

Supplementary Material

***N*-Heterocyclic carbene-catalyzed domino hydroacylation/Stetter reactions of salicyl alkynylphosphonates and aromatic aldehydes**

Zhen-Qiang Wang, Ying Wang, and De-Qing Shi*

*Key Laboratory of Pesticide and Chemical Biology of Ministry of Education,
College of Chemistry, Central China Normal University, Wuhan 430 079, P. R. China
E-mail: chshidq@mail.ccn.u.edu.cn*

Table of Contents

1. ^1H , ^{13}C and ^{31}P NMR-spectra of **2** and **4** 2

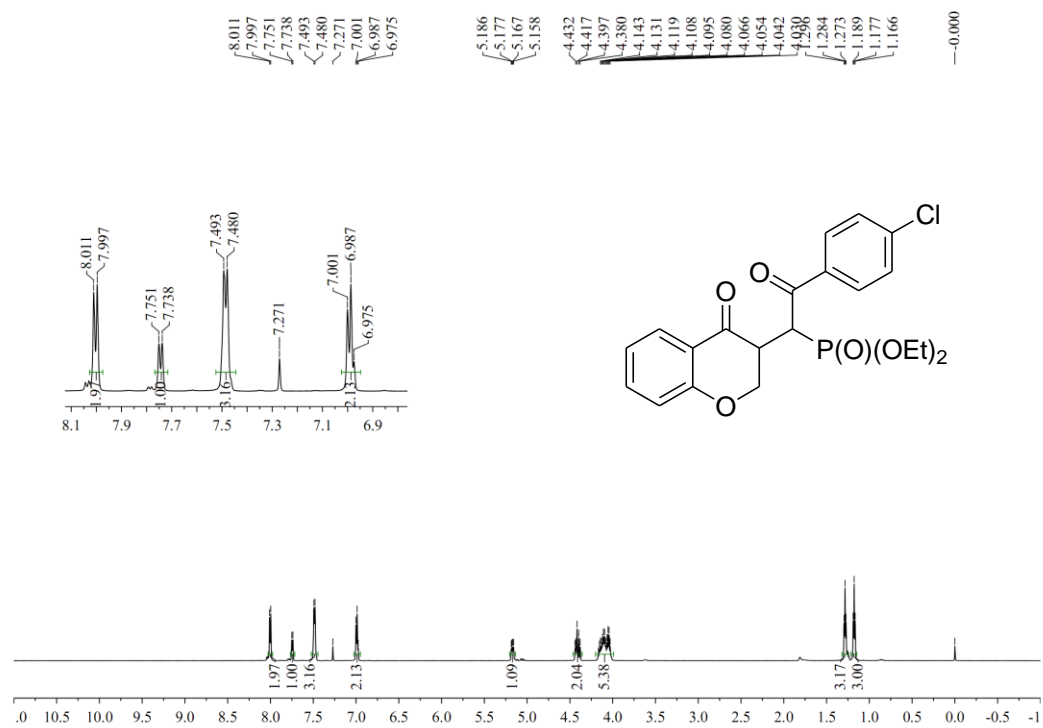


Figure S1. ¹H NMR spectrum (600 MHz, CDCl₃) of Diethyl 2-(4-chlorophenyl)-1-(4-oxochroman-3-yl)-2-oxoethyl phosphonate (2a)

