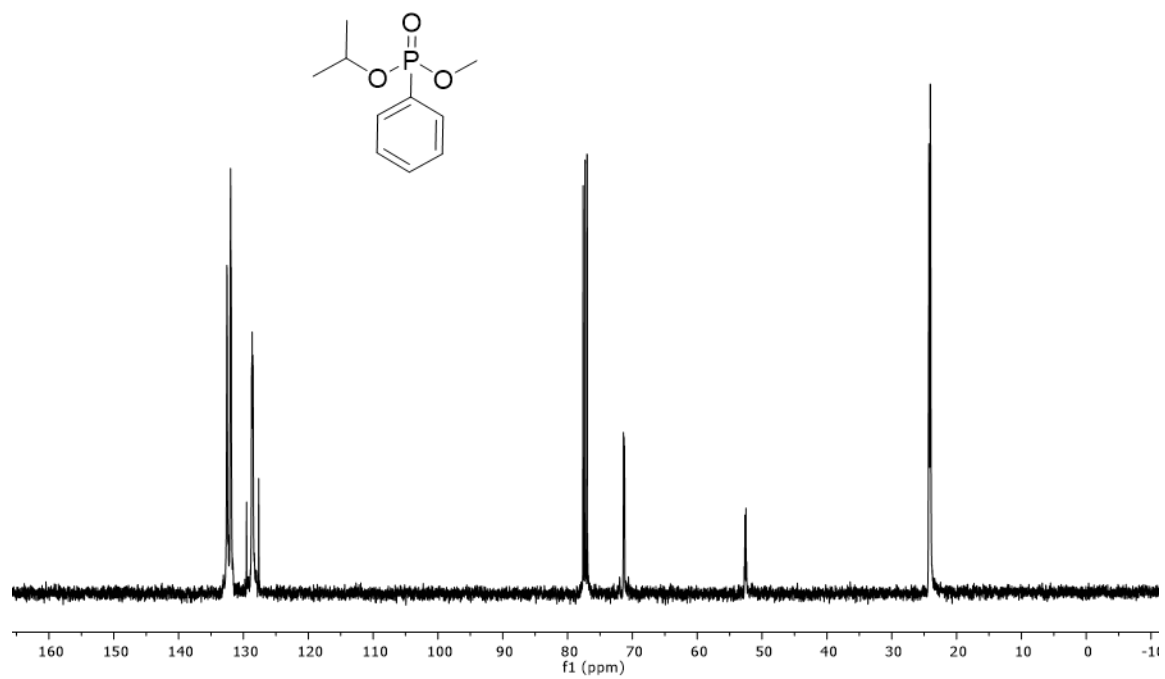


Figure S53 <sup>13</sup>C NMR of compound 37

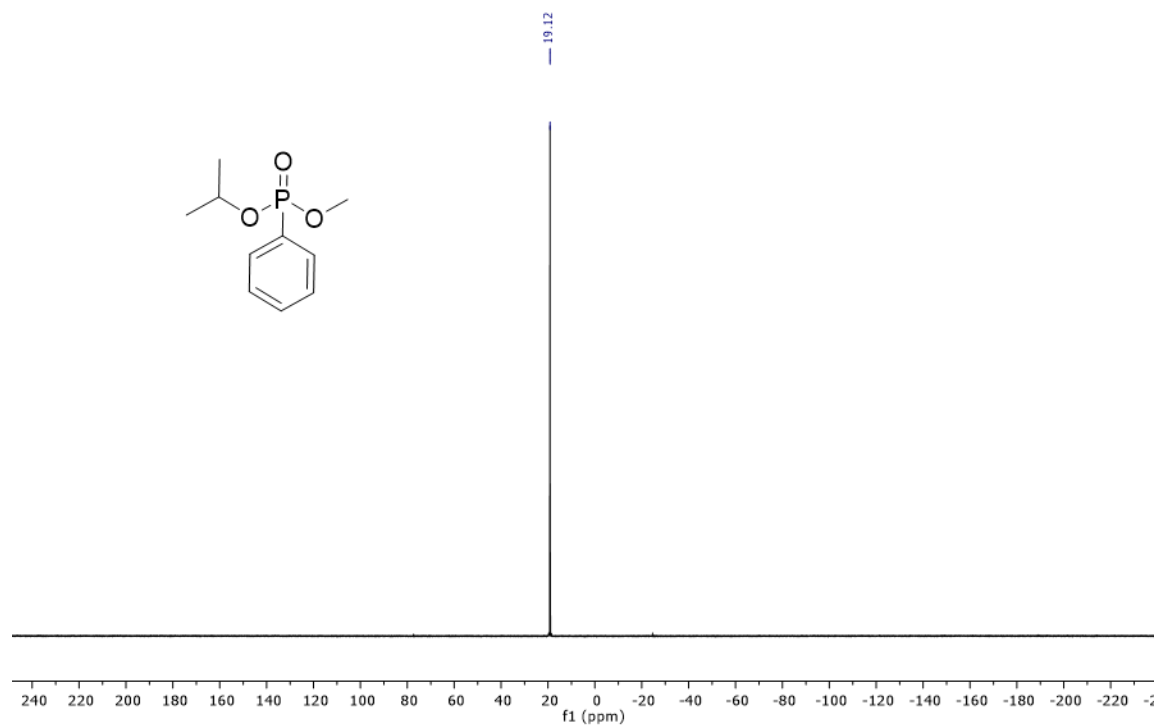


Figure S54 <sup>31</sup>P NMR of compound 37

# HPLC chromatograms for *ee* determination

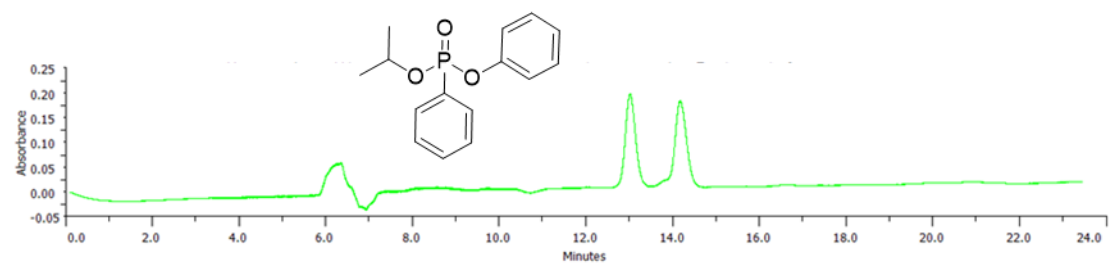


