

Supporting Information

Catalyst-free ultrasonic-promoted multicomponent synthesis of tertiary α -amino phosphonates

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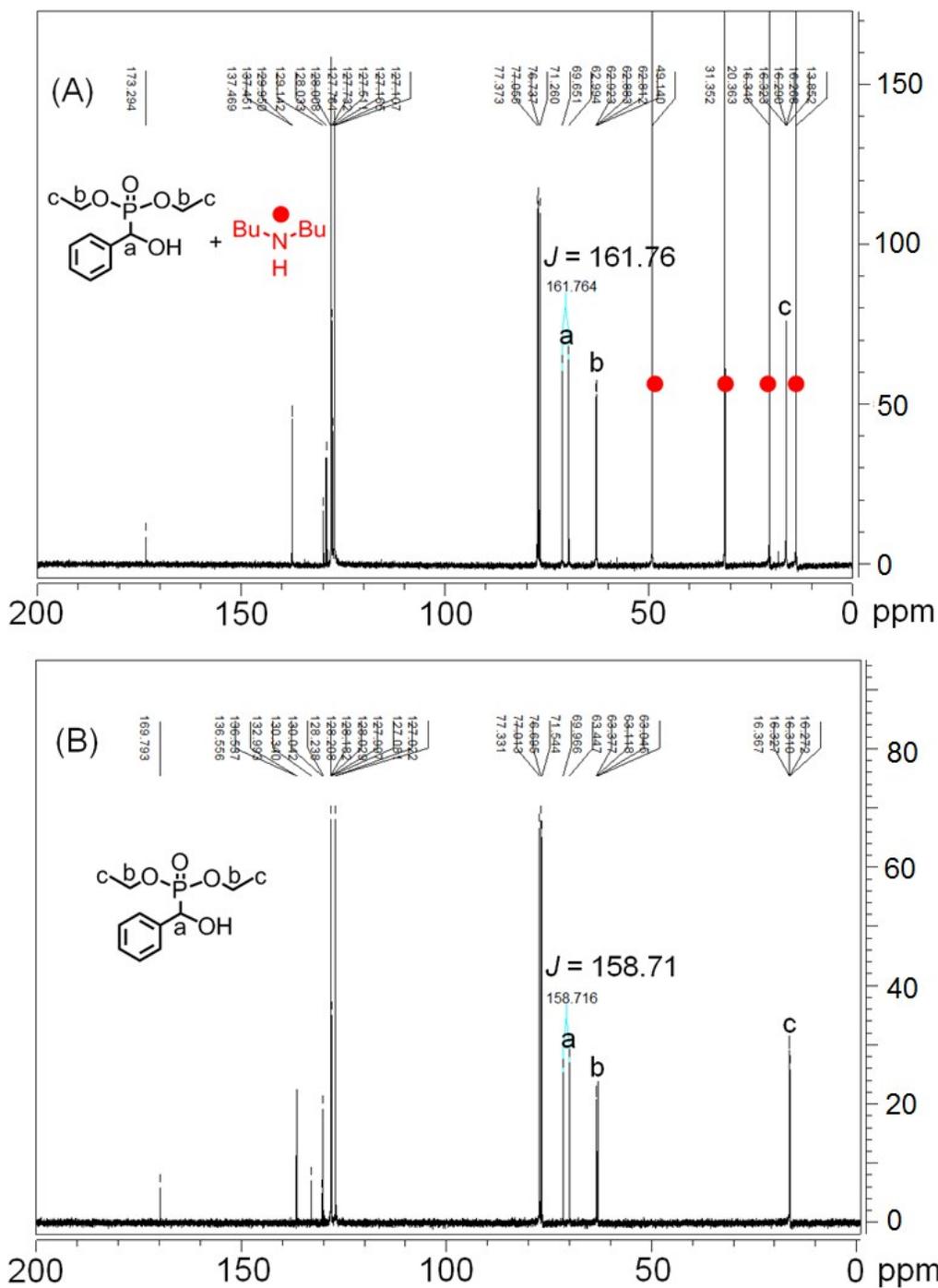


Fig. S1. ¹³C NMR spectra of (A) crude mixture of benzaldehyde, diethyl phosphite and dibutylamine after 20 min, and (B) purified α -hydroxyphosphonates after 24 h.

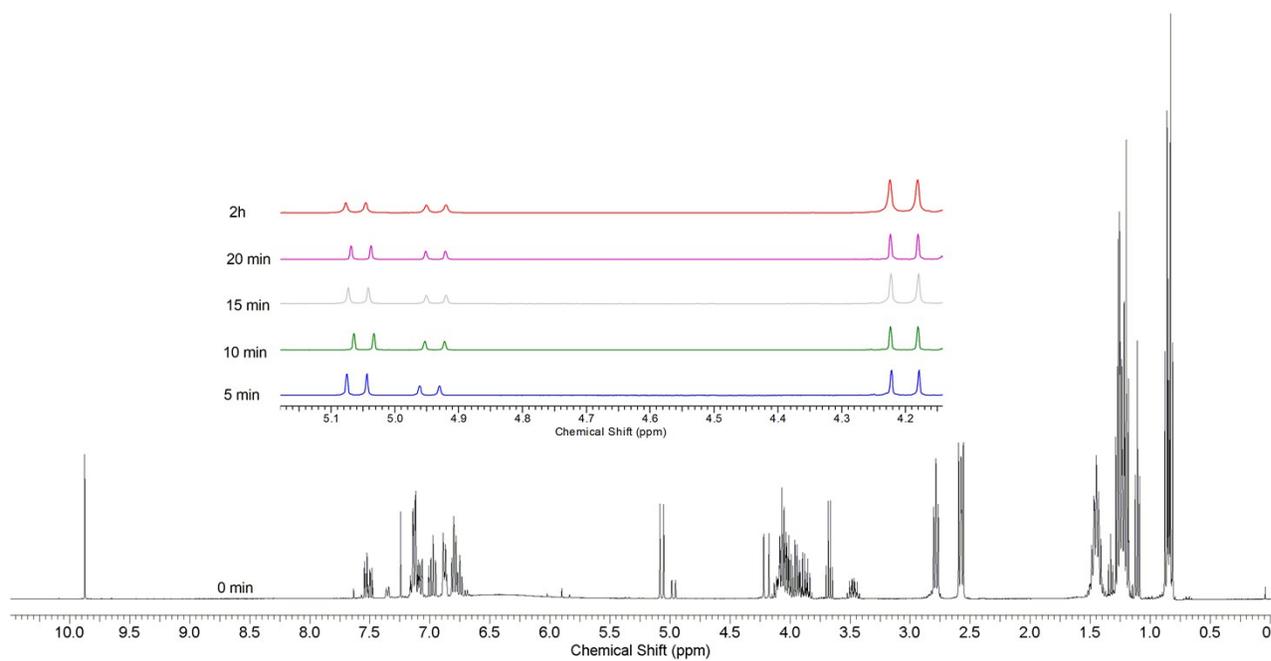


Fig. S2. ^1H NMR spectra of the reaction mixture at various time intervals

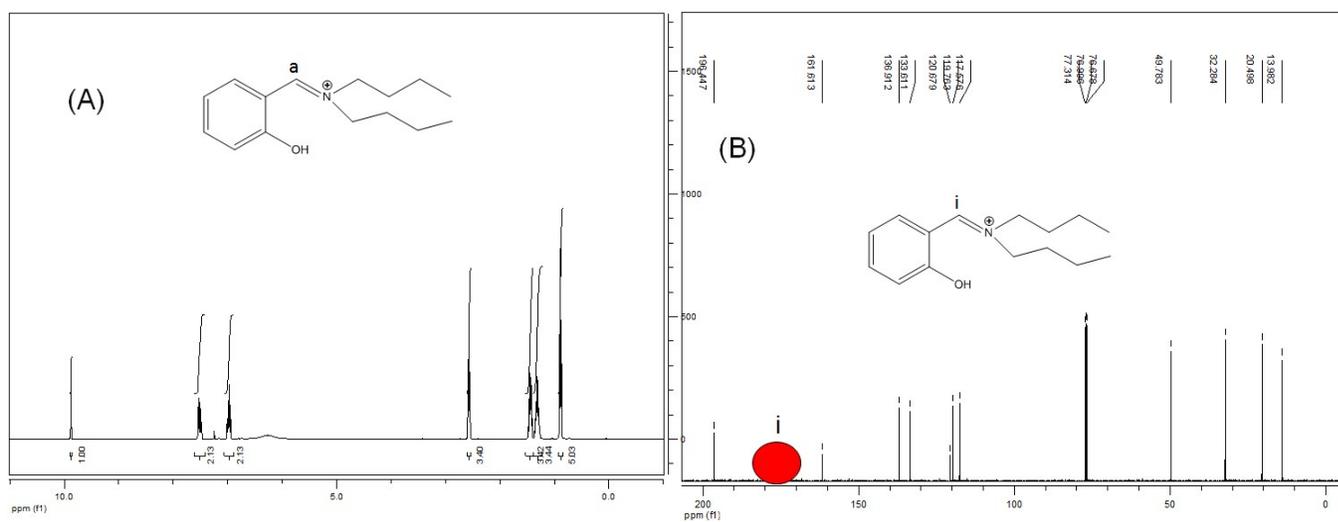
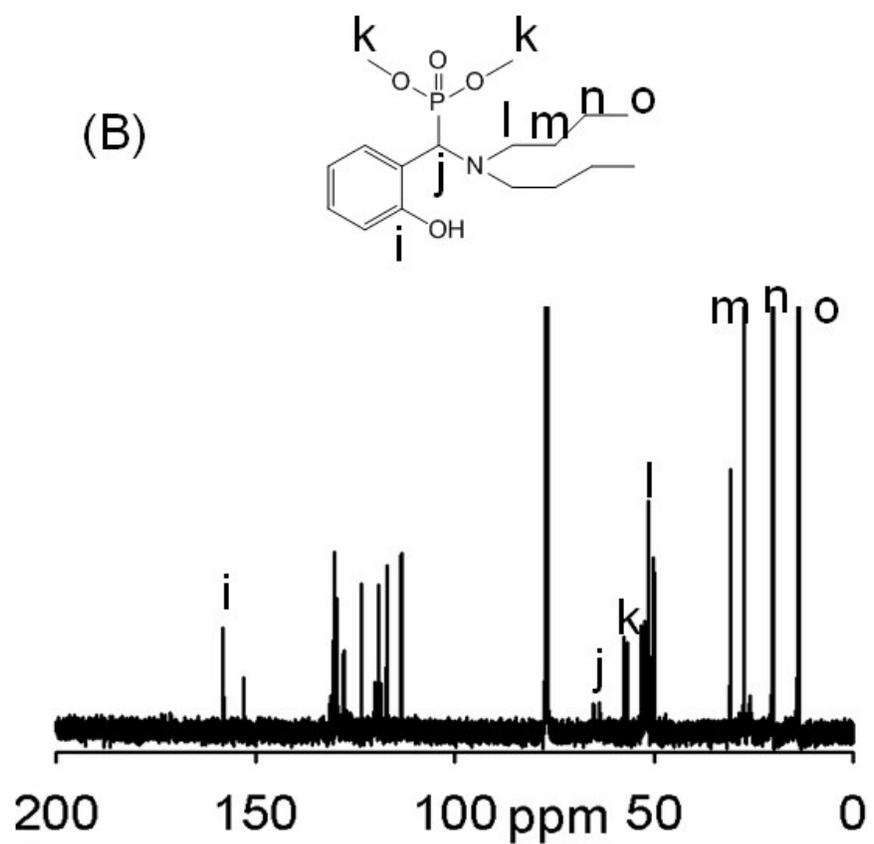
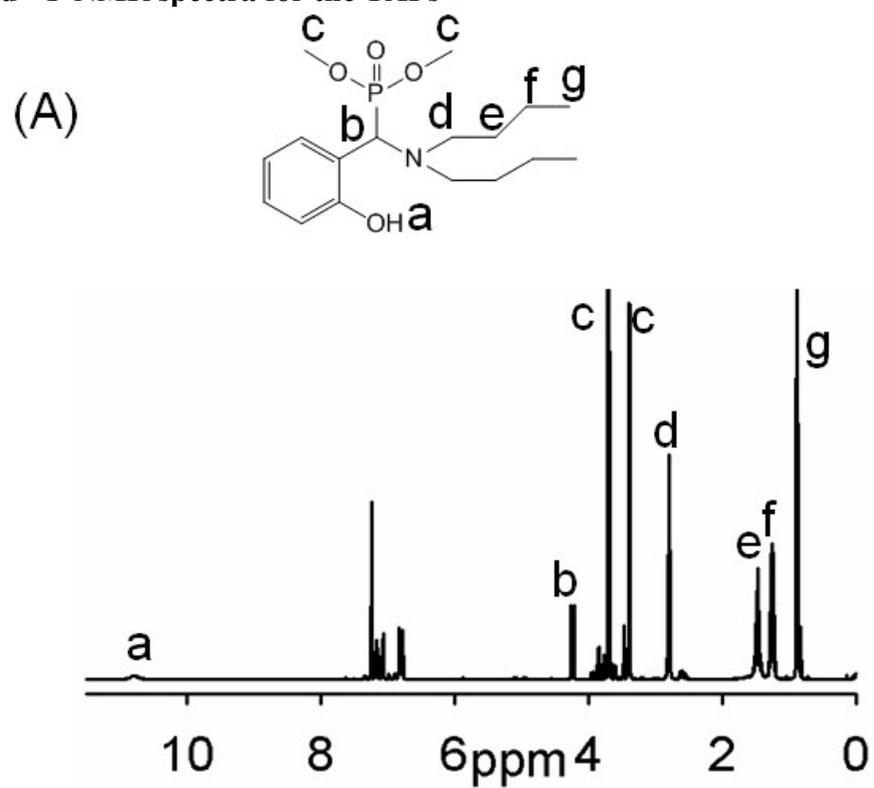


Fig. S3. ^1H NMR (A) and ^{13}C NMR (B) spectra for imine synthesis.

3. ^1H , ^{13}C , and ^{31}P NMR spectra for the TAPs



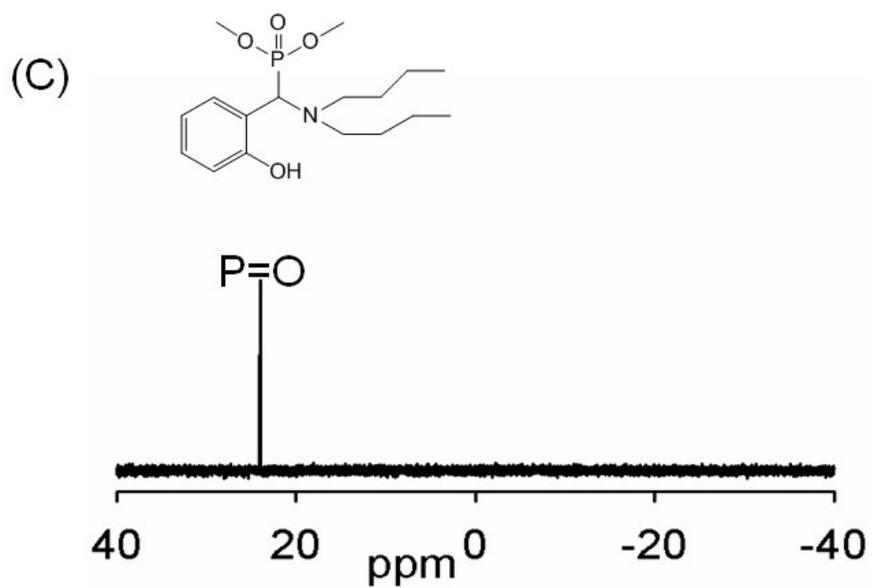
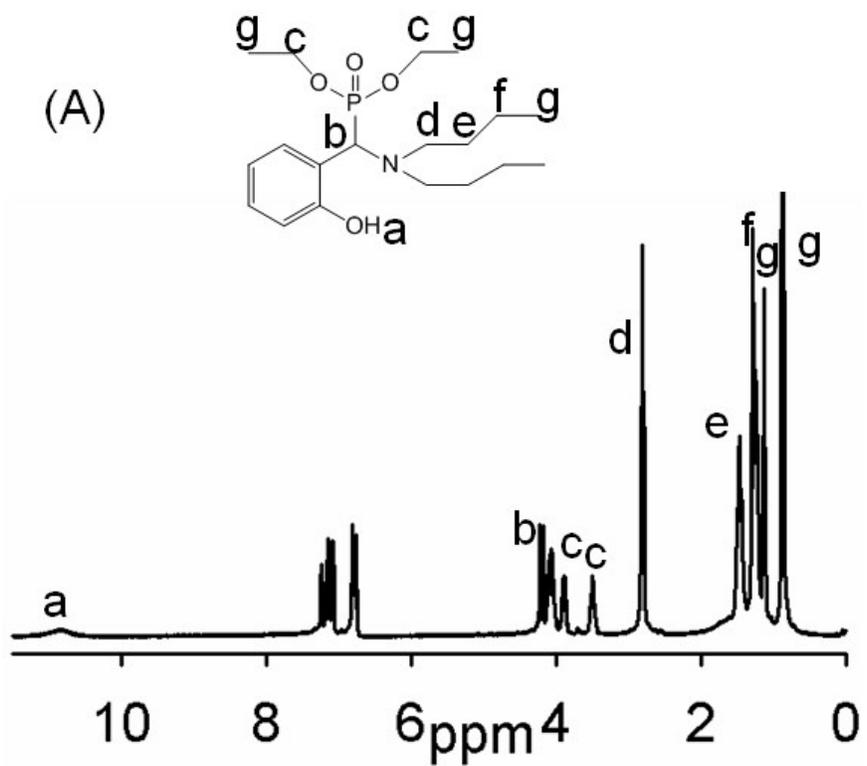


Fig. S4. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 1.