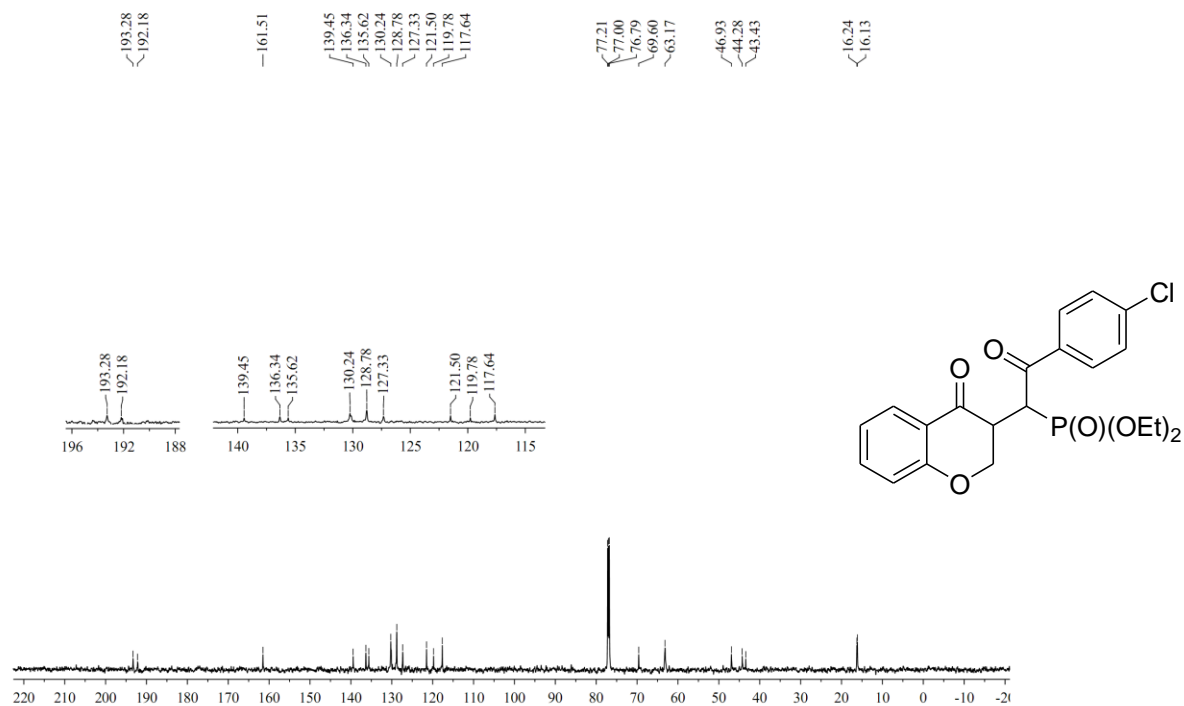


Figure S2. ¹³C NMR spectrum (150 MHz, CDCl₃) of Diethyl 2-(4-chlorophenyl)-1-(4-oxochroman-3-yl)-2-oxoethyl phosphonate (2a)

- 18.84

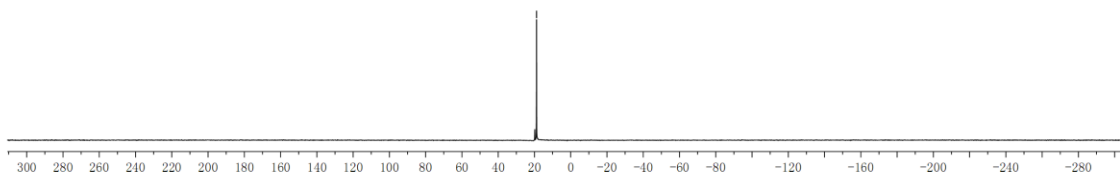
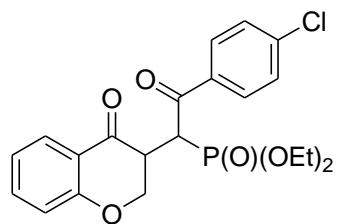


Figure S3. ^{31}P NMR spectrum (243 MHz, CDCl_3) of Diethyl 2-(4-chlorophenyl)-1-(4-oxochroman-3-yl)-2-oxoethyl phosphonate (2a)