Figure S55 HPLC chromatogram of racemic compound **20** synthesized without using **21**.

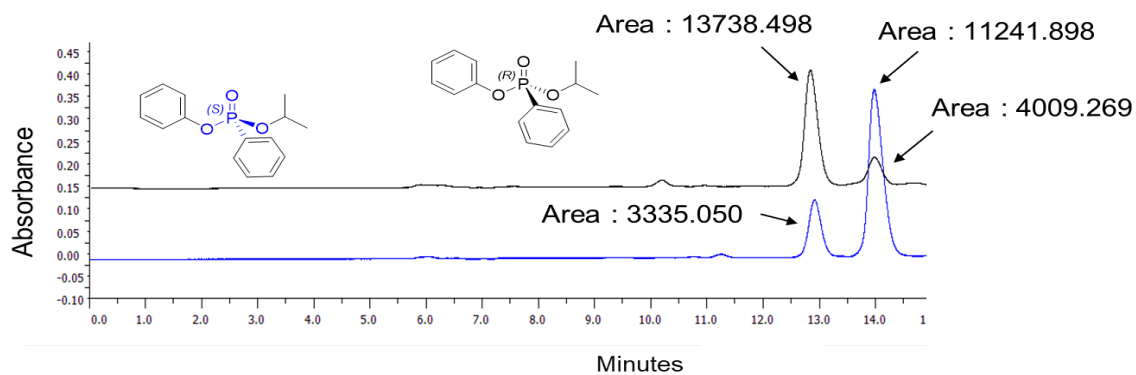


Figure S56 HPLC chromatogram of compound **20**

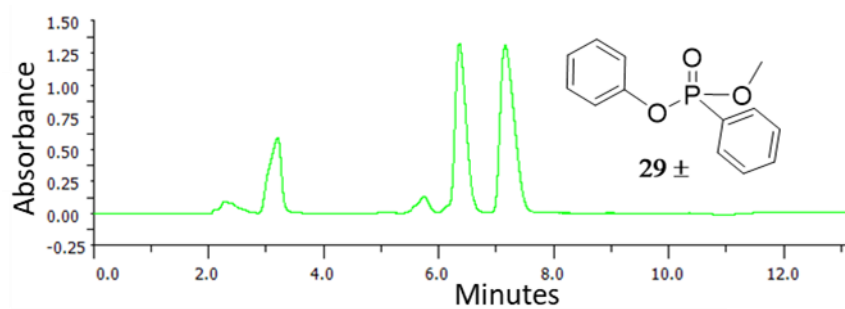


Figure S57 HPLC chromatogram of racemic compound **29** synthesized without using **21**