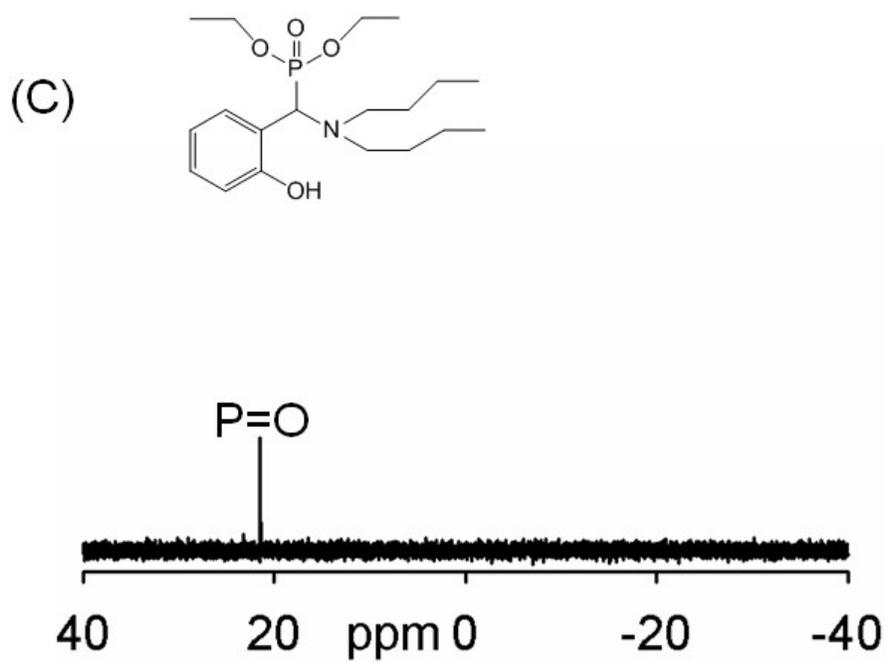
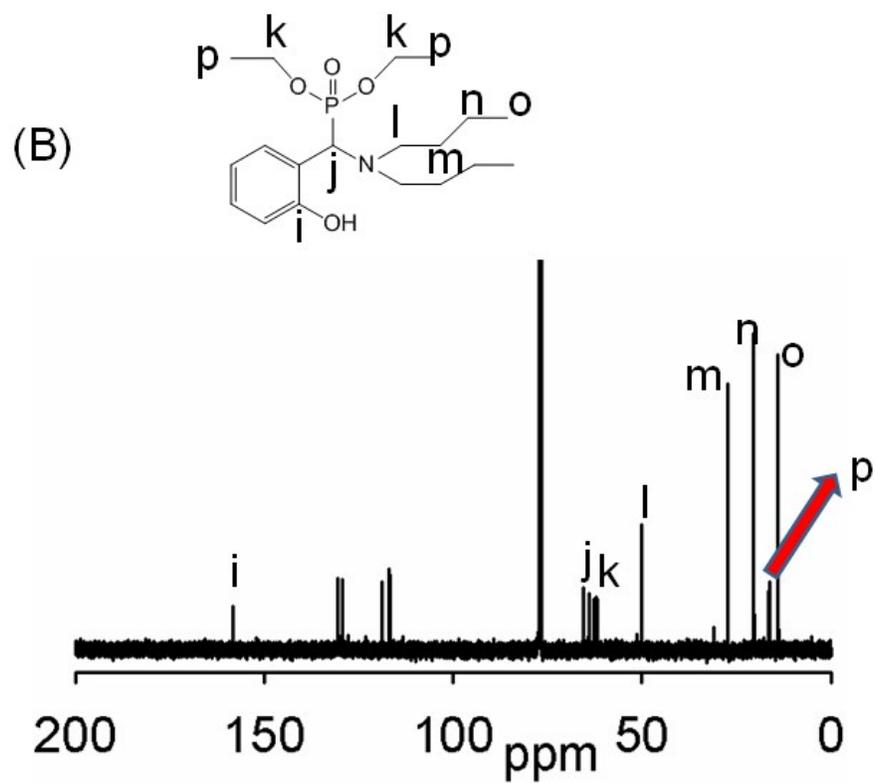
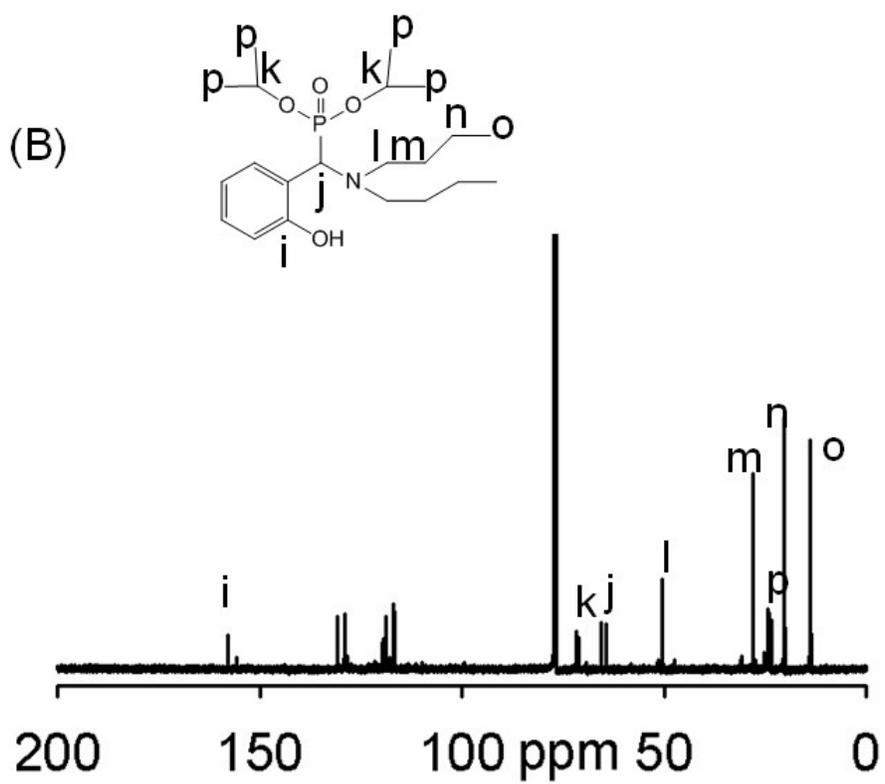
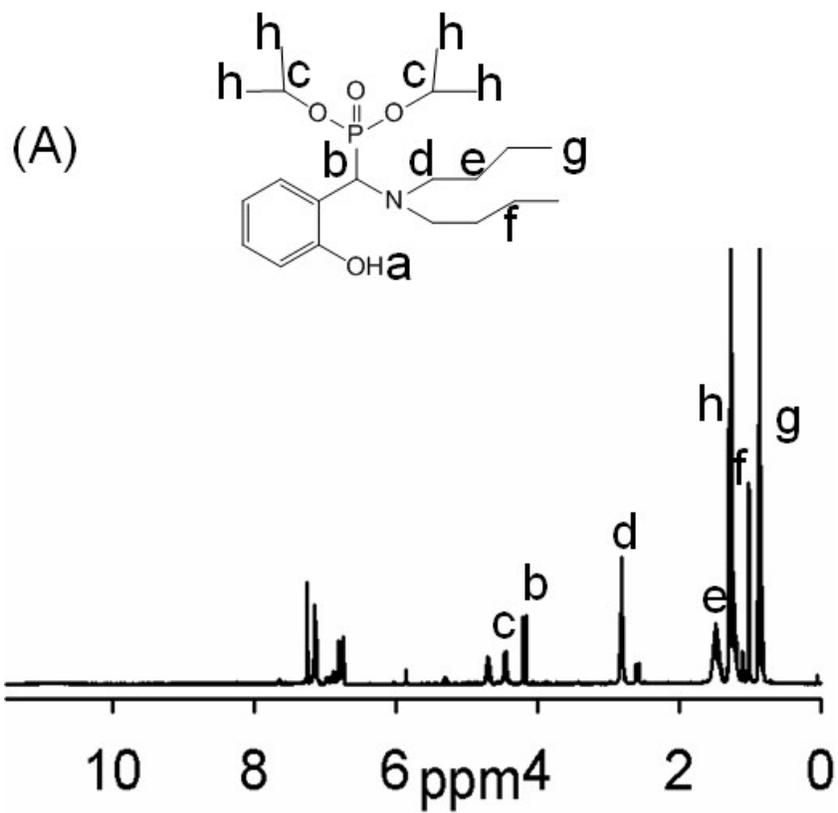


Fig. S5. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 2.



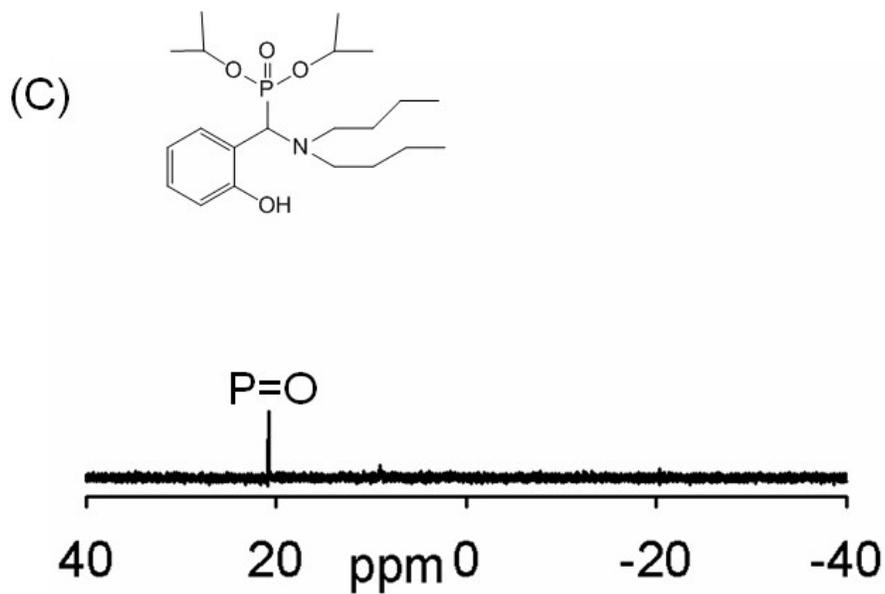
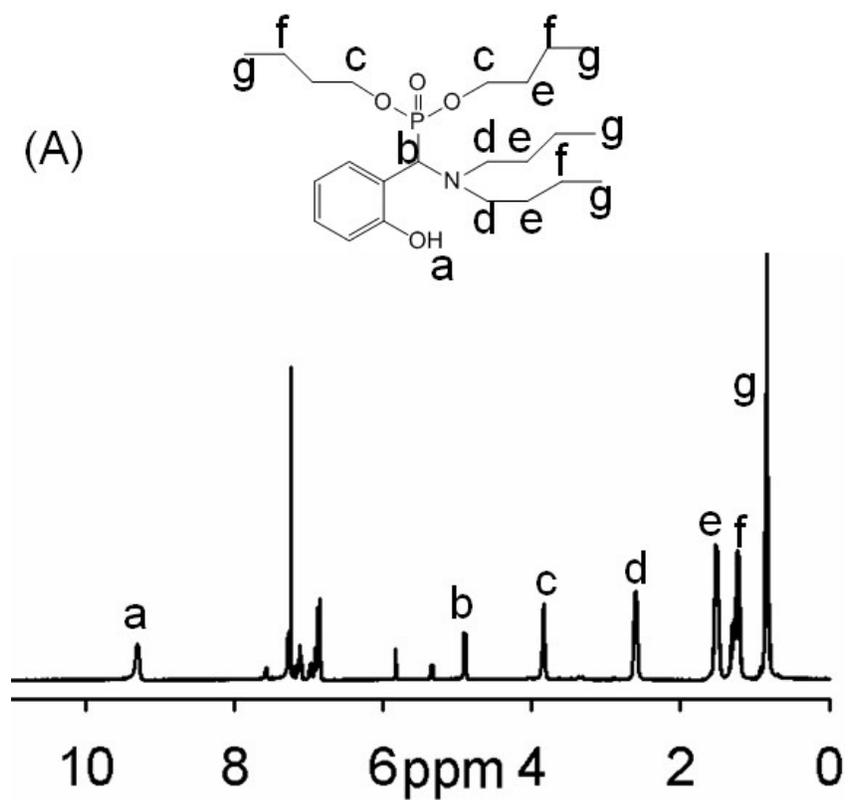


Fig. S6. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 3.



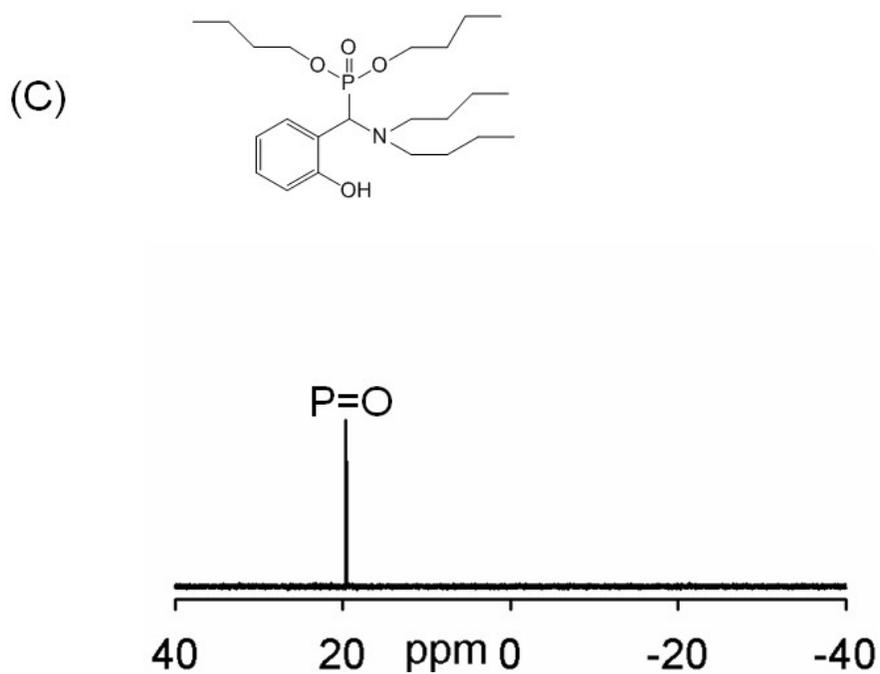
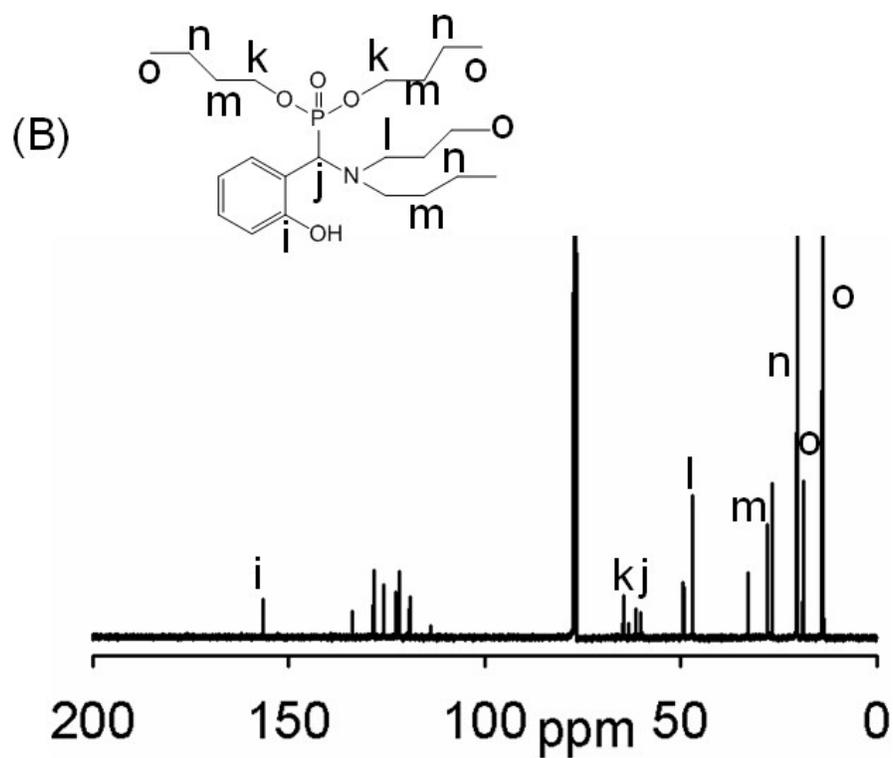
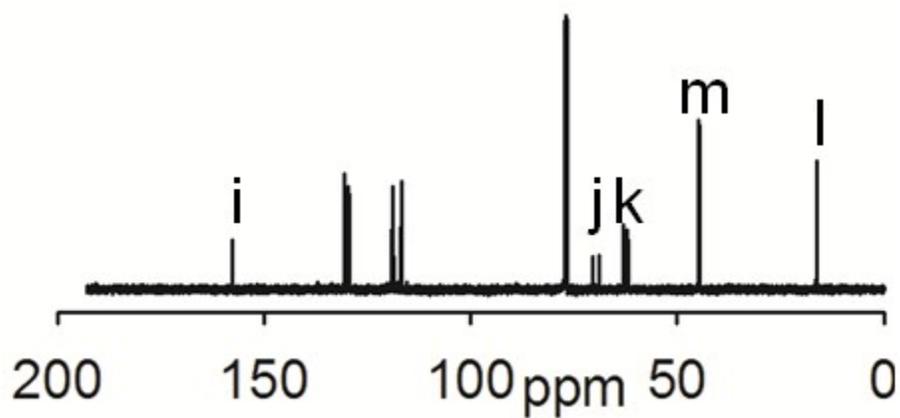
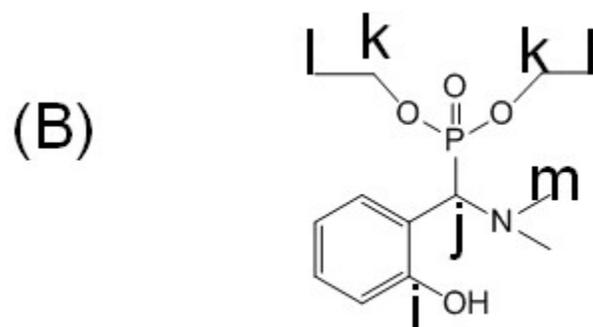
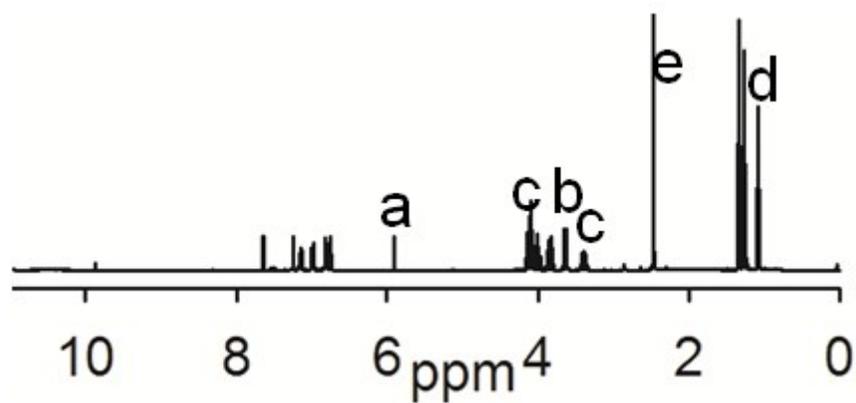
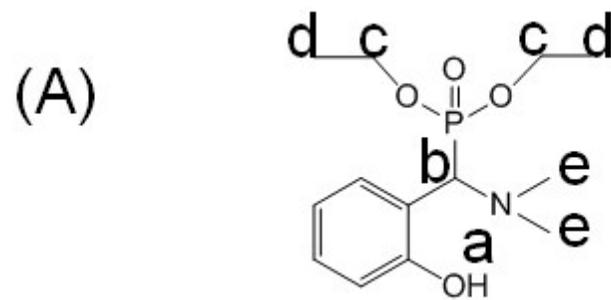


Fig. S7. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 4.