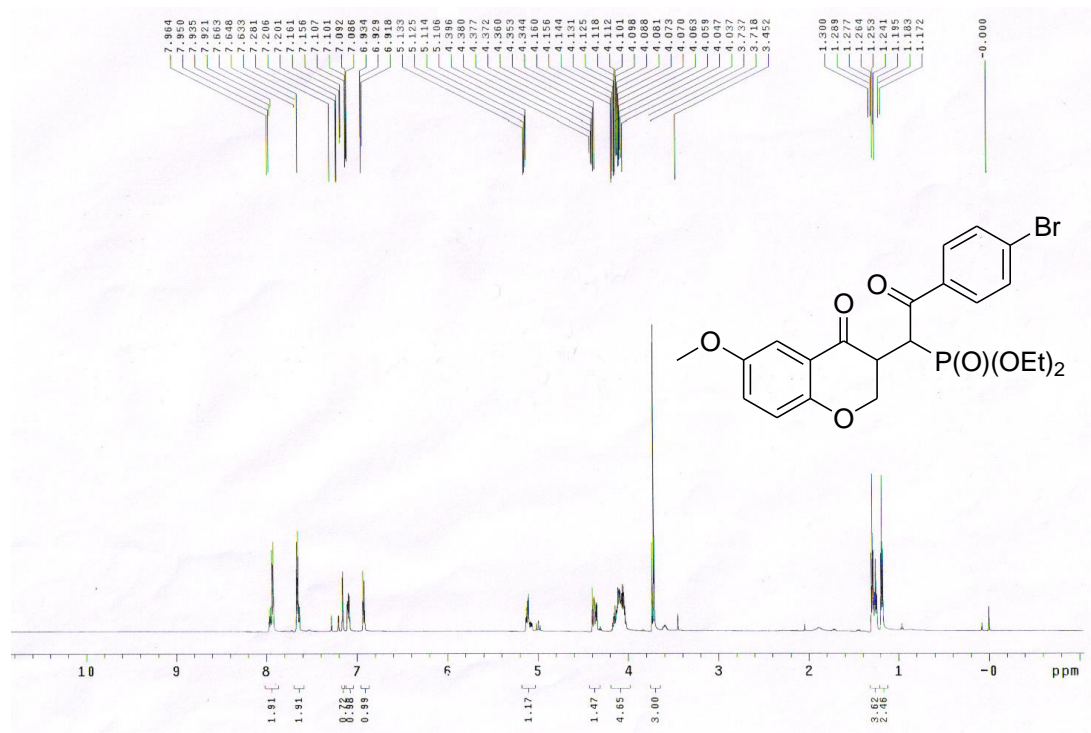


Figure S4. ^1H NMR spectrum (600 MHz, CDCl_3) of Diethyl 2-(4-bromophenyl)-1-(6-methoxy-4-oxochroman-3-yl)-2-oxoethyl phosphonate (2b)

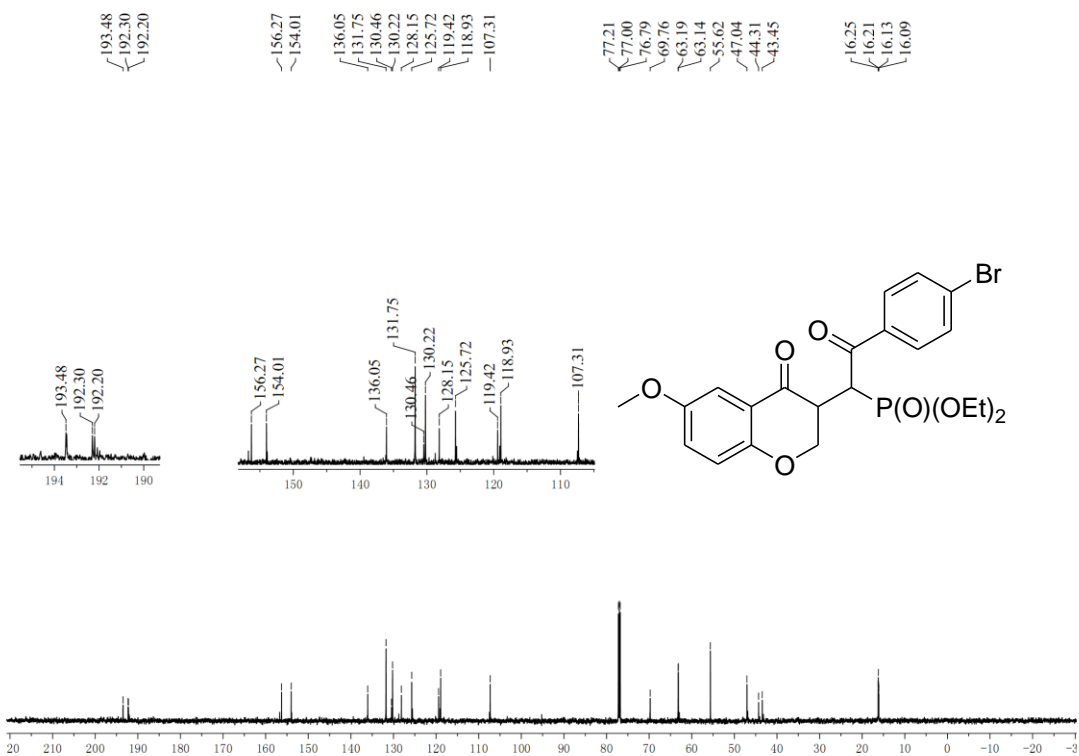


Figure S5. ^{13}C NMR spectrum (150 MHz, CDCl_3) of Diethyl 2-(4-bromophenyl)-1-(6-methoxy-4-oxochroman-3-yl)-2-oxoethyl phosphonate (2b)