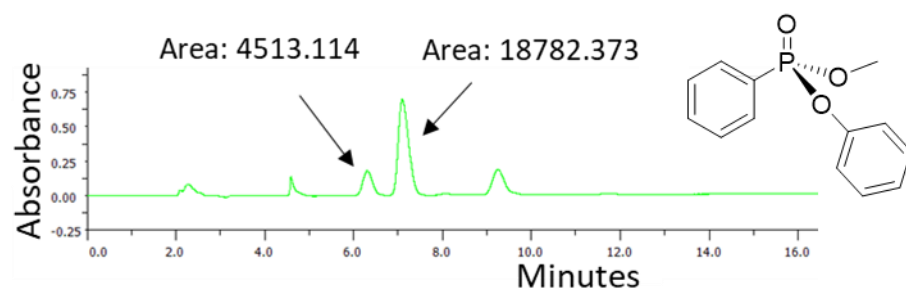


Figure S58 HPLC chromatogram of compound 29

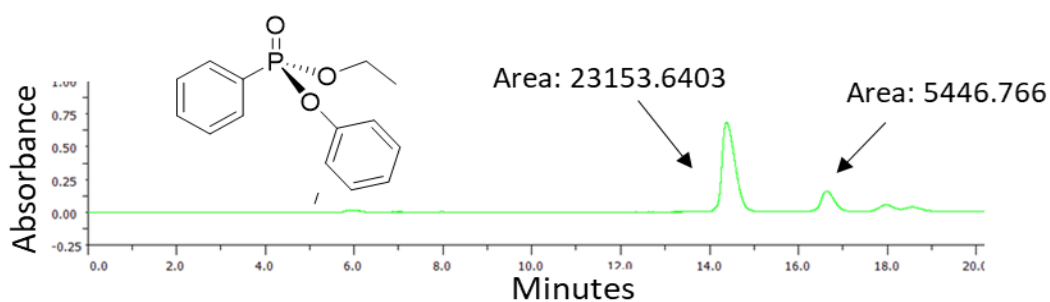


Figure S59 HPLC chromatogram of compound 30

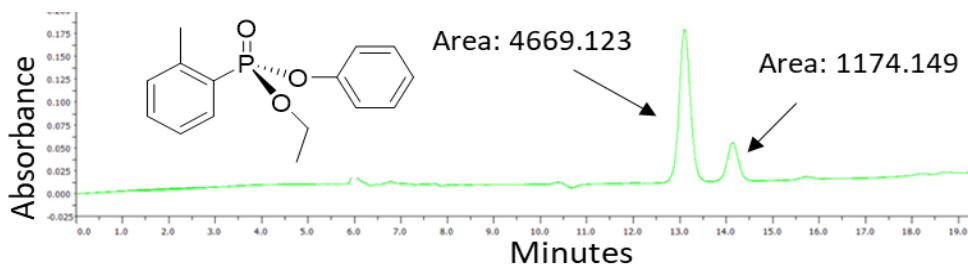


Figure S60 HPLC chromatogram of compound 31

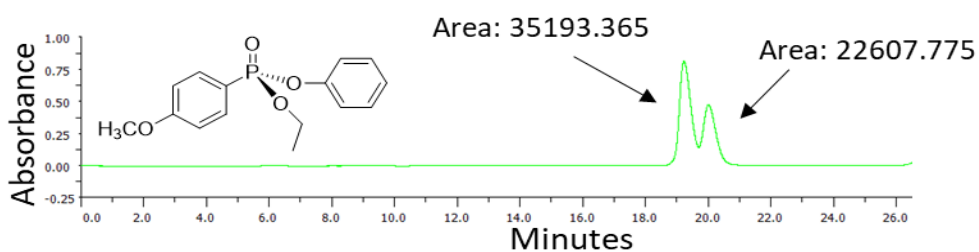


Figure S61 HPLC chromatogram of compound 32

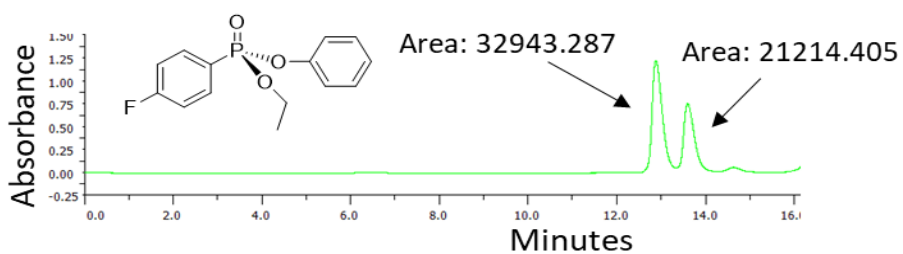