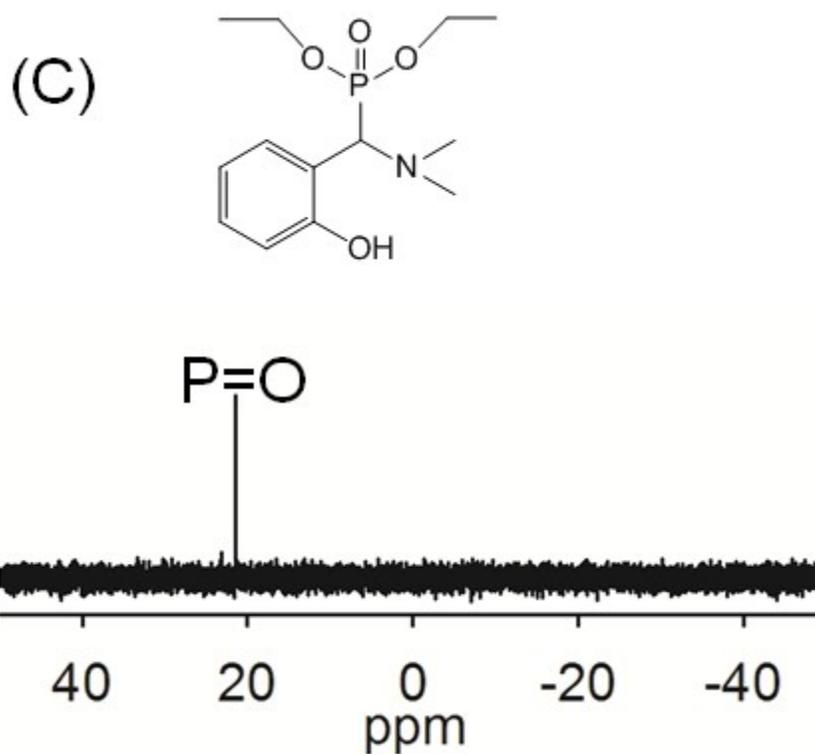
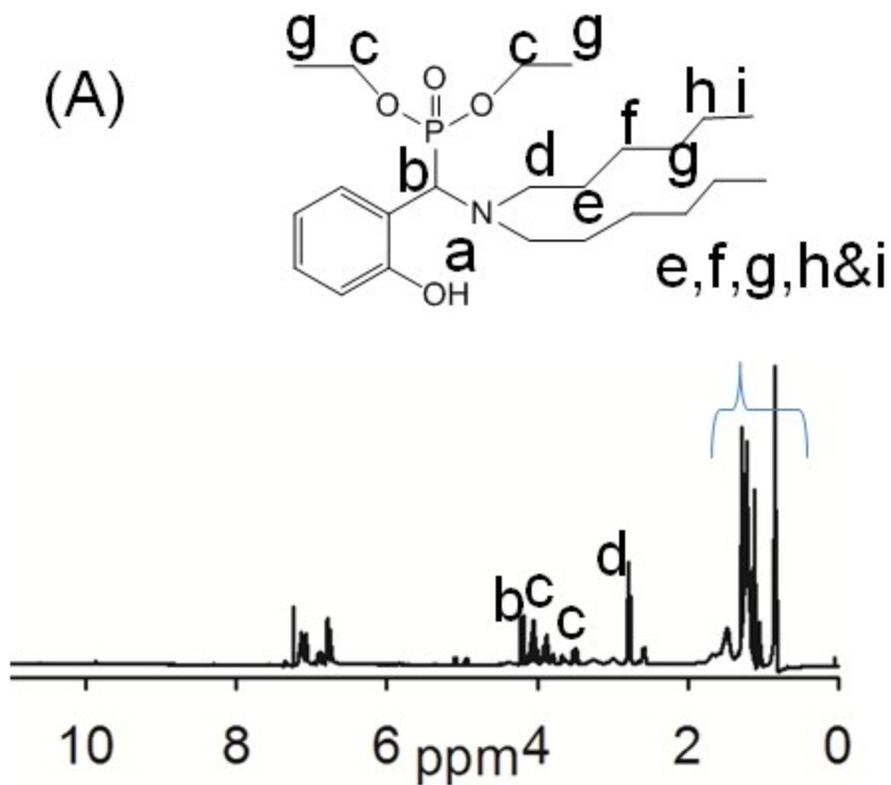


Fig. S8. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 5.



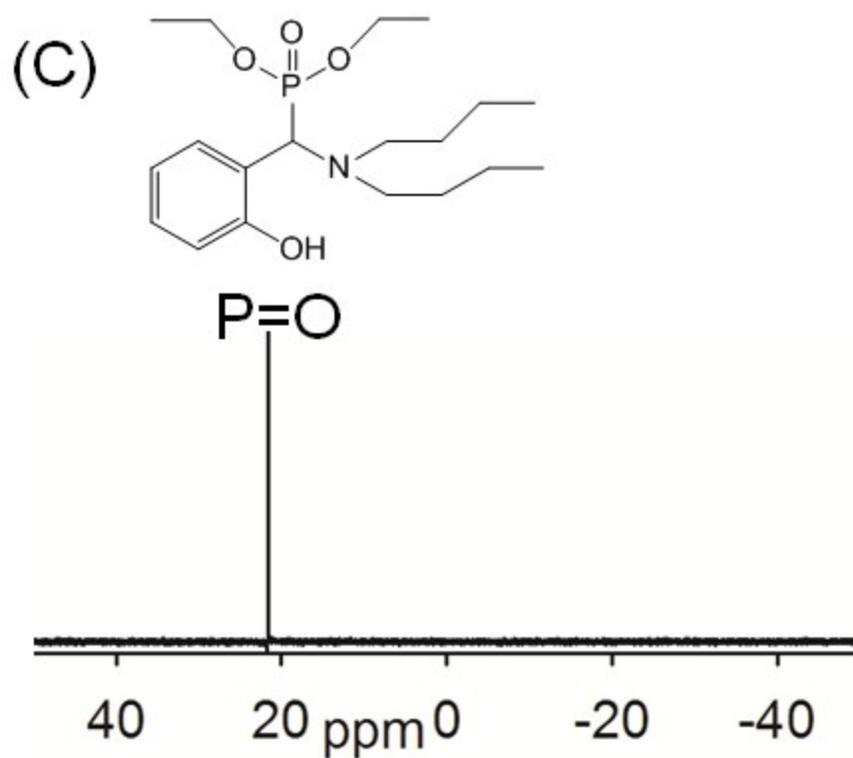
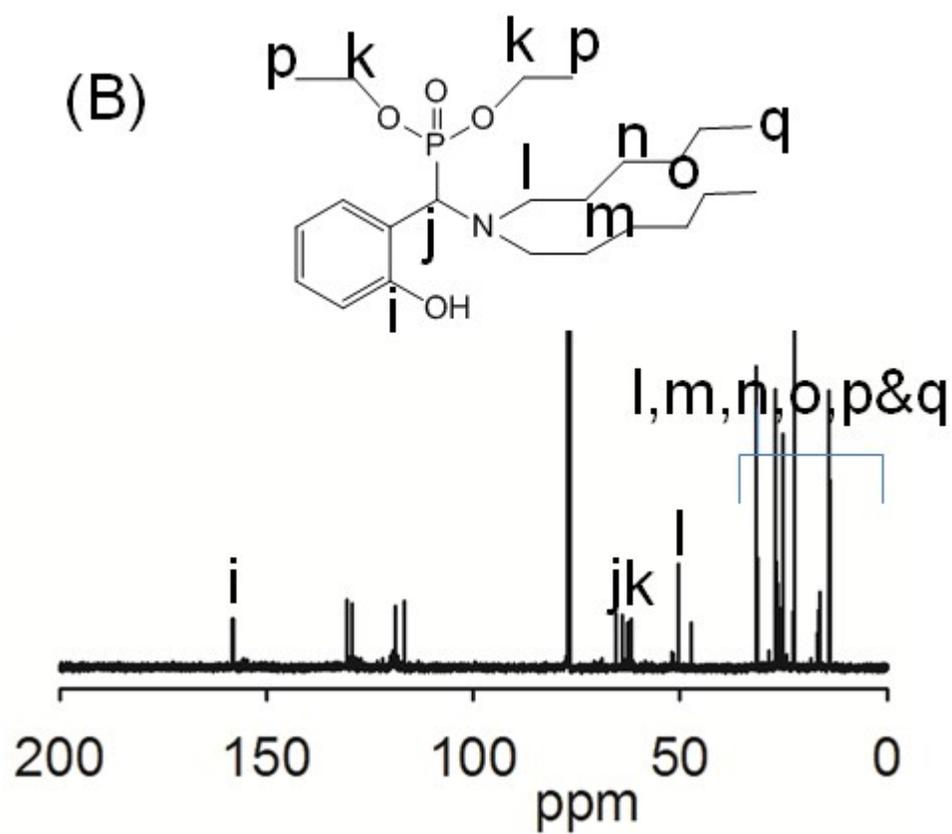
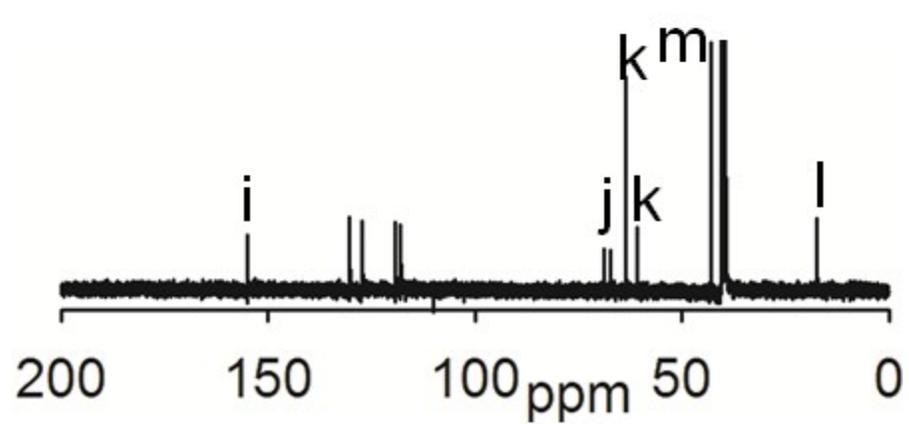
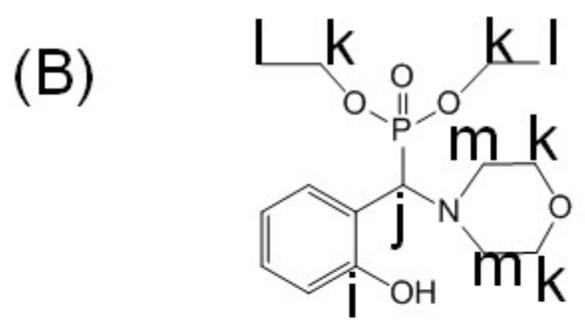
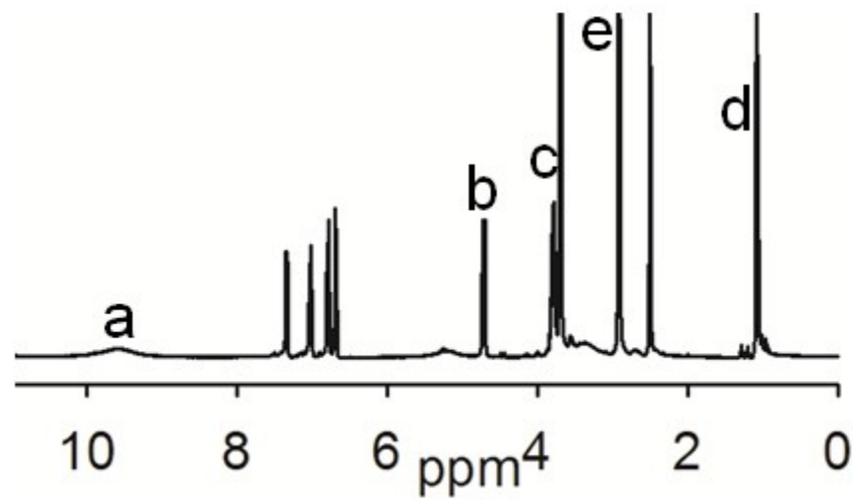
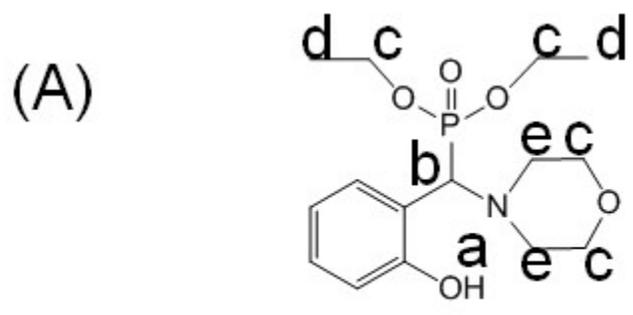


Fig. S9. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 6.



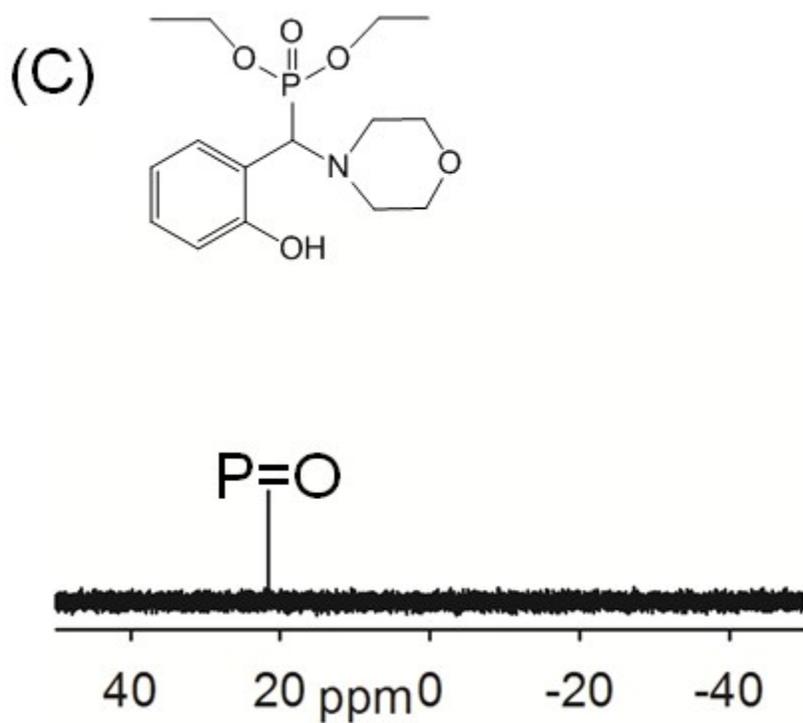
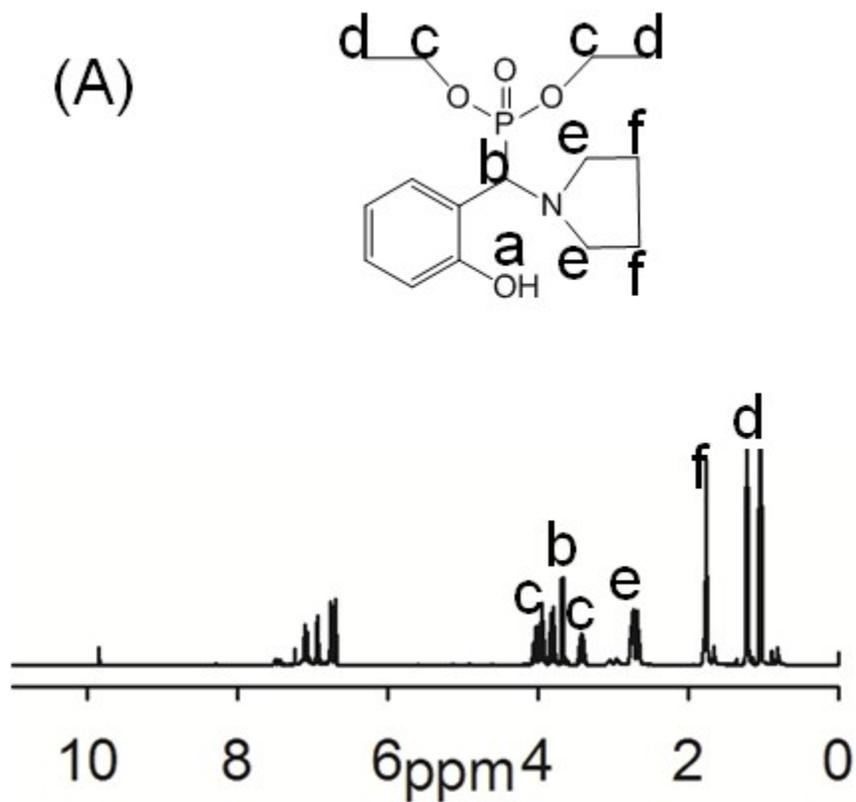


Fig. S10. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 7.