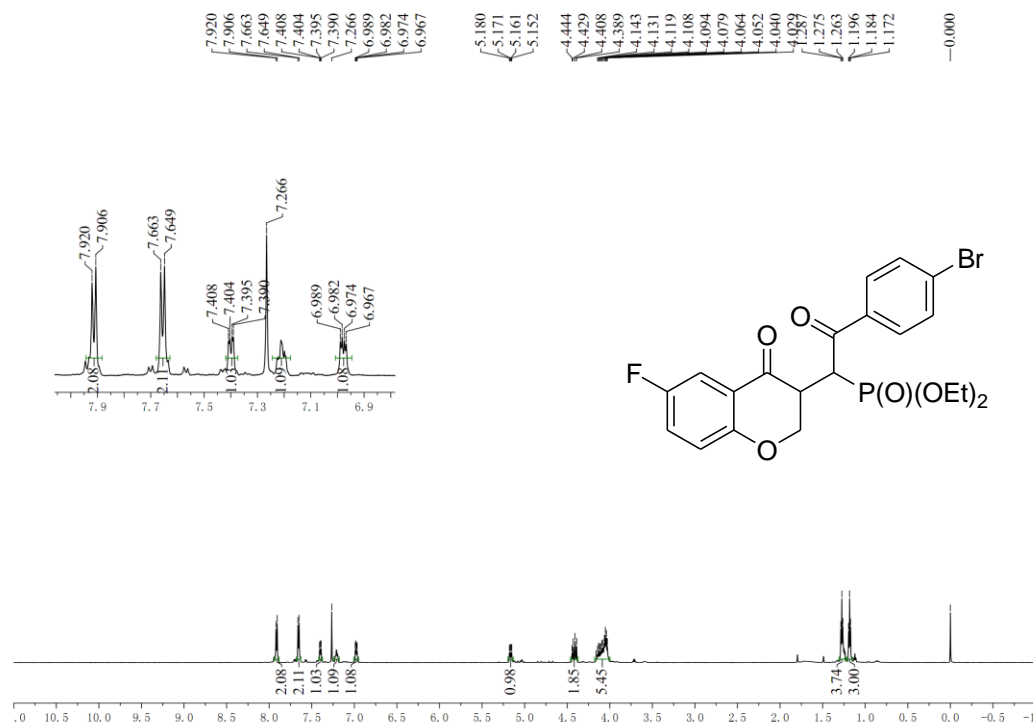


Figure S6. ¹H NMR spectrum (600 MHz, CDCl₃) of Diethyl 2-(4-bromophenyl)-1-(6-fluoro-4-oxochroman-3-yl)-2-oxoethyl phosphonate (2c)

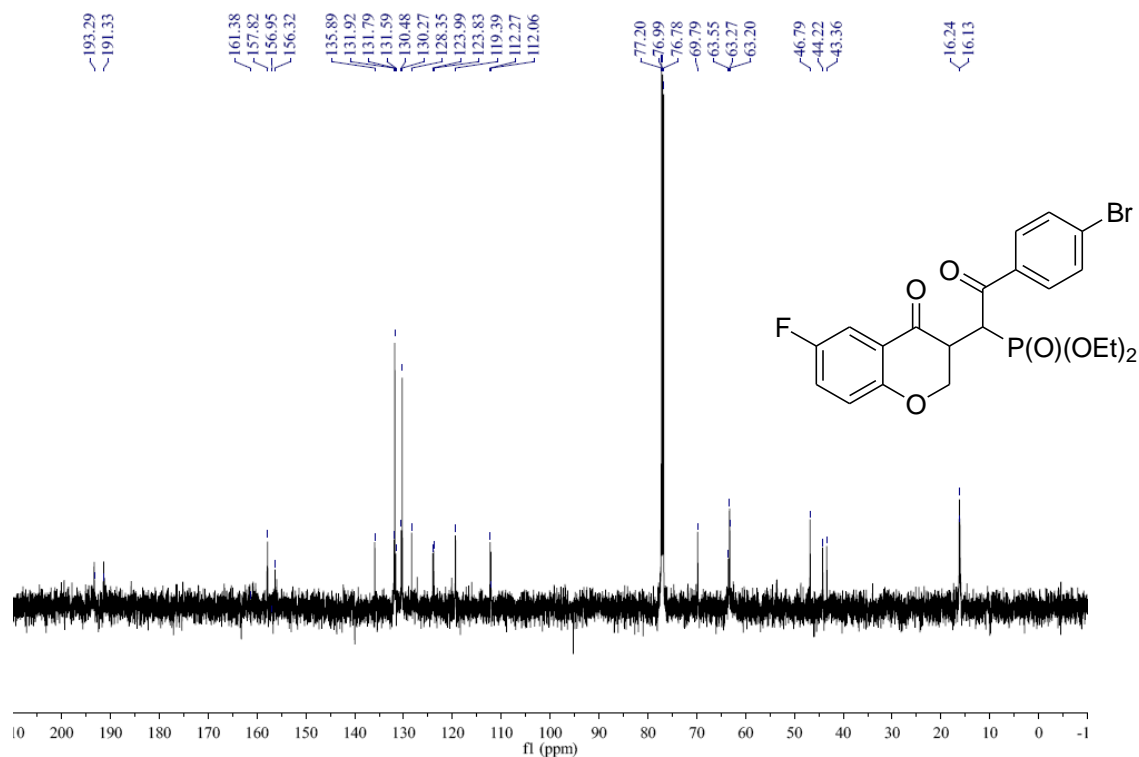


Figure S7. ¹³C NMR spectrum (150 MHz, CDCl₃) of Diethyl 2-(4-bromophenyl)-1-(6-fluoro-4-oxochroman-3-yl)-2-oxoethyl phosphonate (2c)