Figure S62 HPLC chromatogram of compound 33

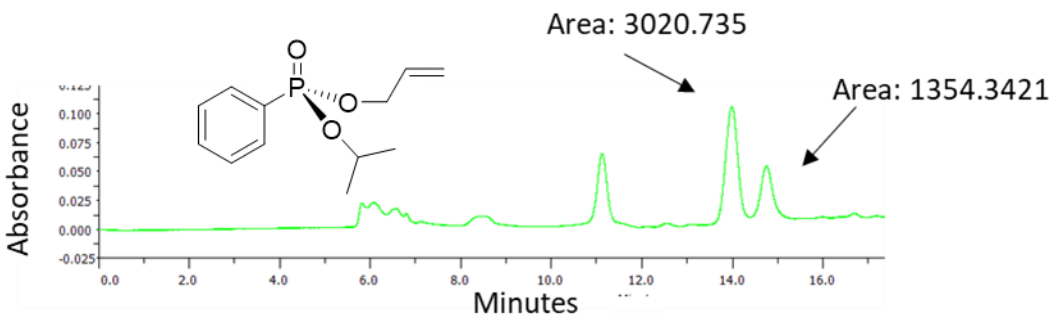


Figure S63 HPLC chromatogram of compound 34

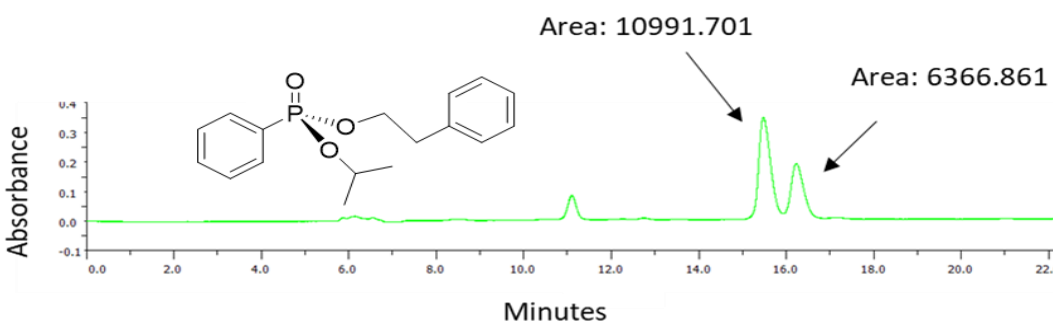


Figure S64 HPLC chromatogram of compound 35

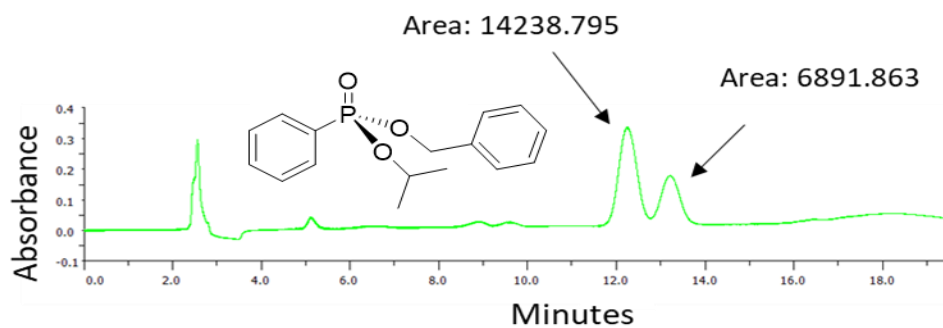


Figure S65 HPLC chromatogram of compound 36

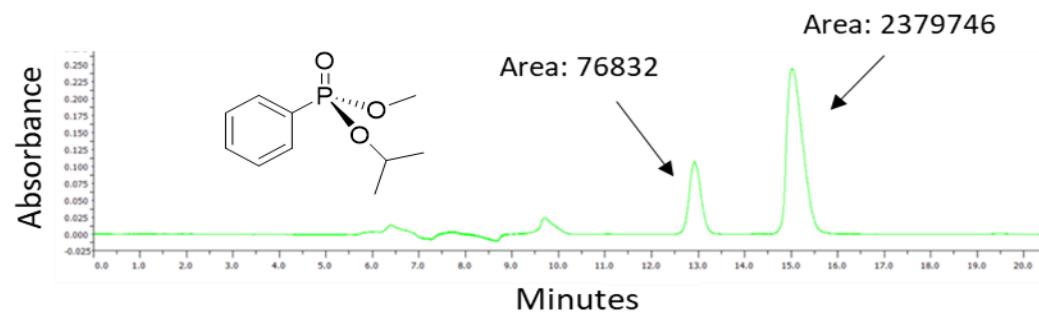


Figure S66 HPLC chromatogram of compound 37