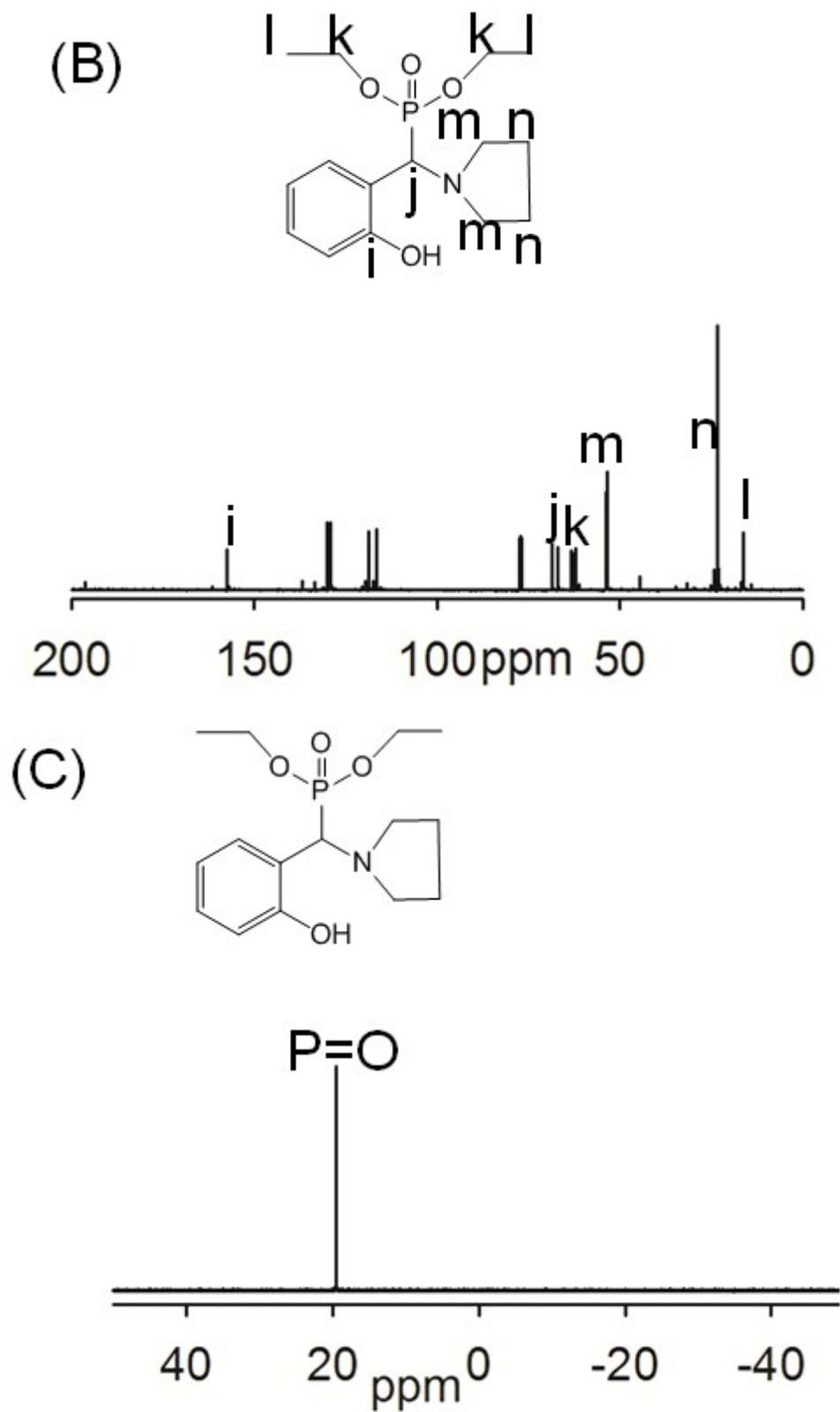
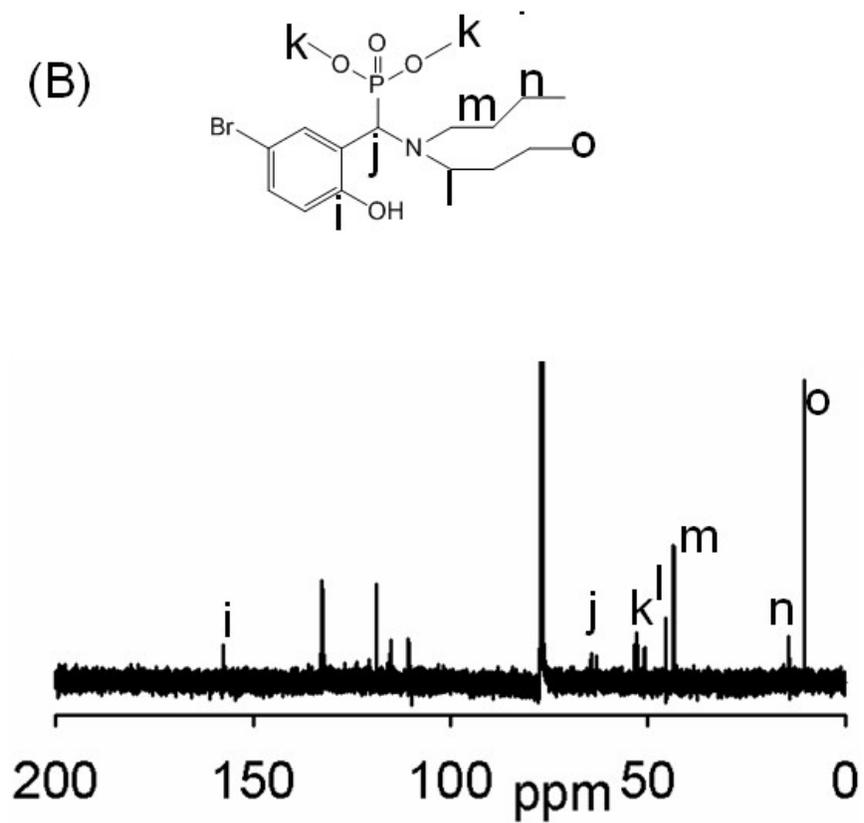
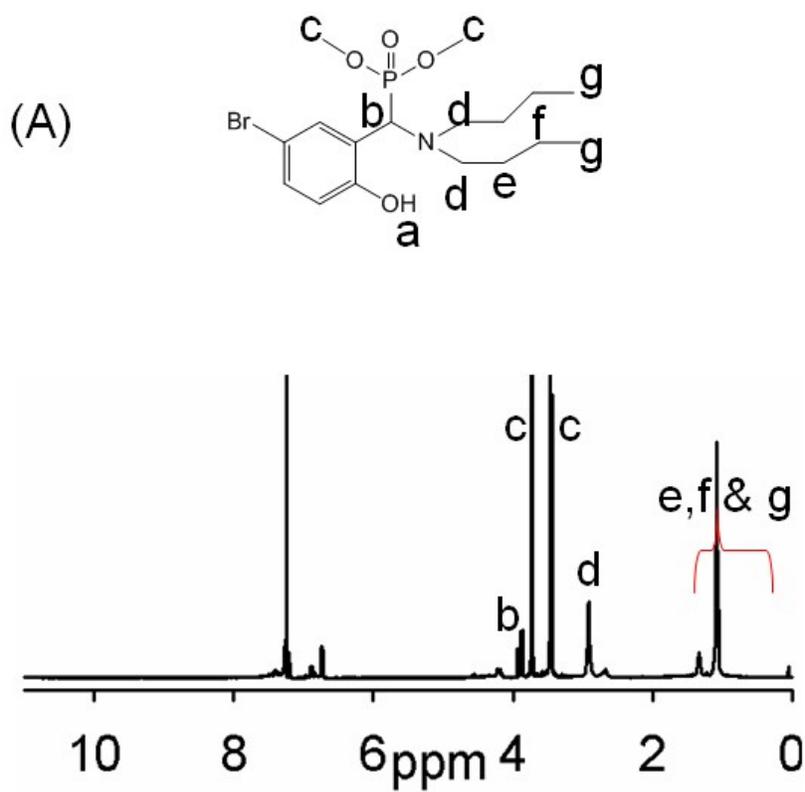


Fig. S11. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound **8**.



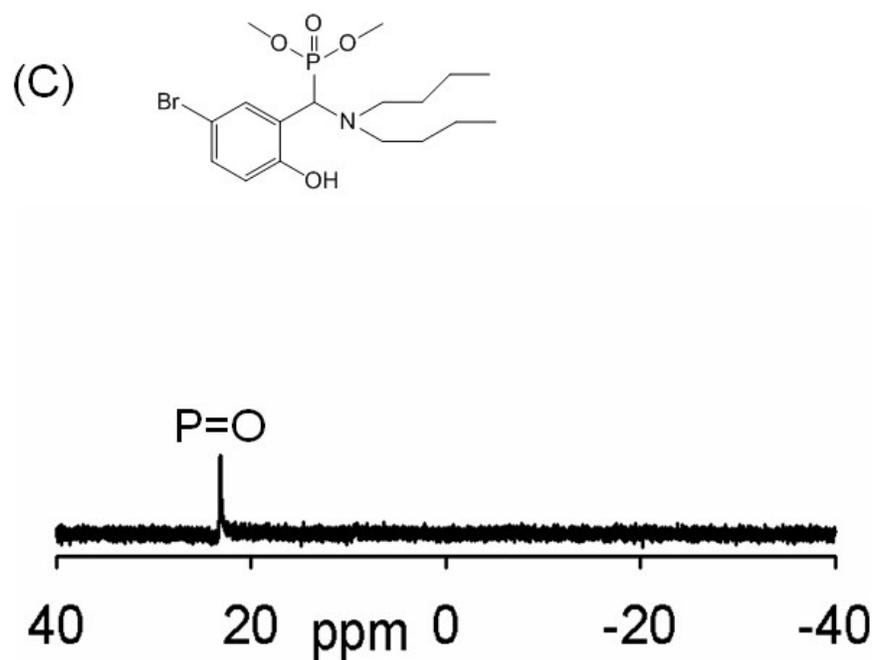
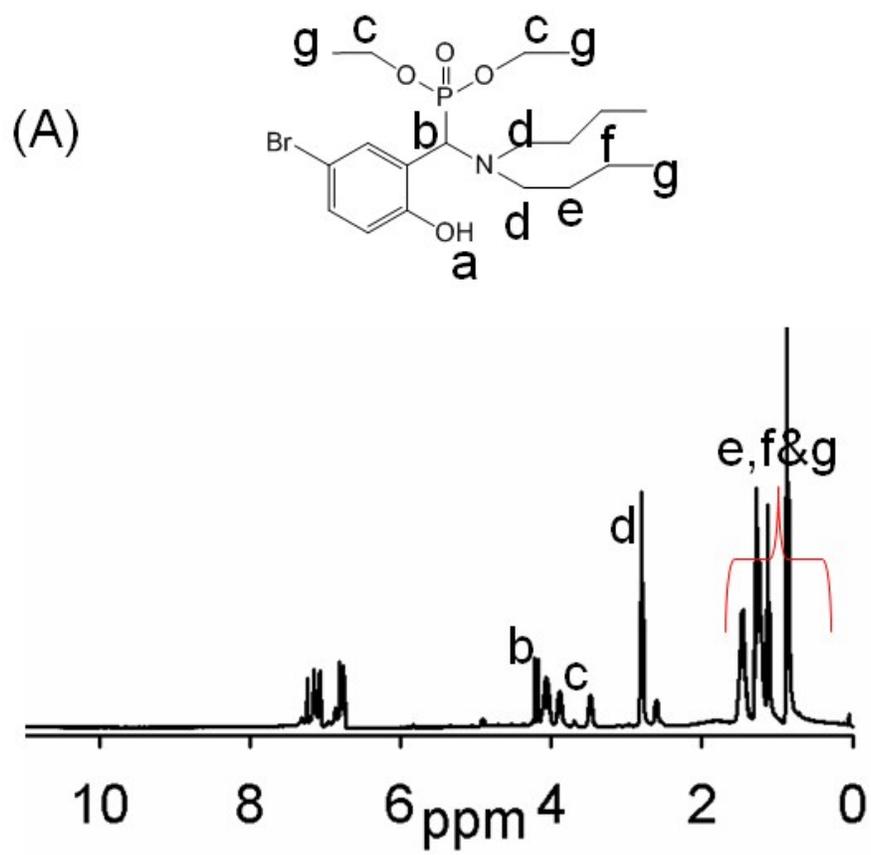


Fig. S12. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 9.



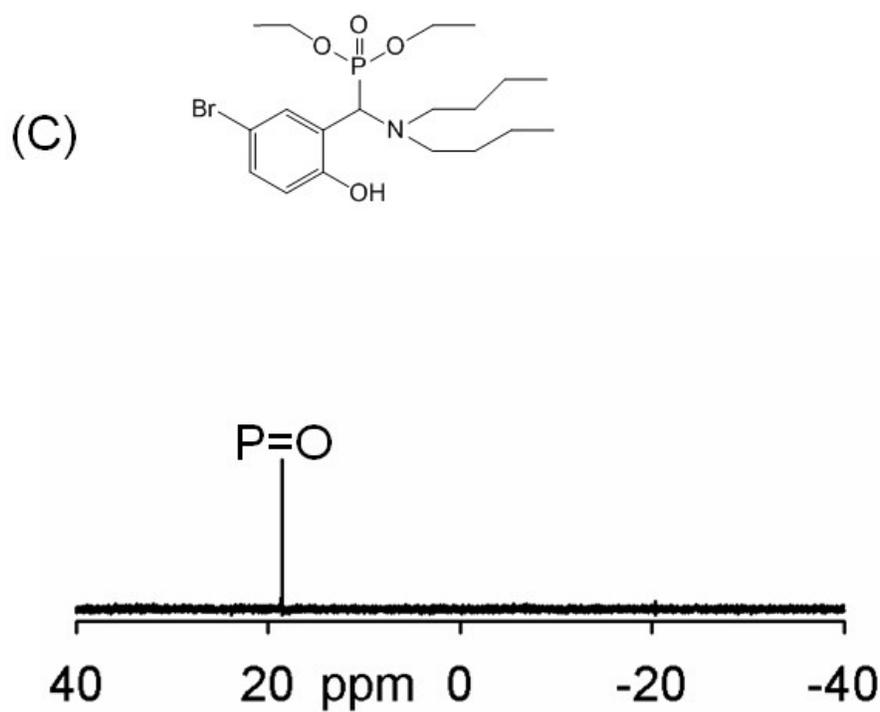
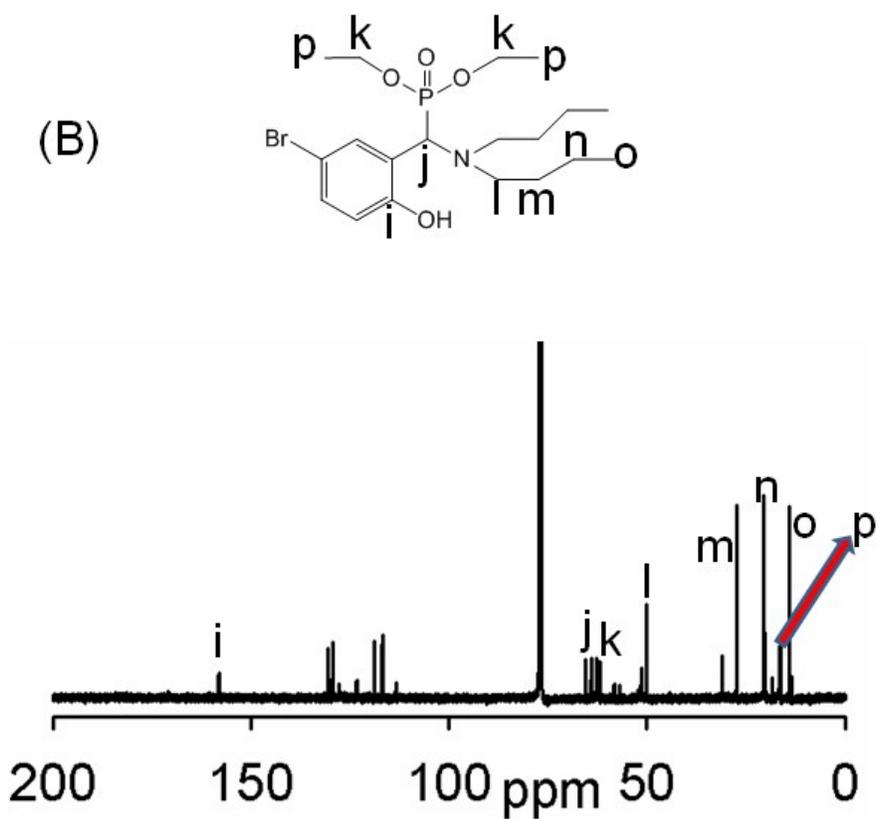
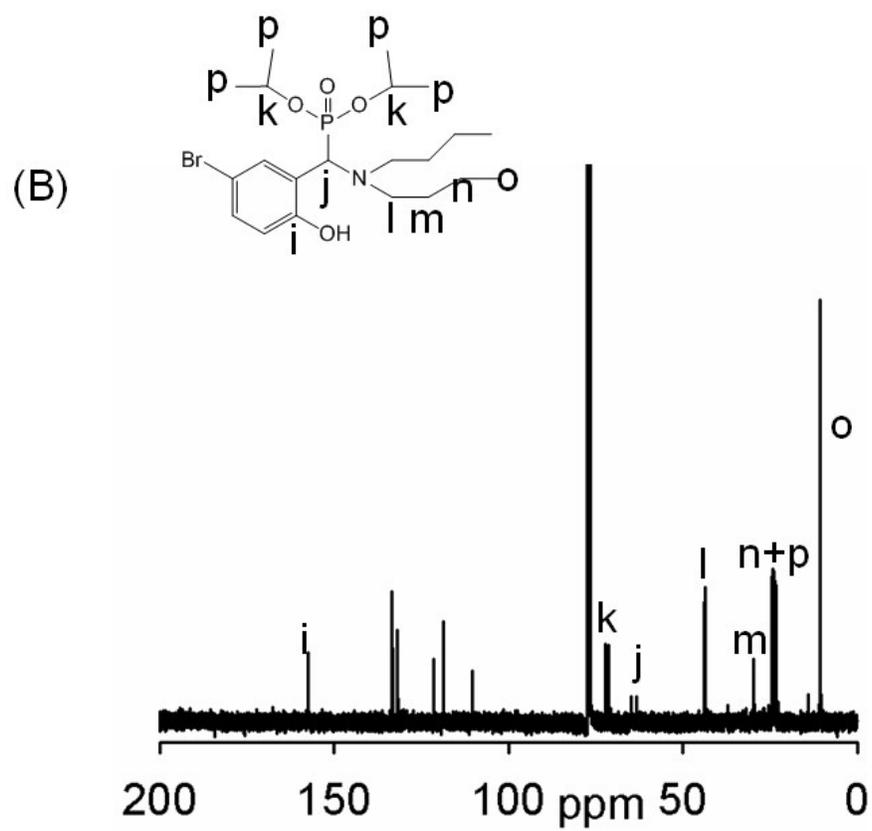
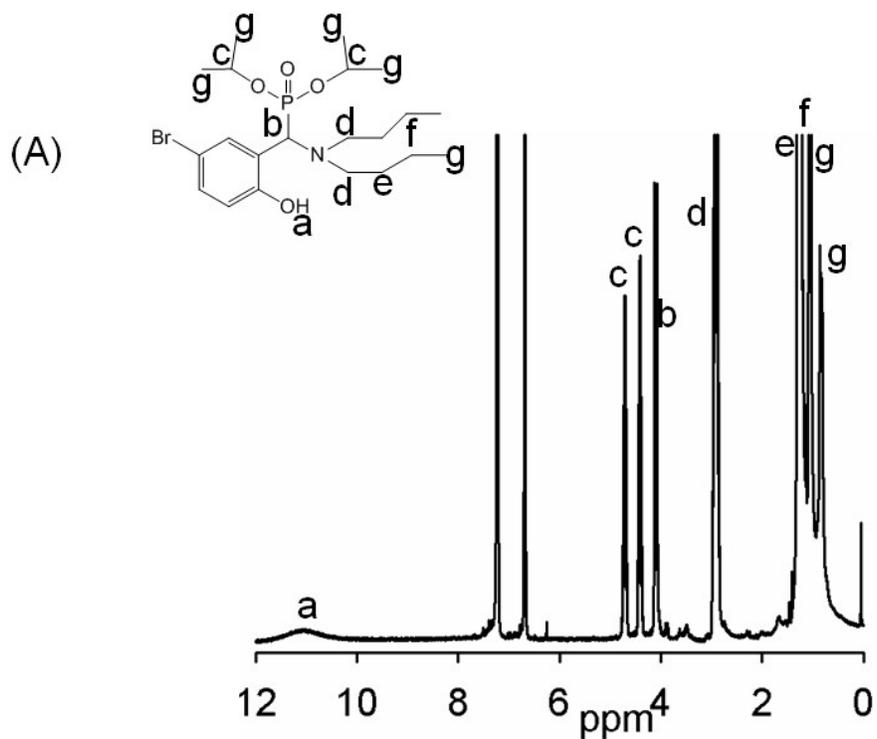


Fig. S13. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 10.