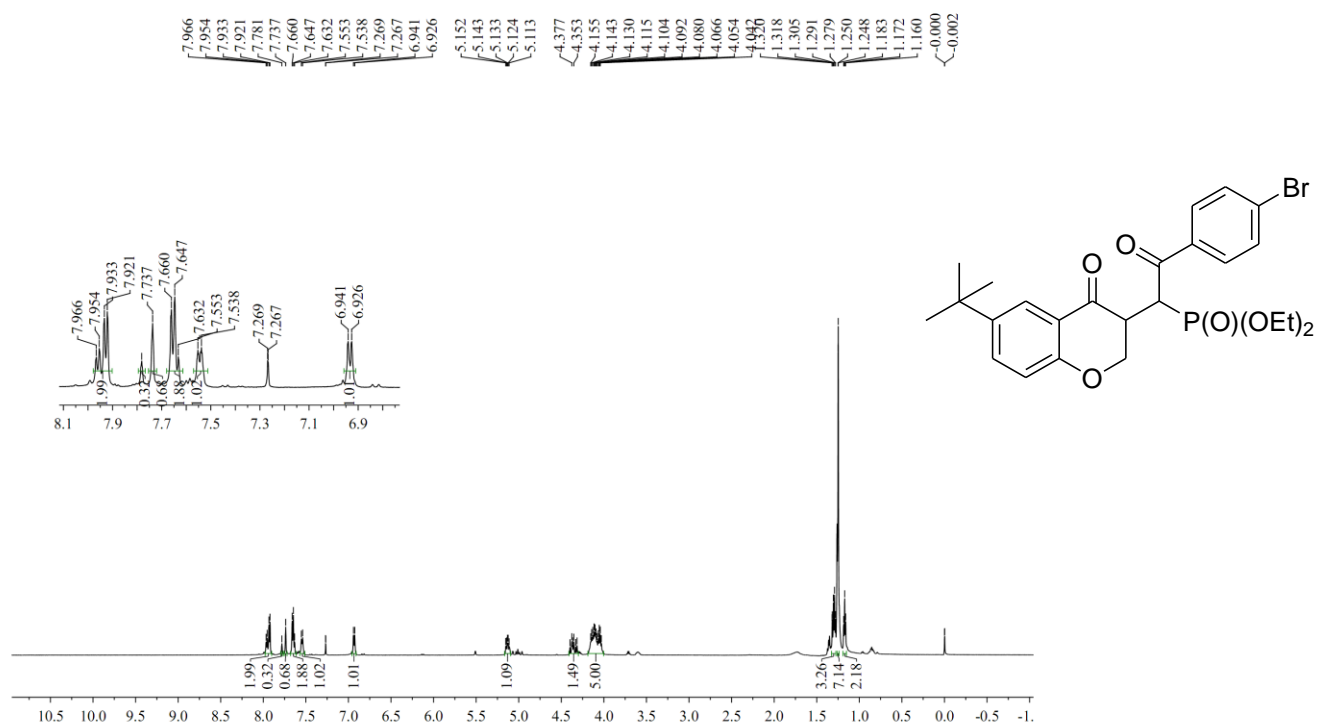


Figure S8. ¹H NMR spectrum (600 MHz, CDCl₃) of Diethyl 2-(4-bromophenyl)-1-(6-tert-butyl-4-oxo chroman-3-yl)-2-oxoethyl phosphonate (2d)