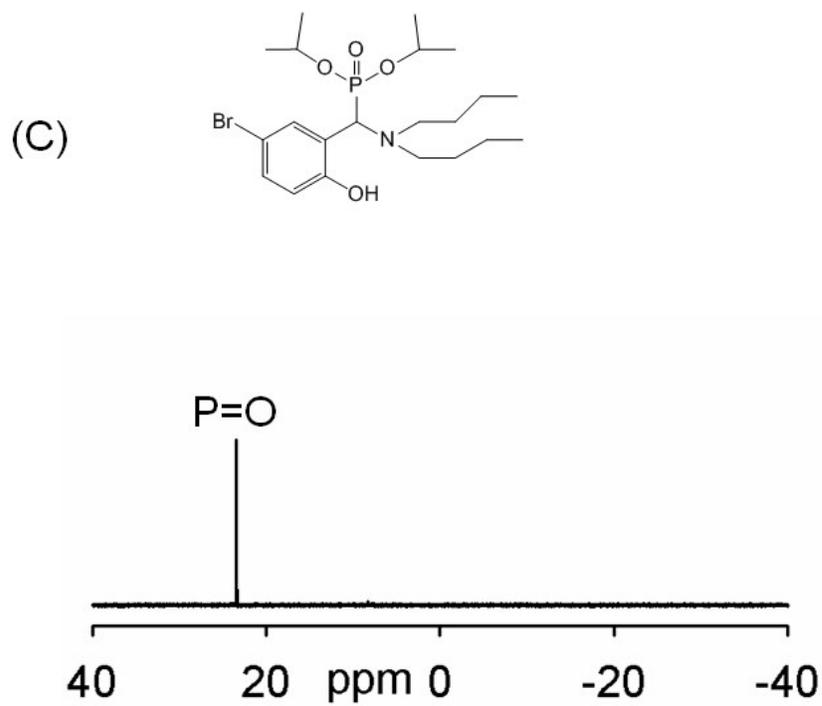
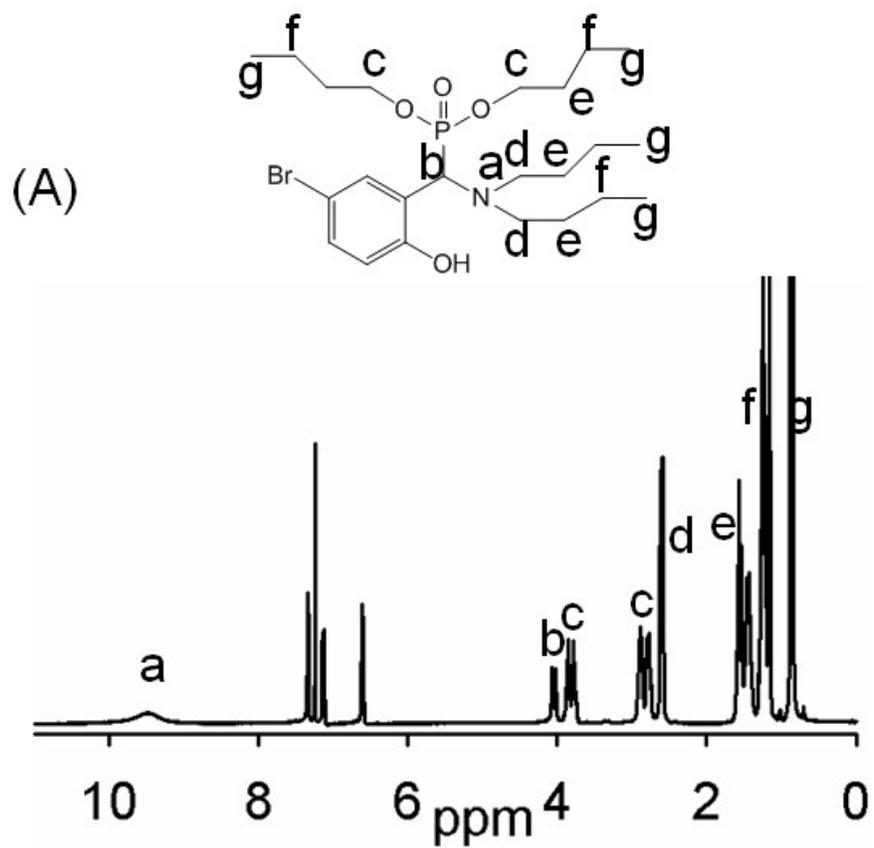


Fig. S14. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 11.



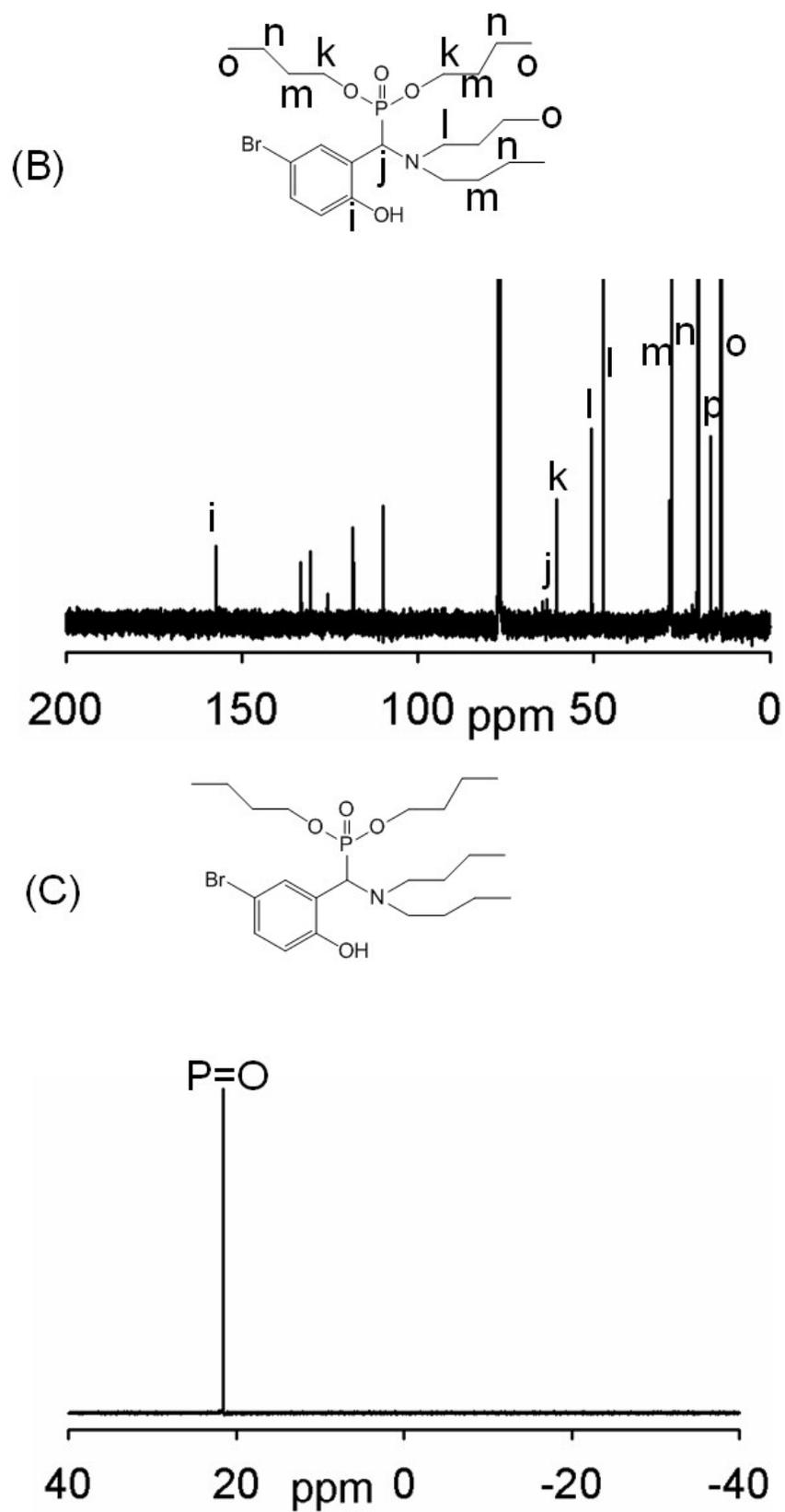
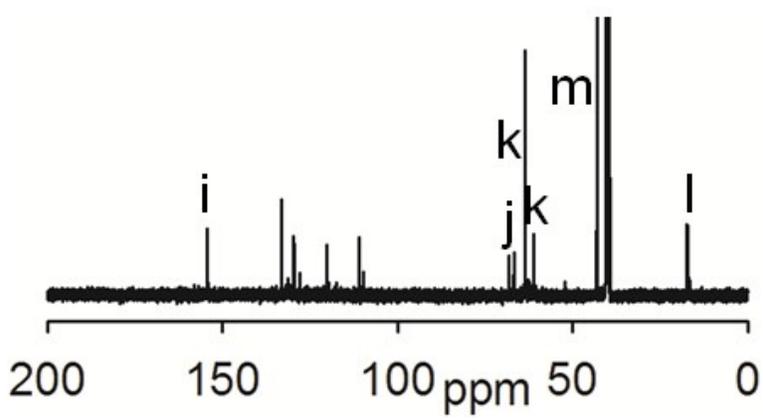
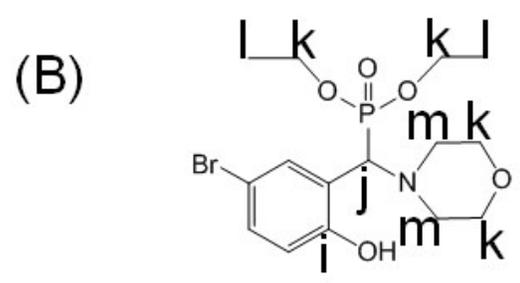
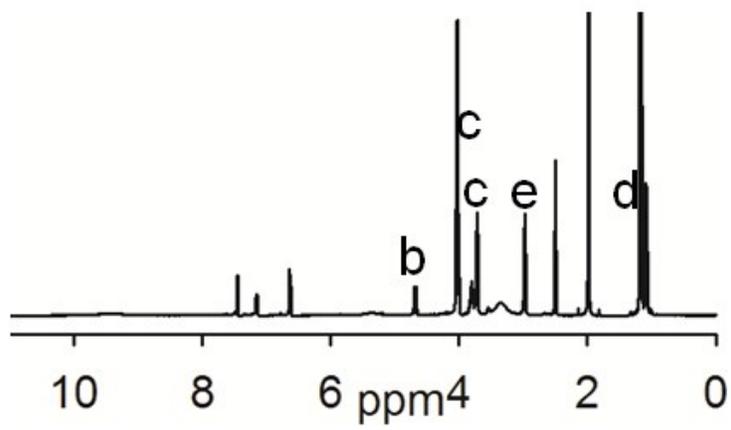
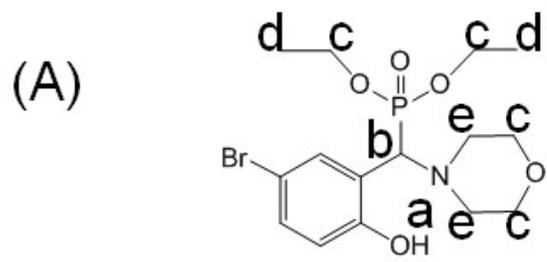


Fig. S15. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 12.



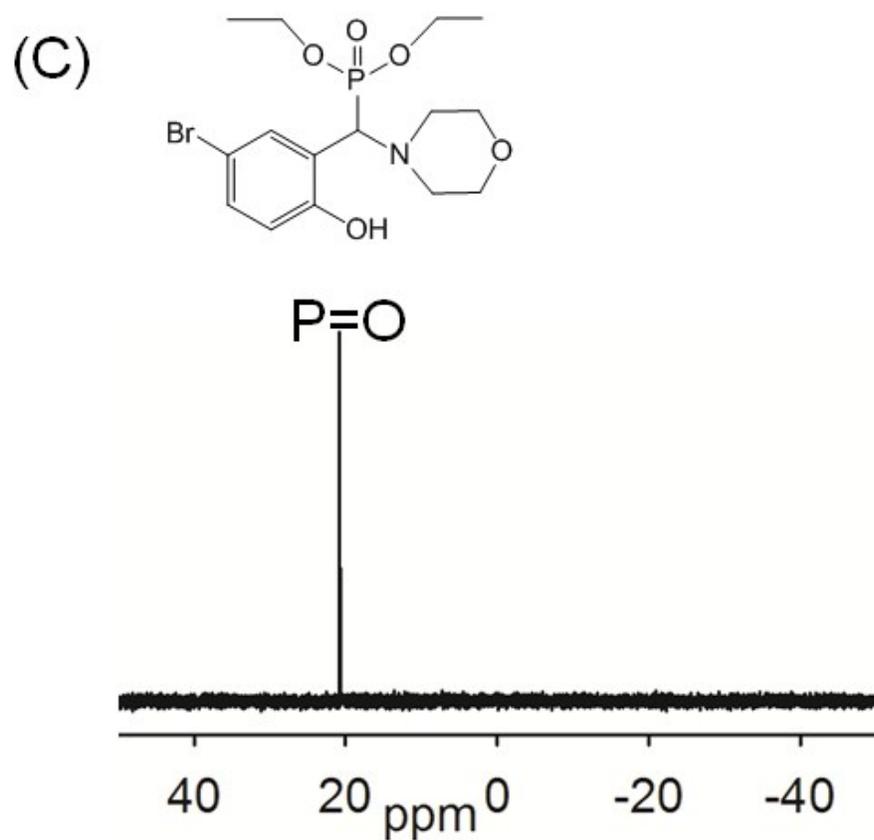
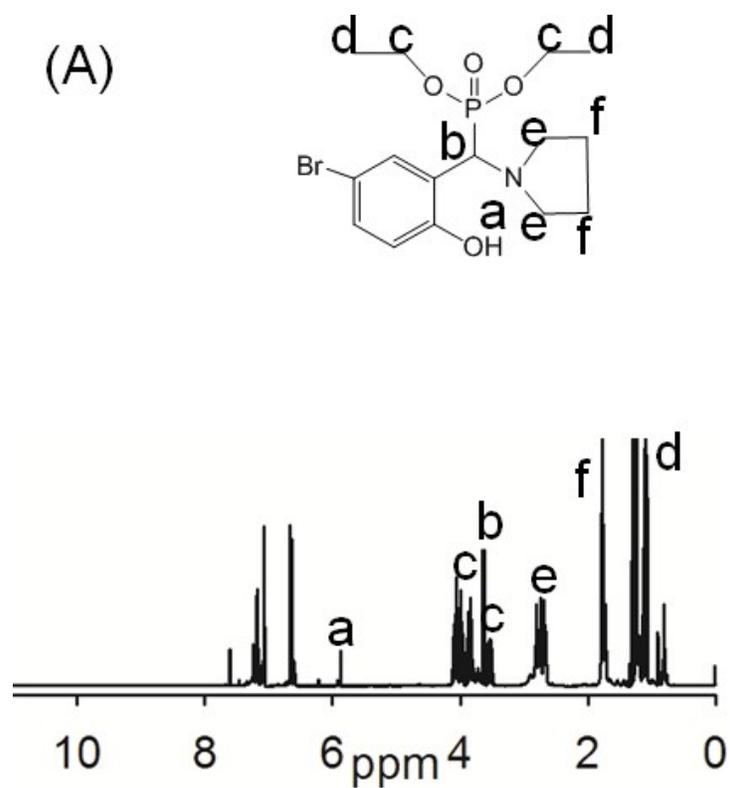


Fig. S16. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 13.



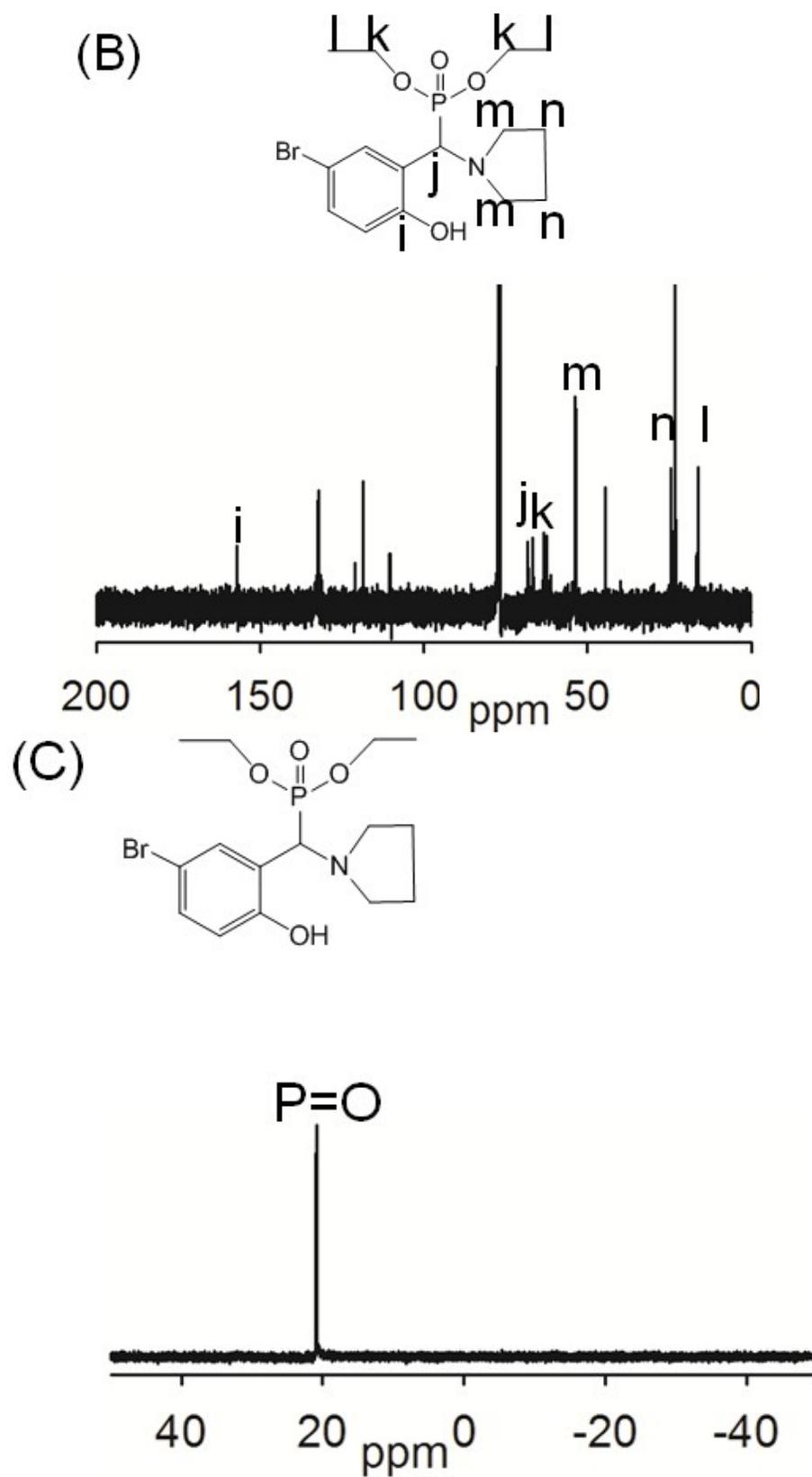
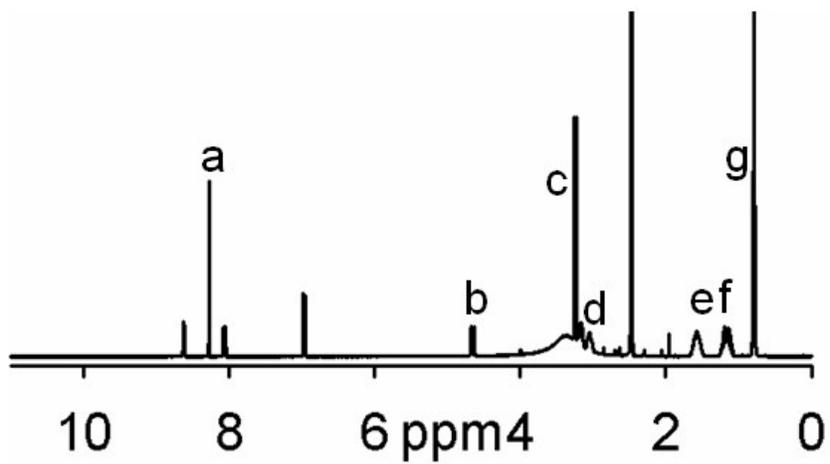
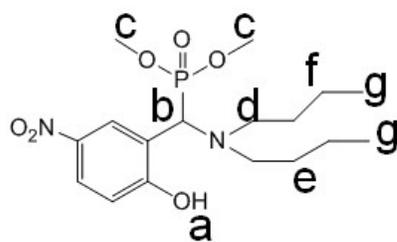
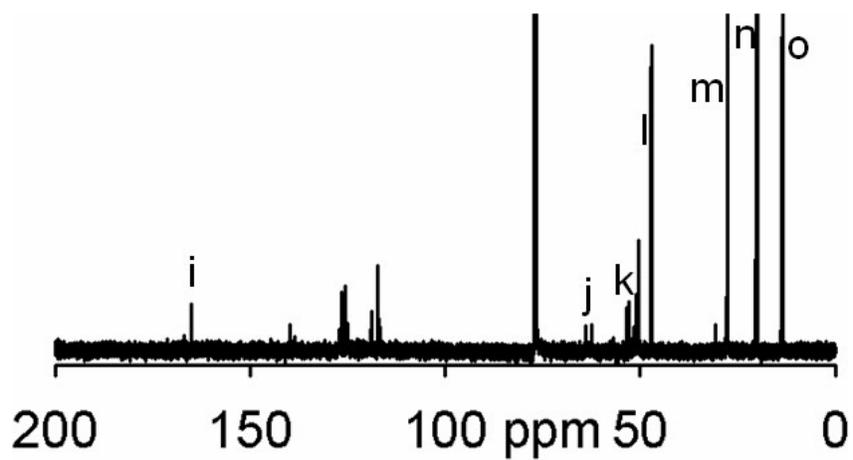
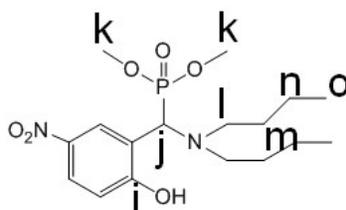


Fig. S17. ¹H NMR (A), ¹³C NMR (B), and ³¹P NMR (C) spectra of compound 14.

(A)



(B)



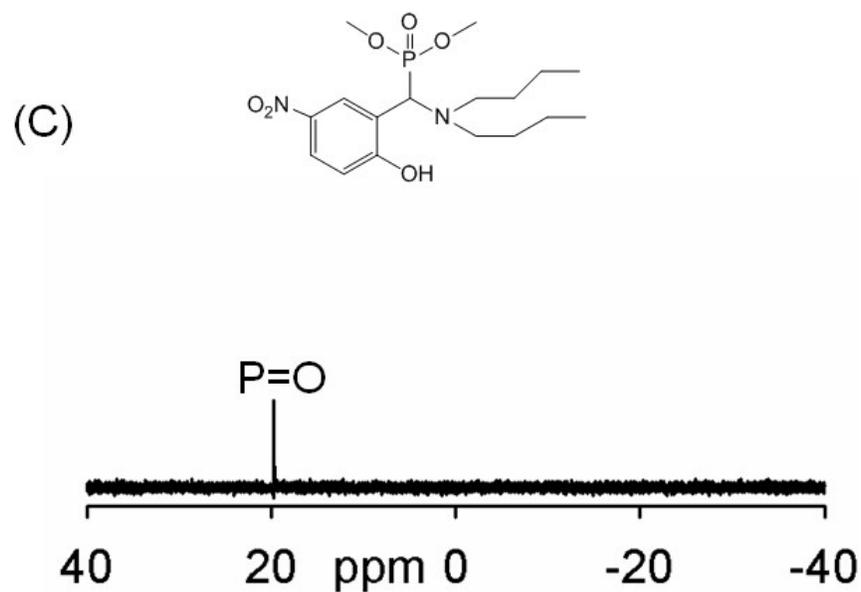
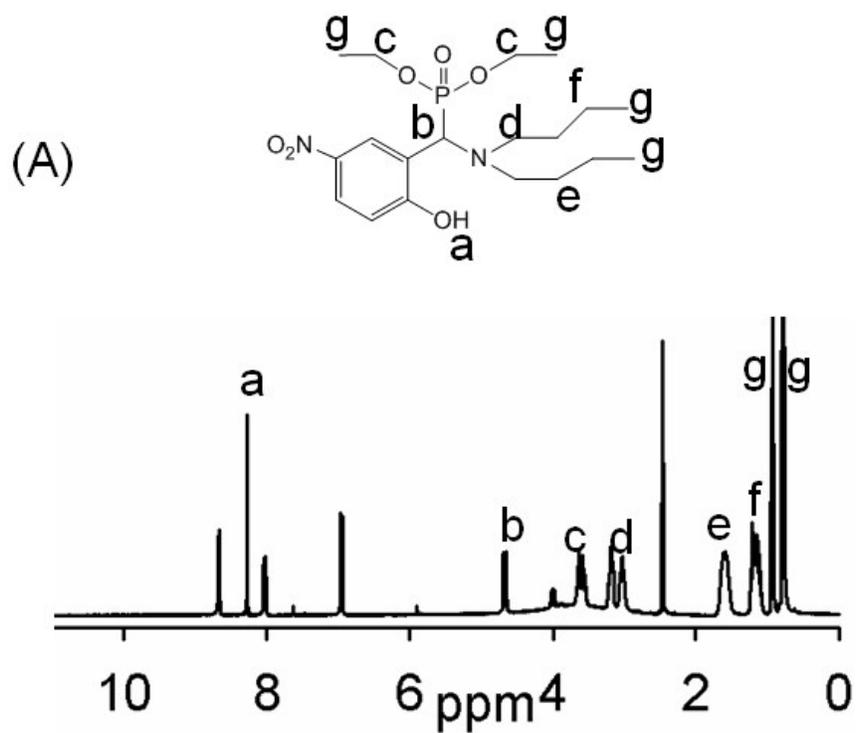


Fig. S18. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 15.



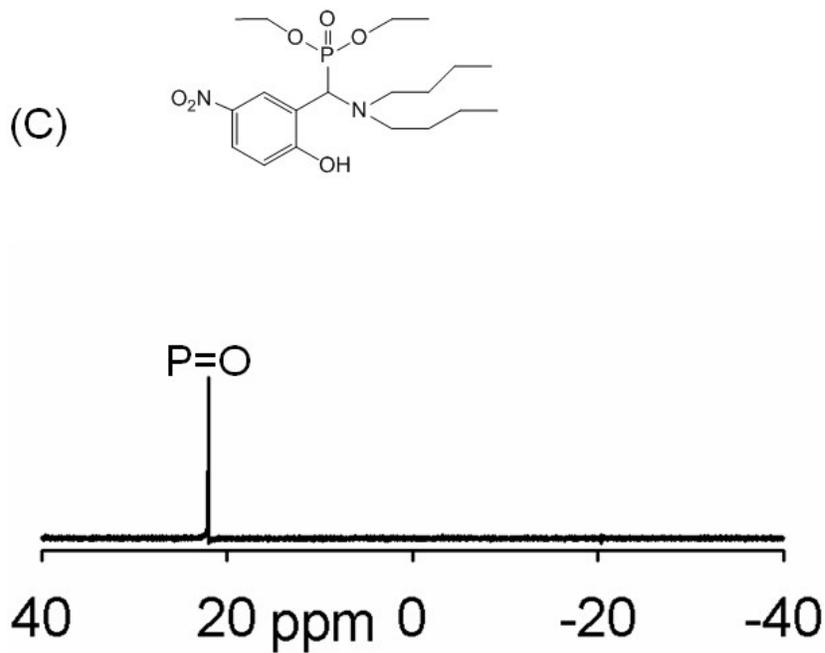
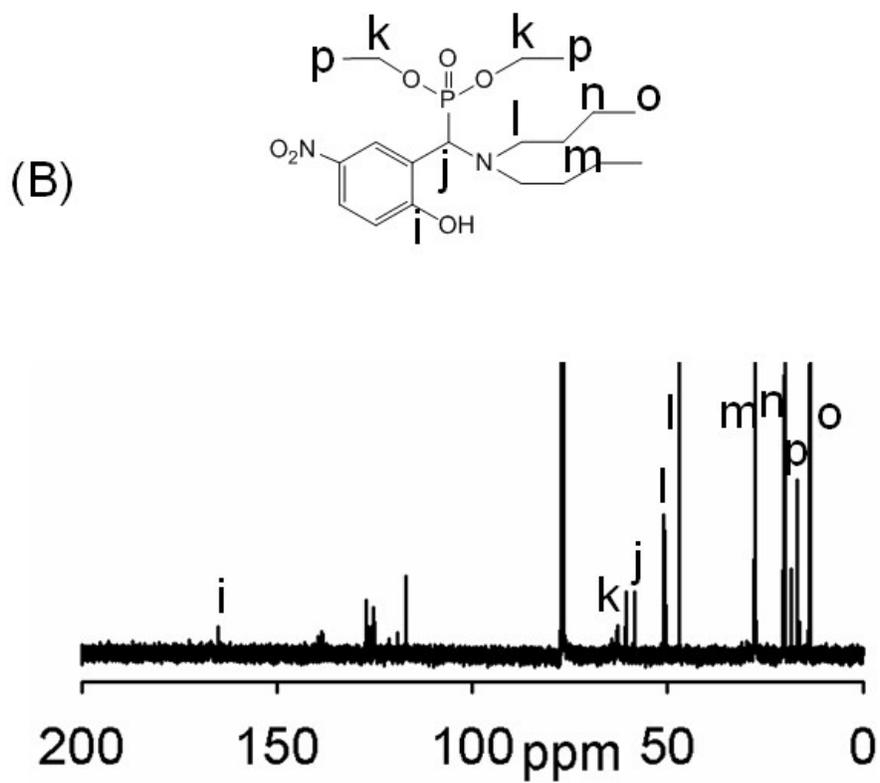
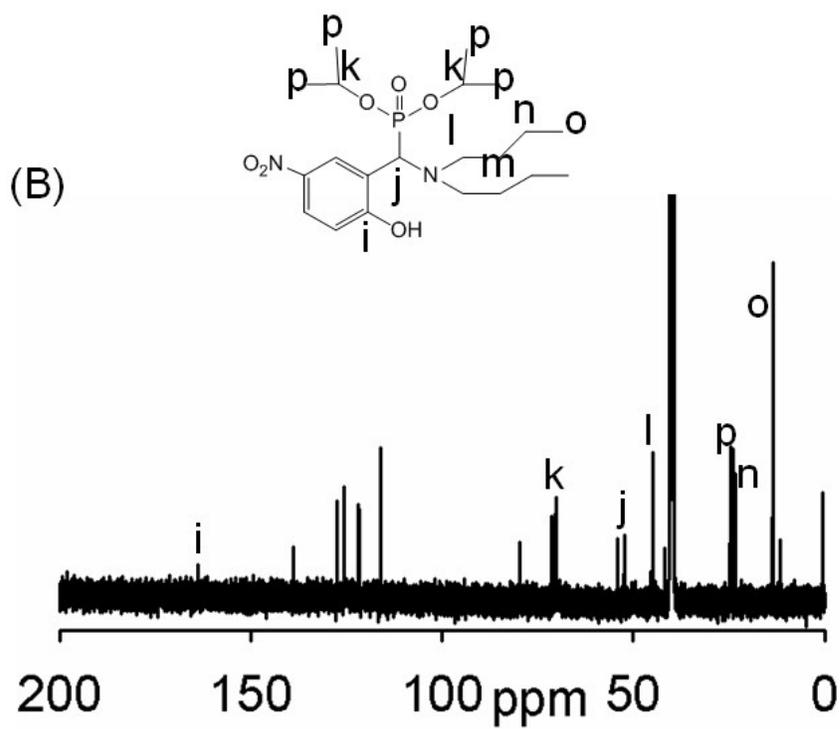
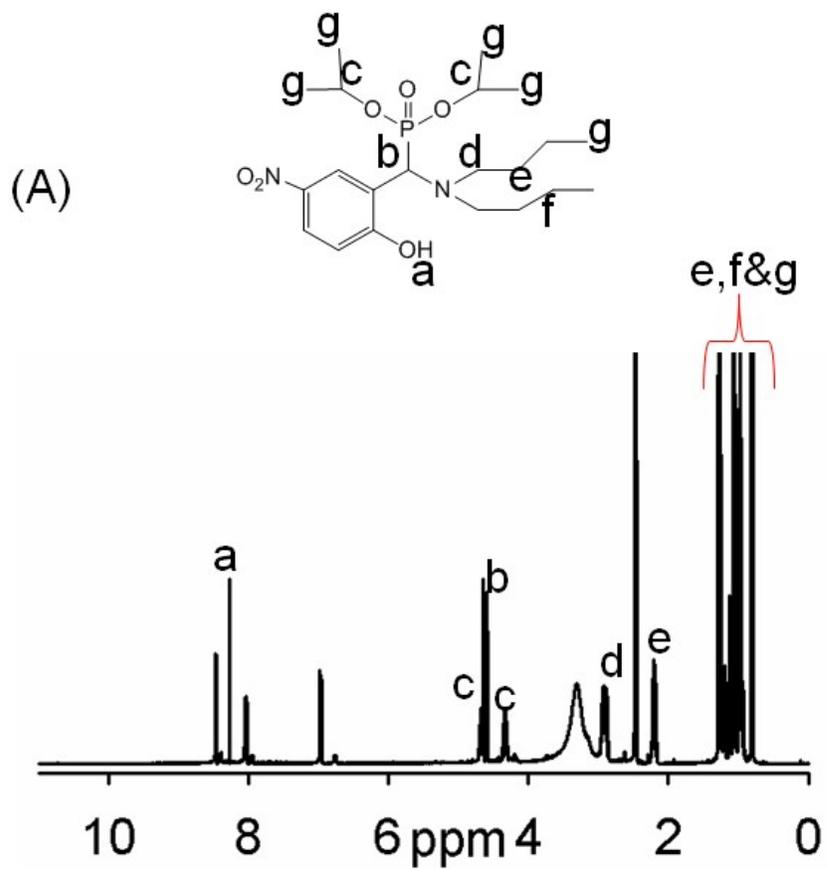


Fig. S19. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 16.



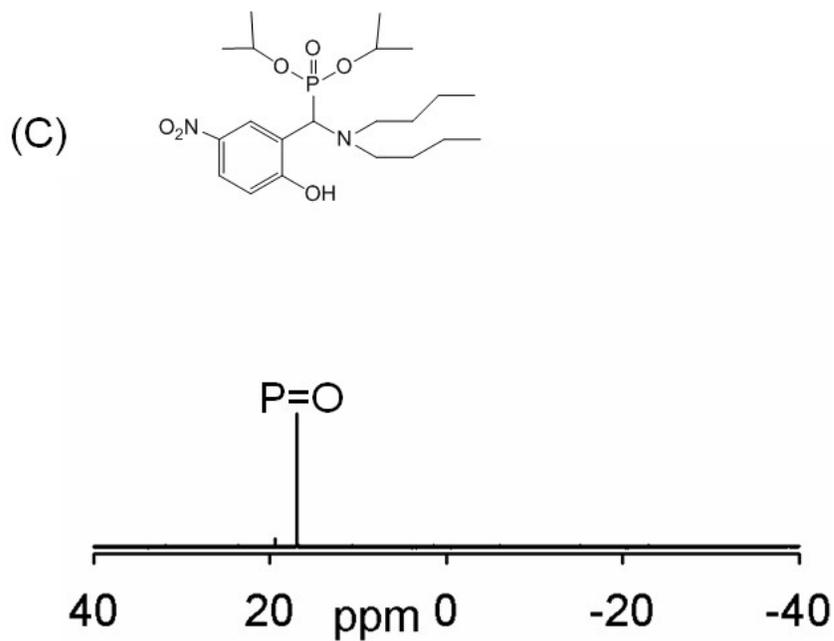
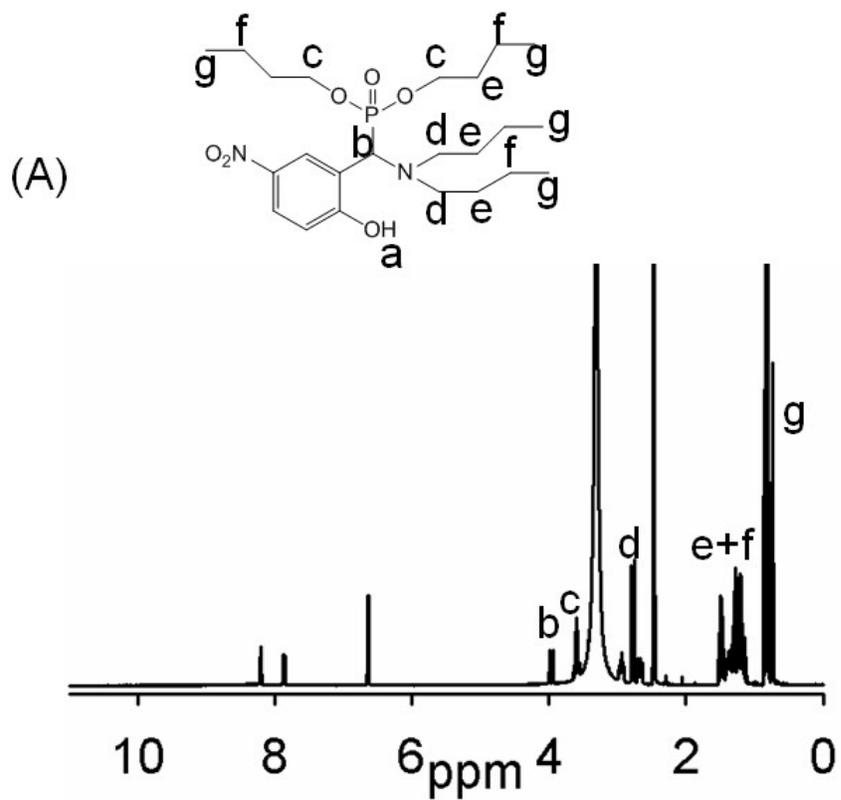


Fig. S20. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 17.