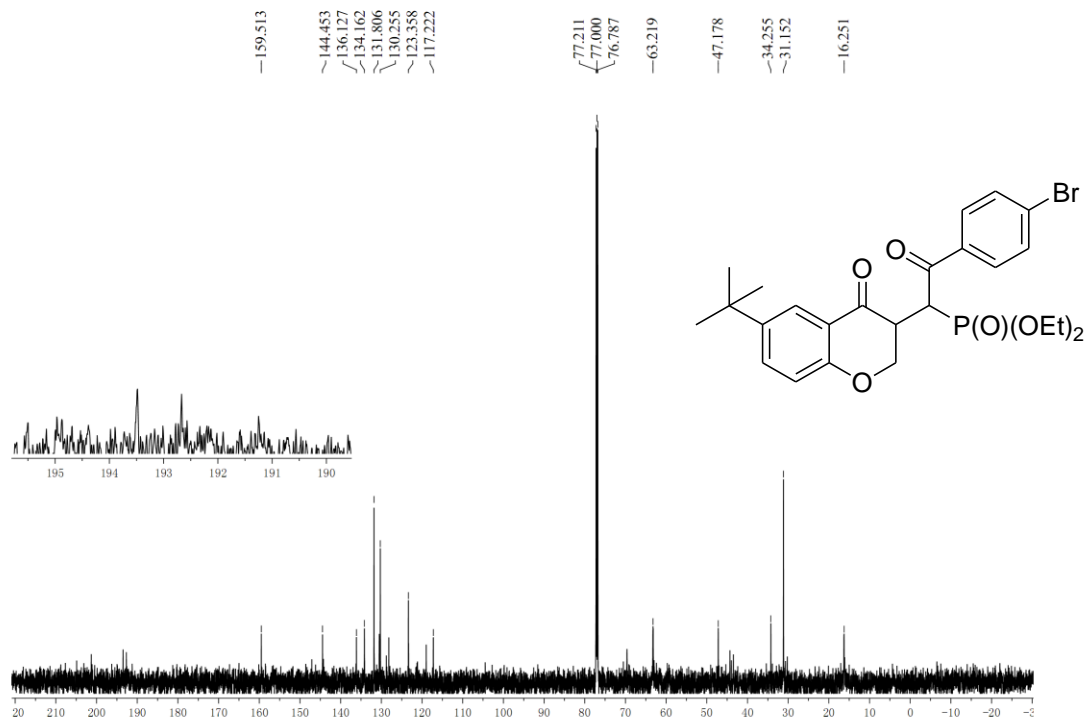


Figure S9. ¹³C NMR spectrum (150 MHz, CDCl₃) of Diethyl 2-(4-bromophenyl)-1-(6-tert-butyl-4-oxo chroman-3-yl)-2-oxoethyl phosphonate (2d)

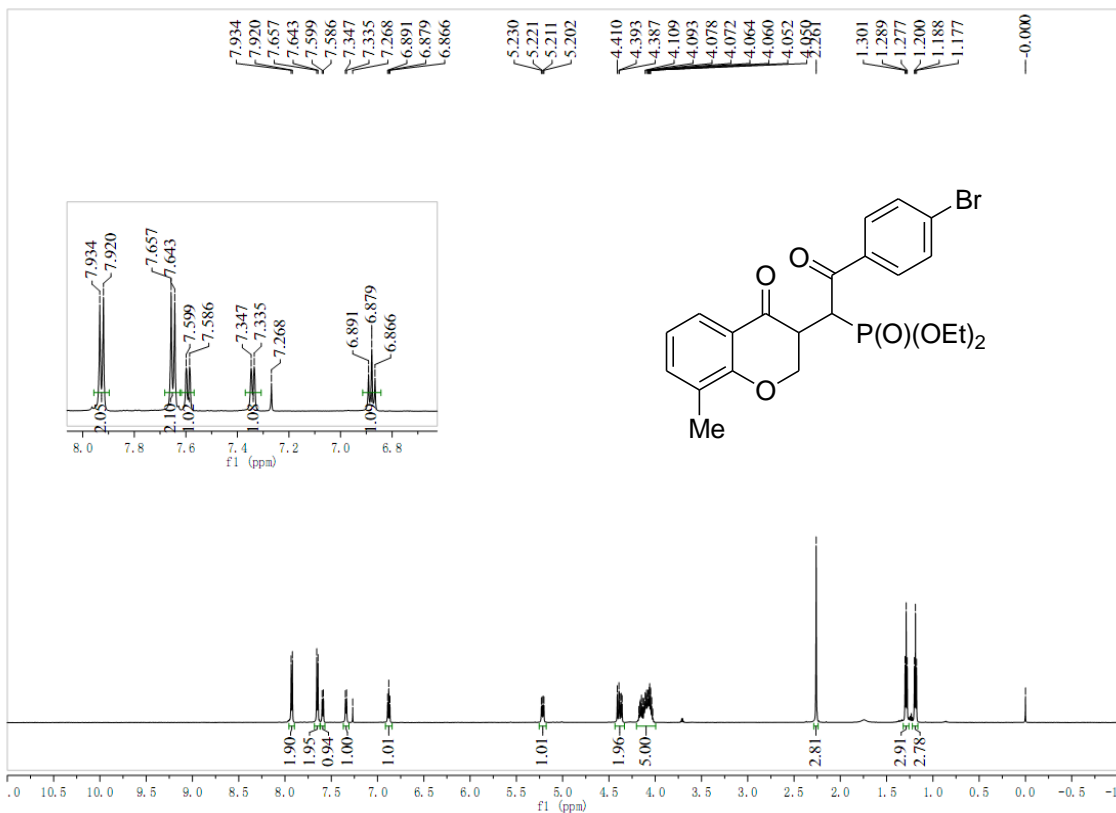


Figure S10. ¹H NMR spectrum (600 MHz, CDCl₃) of Diethyl 2-(4-bromophenyl)-1-(8-methyl-4-oxo chroman-3-yl)-2-oxoethyl phosphonate (2e)