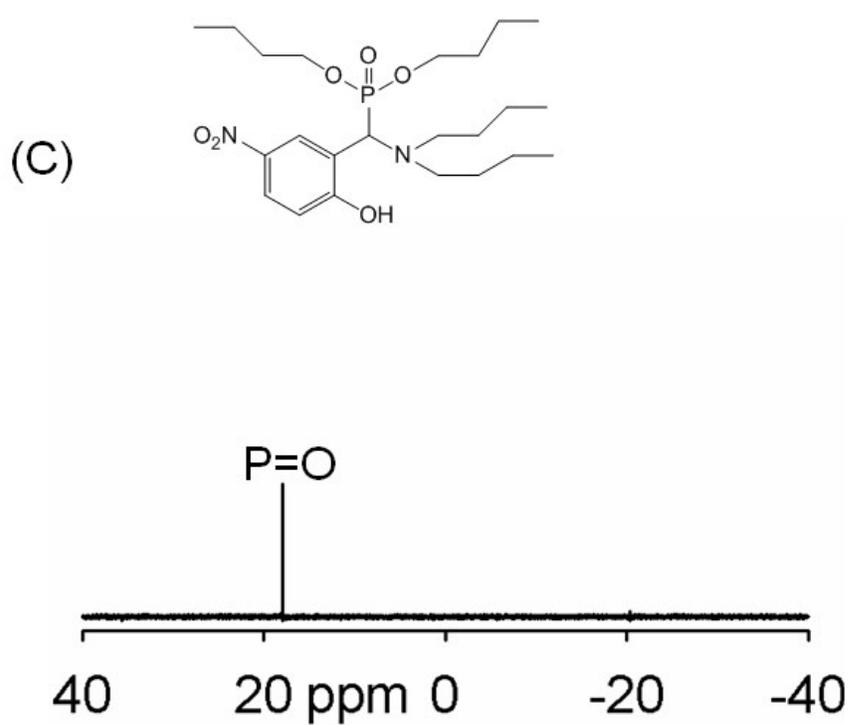
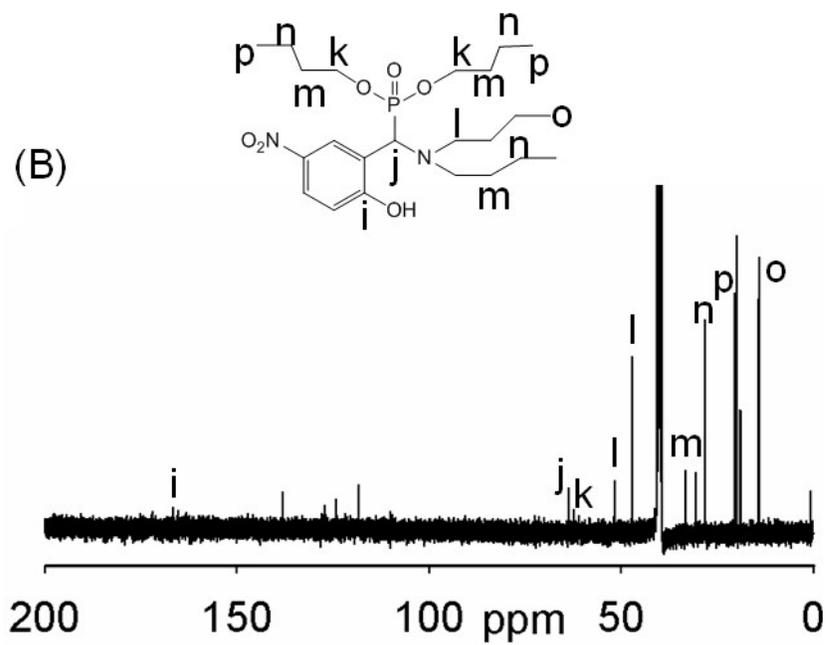
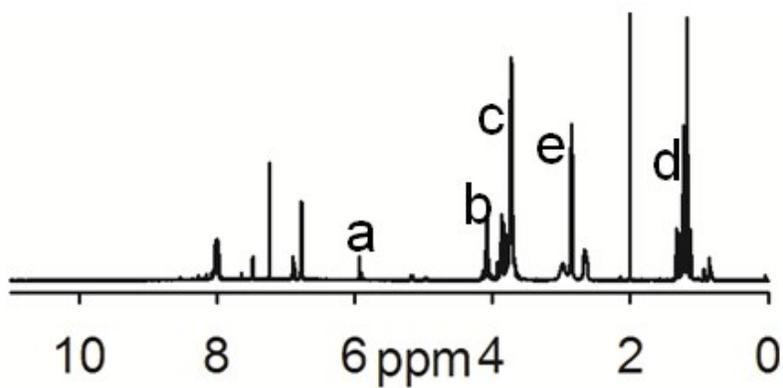
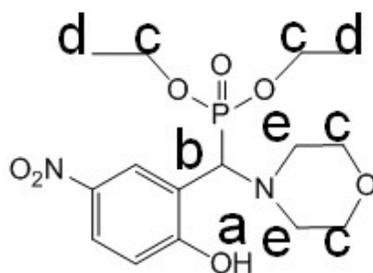
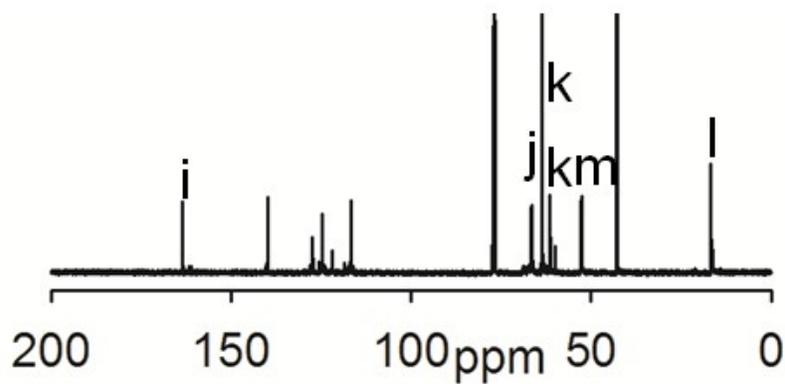
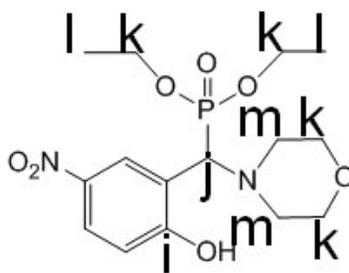


Fig. S21. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound **18**.

(A)



(B)



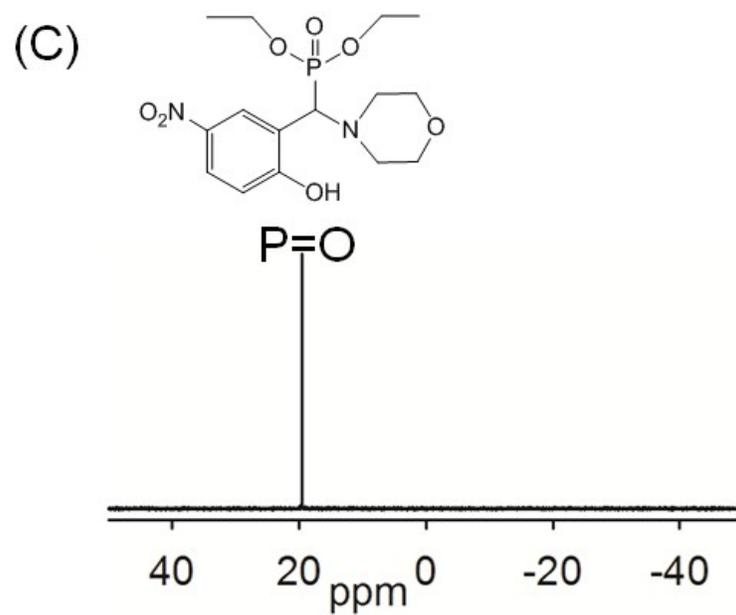
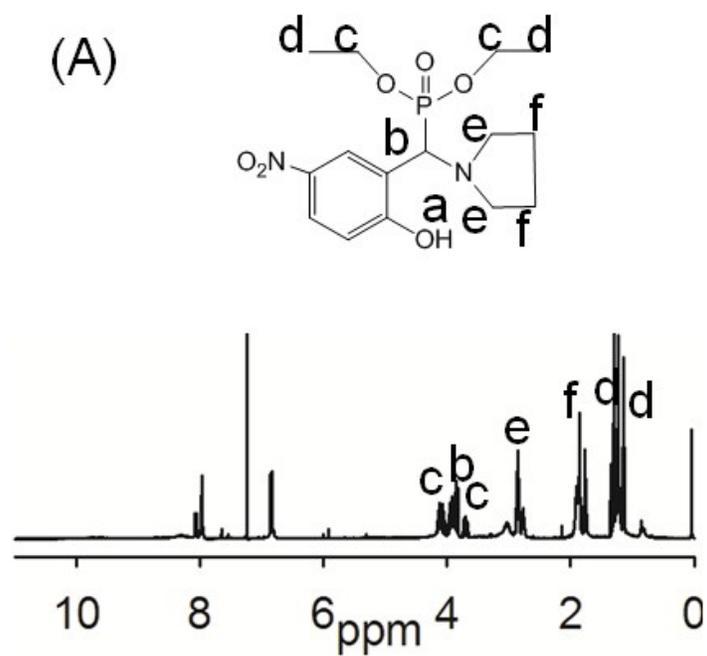
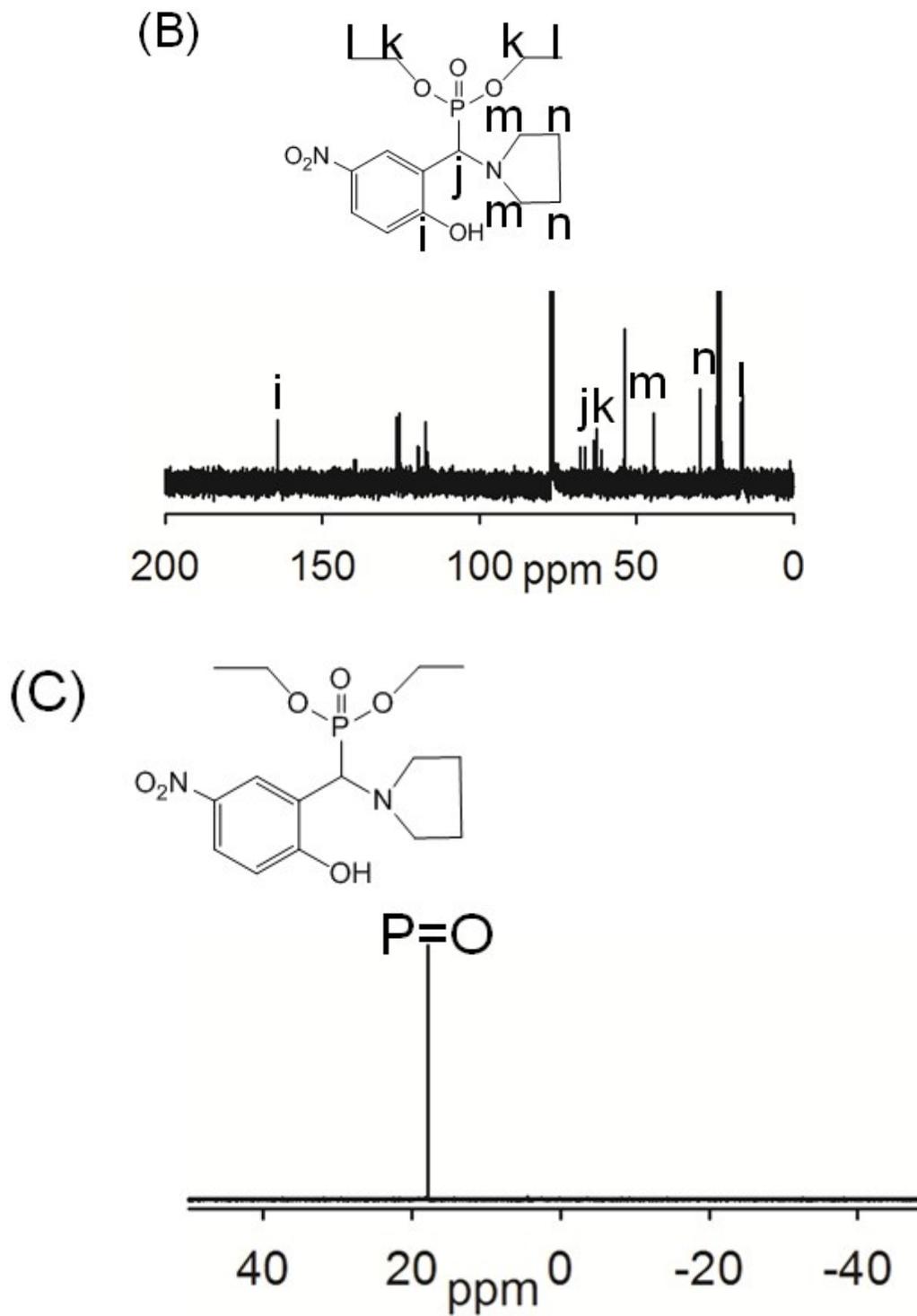
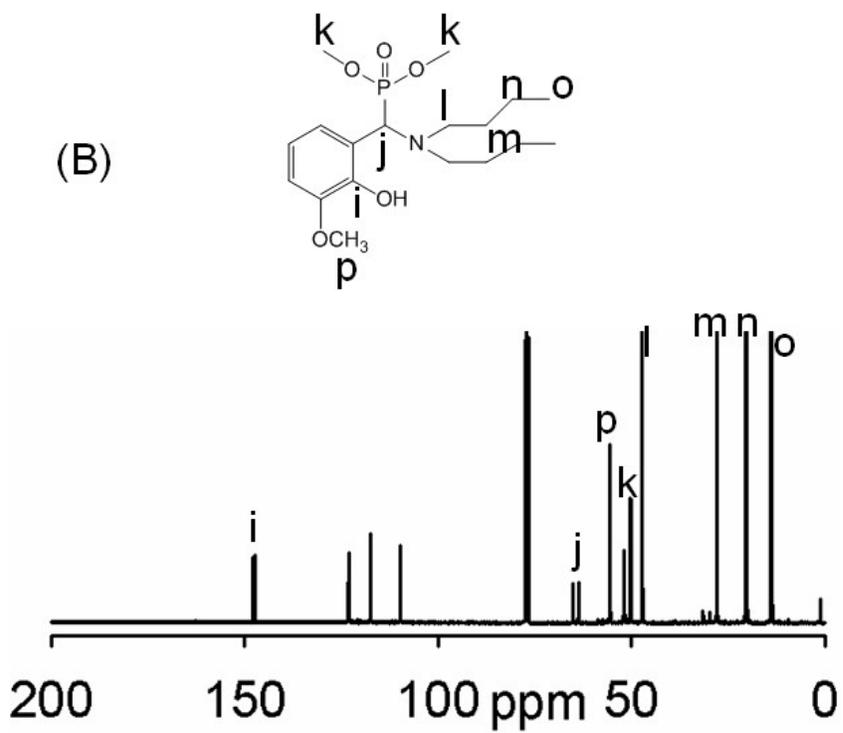
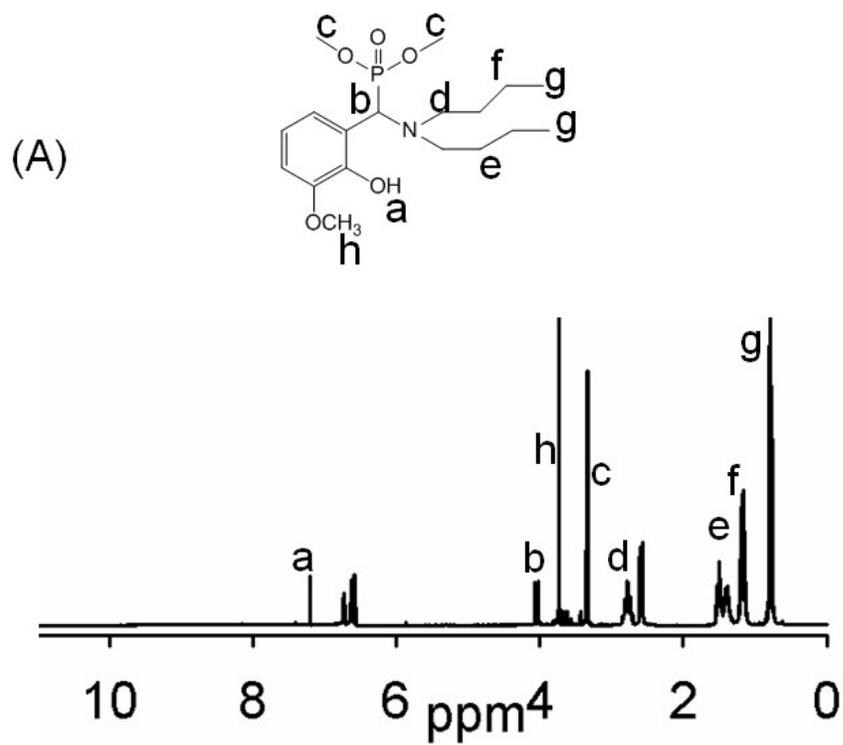


Fig. S22. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound **19**.