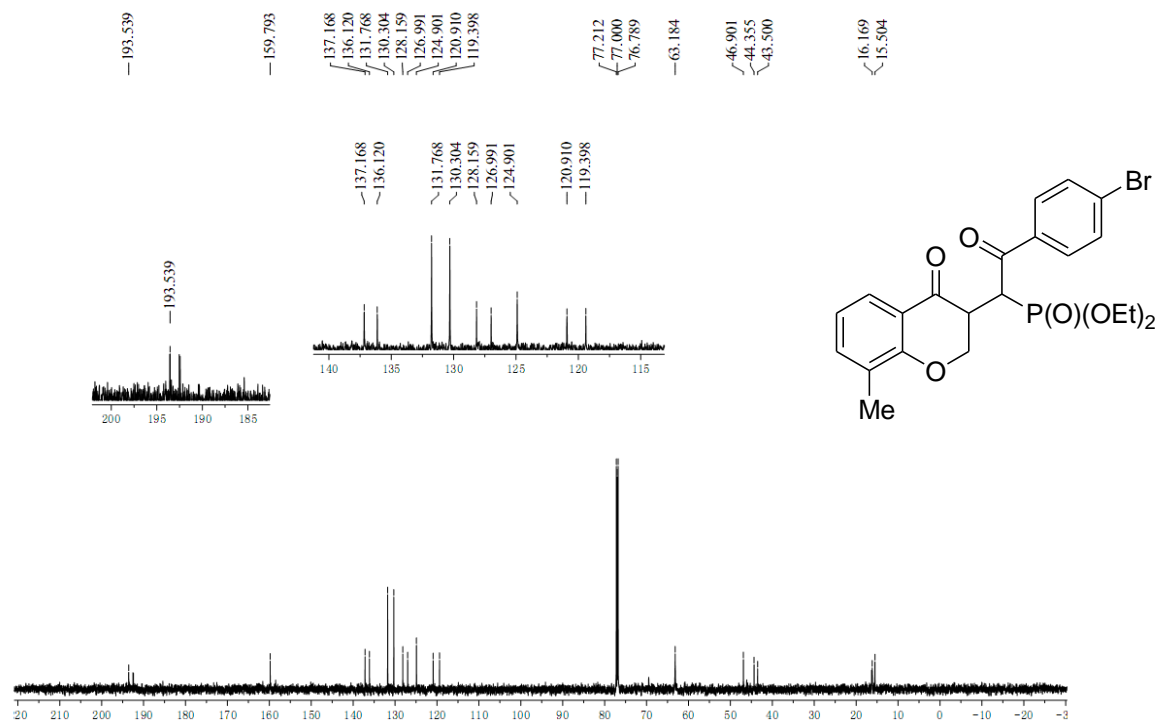


Figure S11. ¹³C NMR spectrum (150 MHz, CDCl₃) of Diethyl 2-(4-bromophenyl)-1-(8-methyl-4-oxochroman-3-yl)-2-oxoethyl phosphonate (2e)