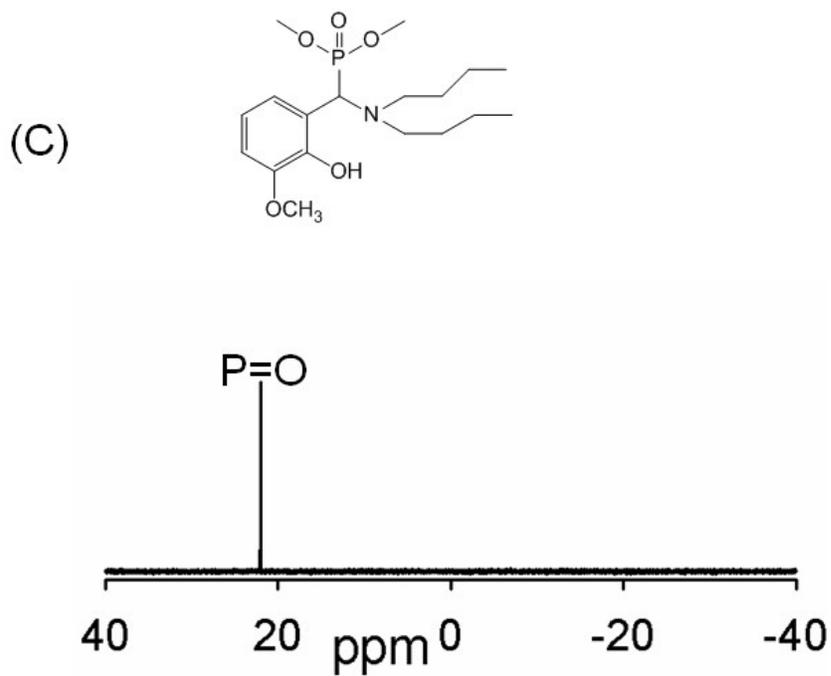
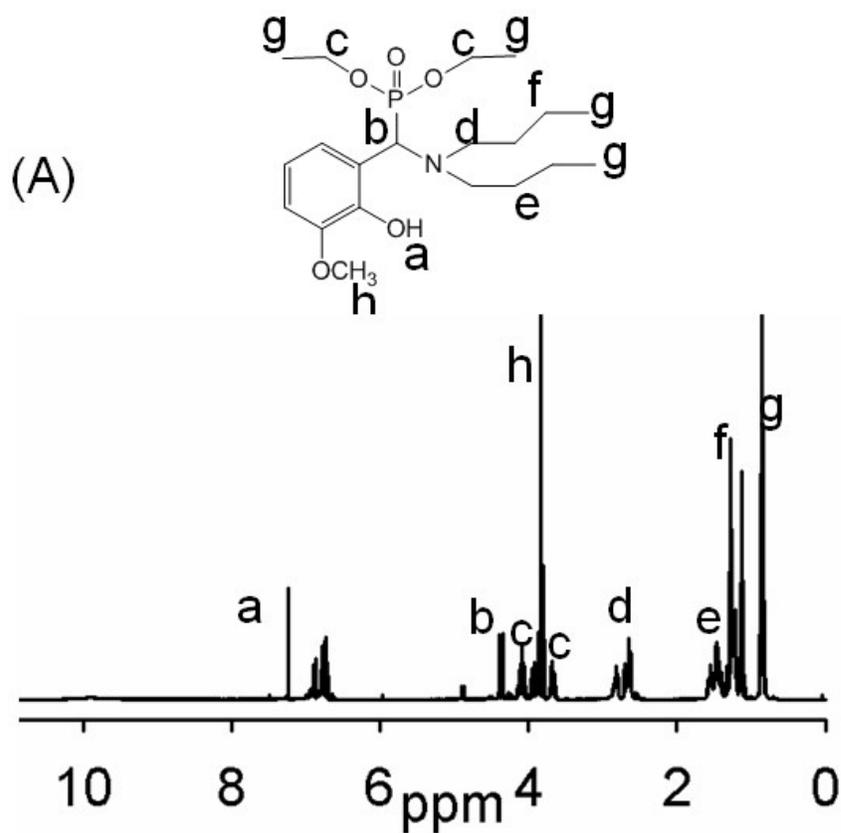


Fig. S24. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound **21**.



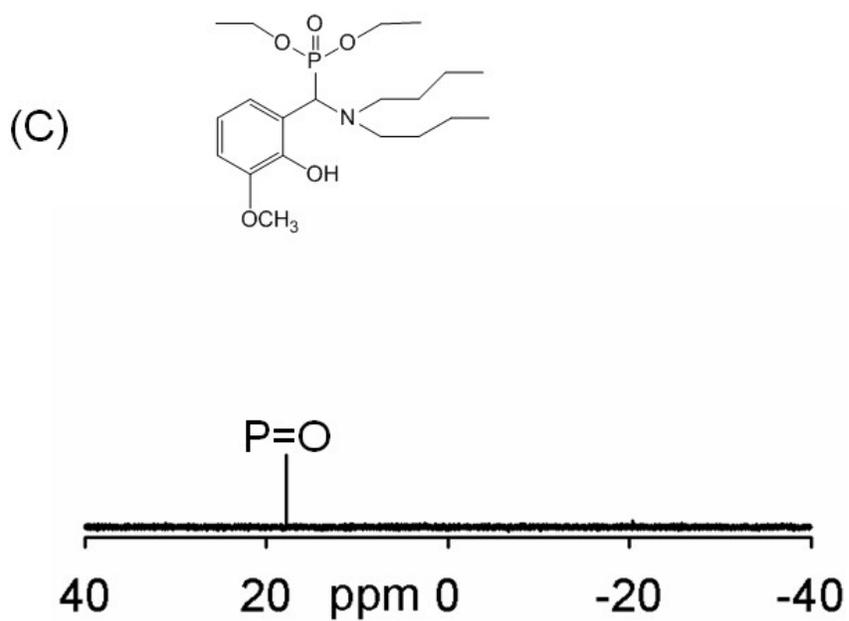
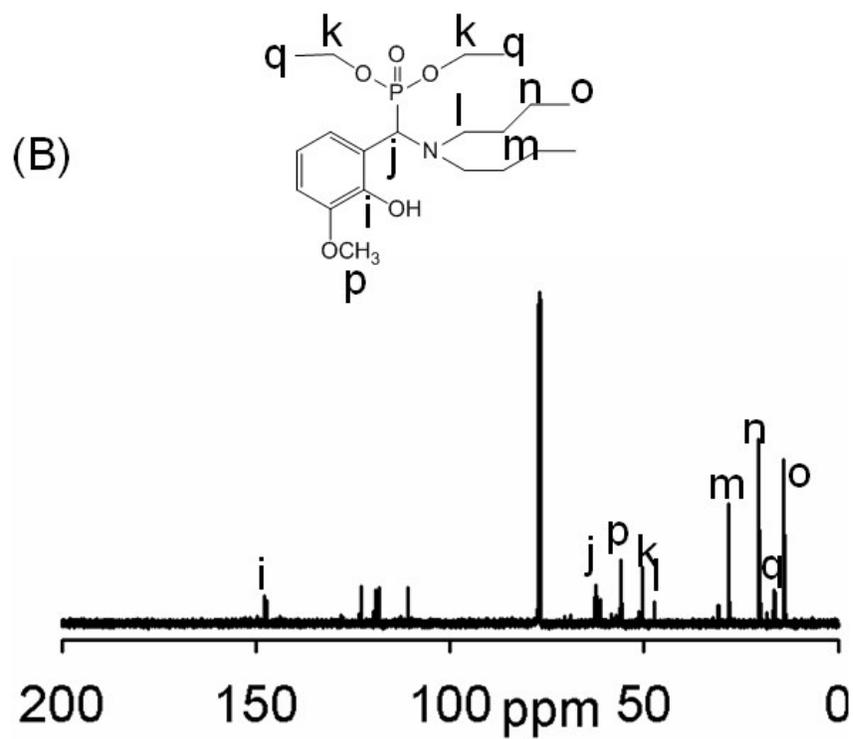
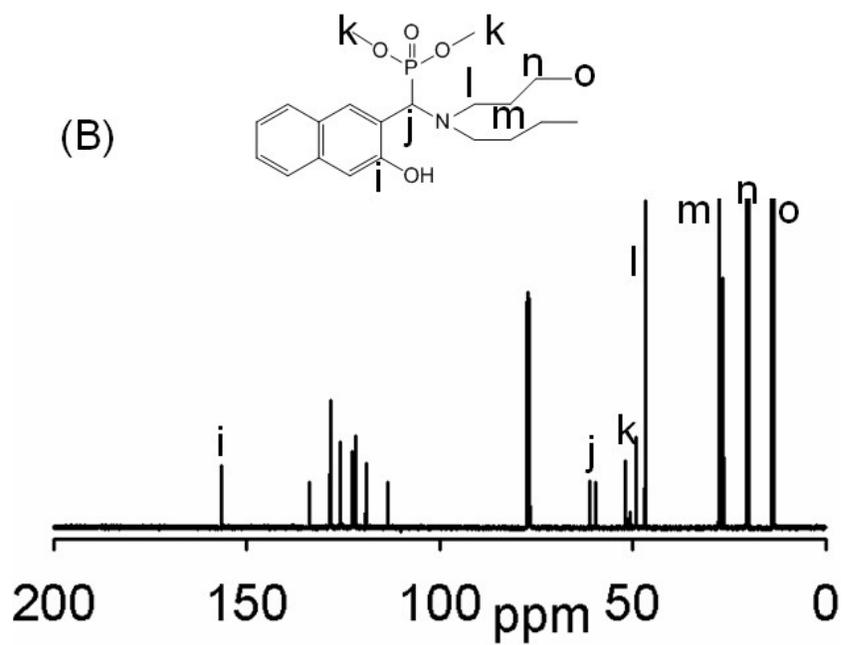
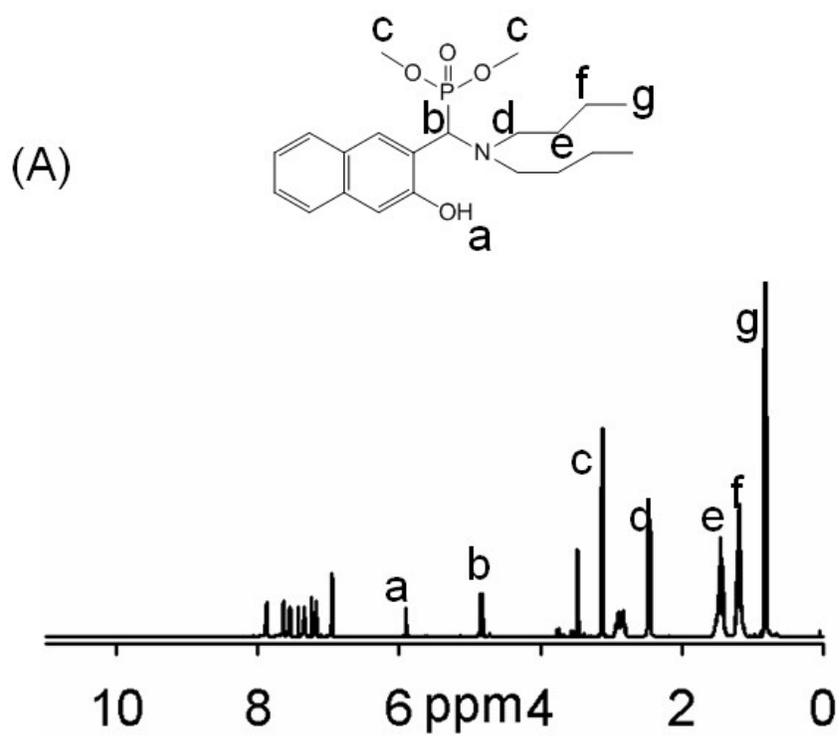


Fig. S25. ¹H NMR (A), ¹³C NMR (B), and ³¹P NMR (C) spectra of compound 22.



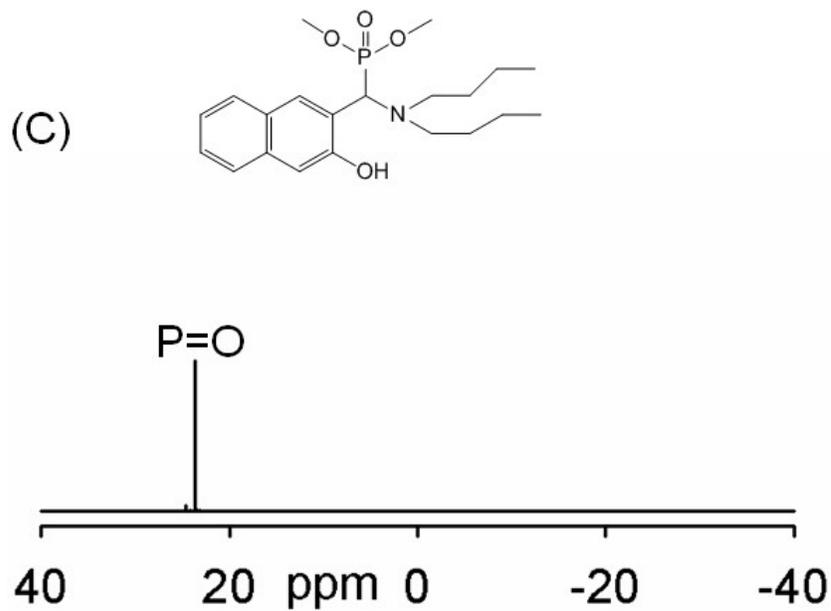
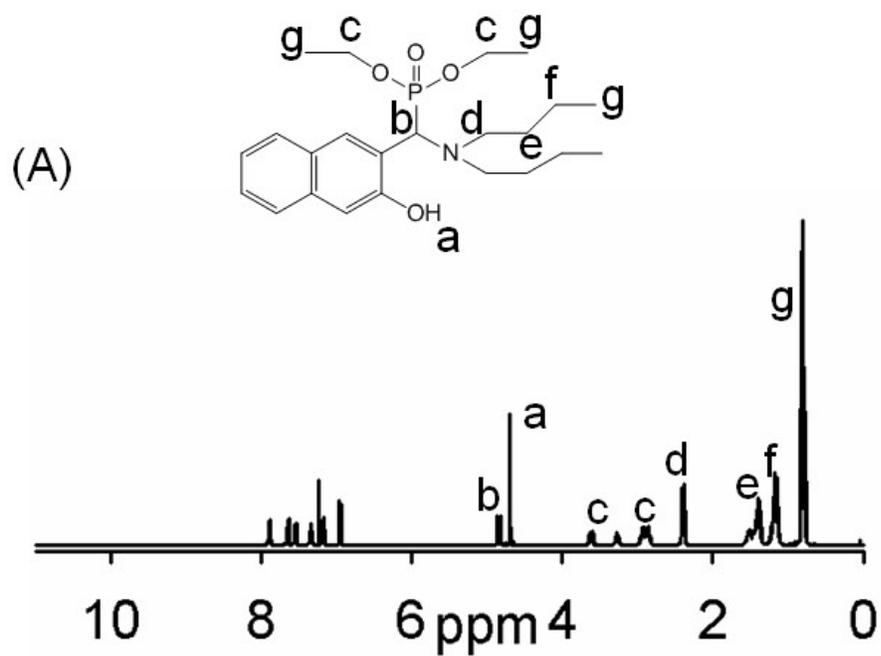


Fig. S26. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound **23**.



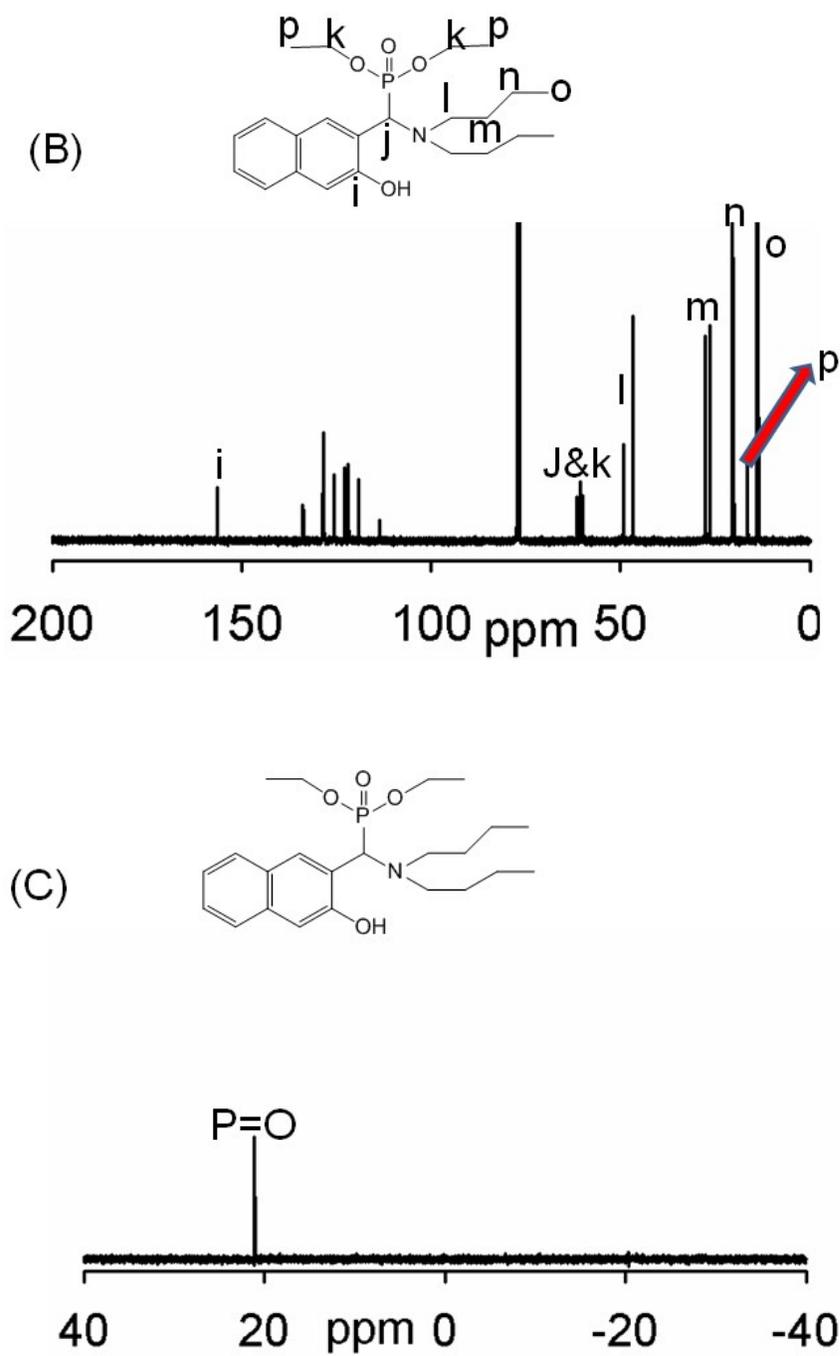


Fig. S27. ^1H NMR (A), ^{13}C NMR (B), and ^{31}P NMR (C) spectra of compound 24.