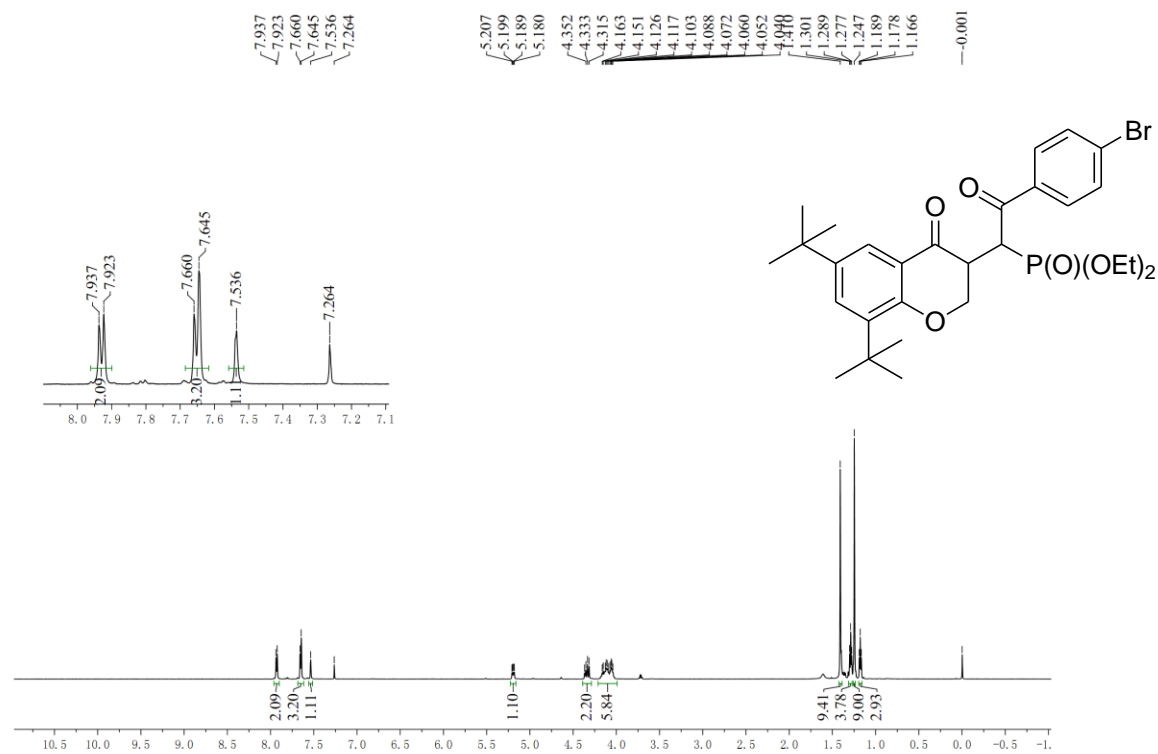


Figure S12. ¹H NMR spectrum (600 MHz, CDCl₃) of Diethyl 2-(4-bromophenyl)-1-(6,8-di-tert-butyl-4-oxochroman-3-yl)-2-oxoethyl phosphonate (2f)

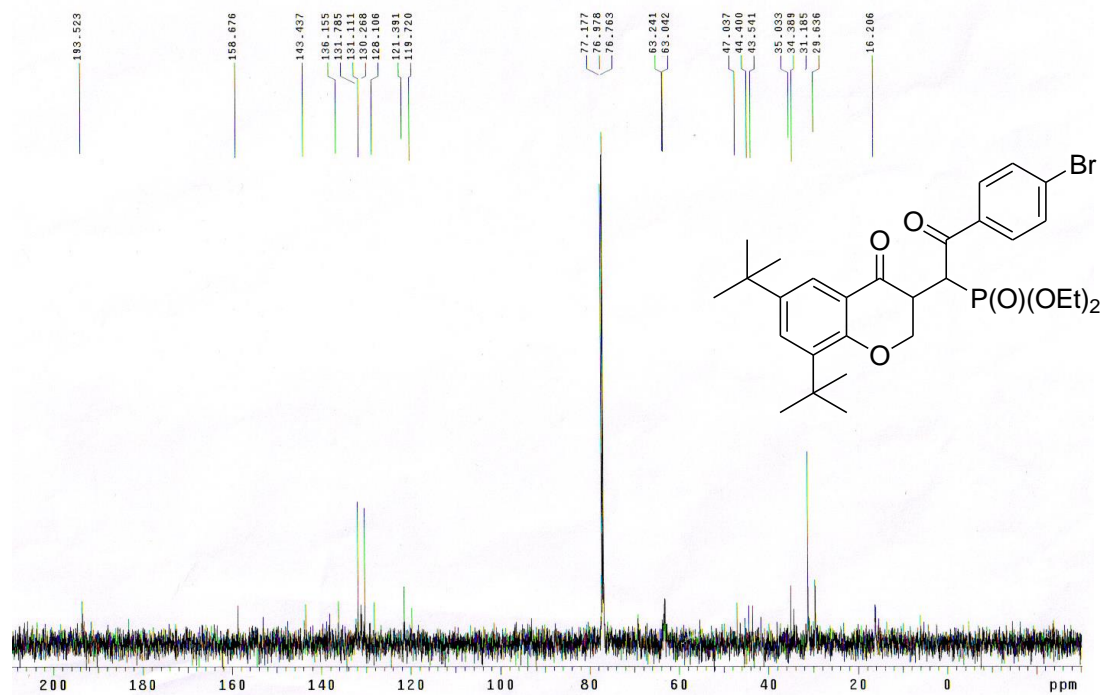


Figure S13. ^{13}C NMR spectrum (150 MHz, CDCl_3) of Diethyl 2-(4-bromophenyl)-1-(6,8-di-tert-butyl-4-oxochroman-3-yl)-2-oxoethyl phosphonate (2f)

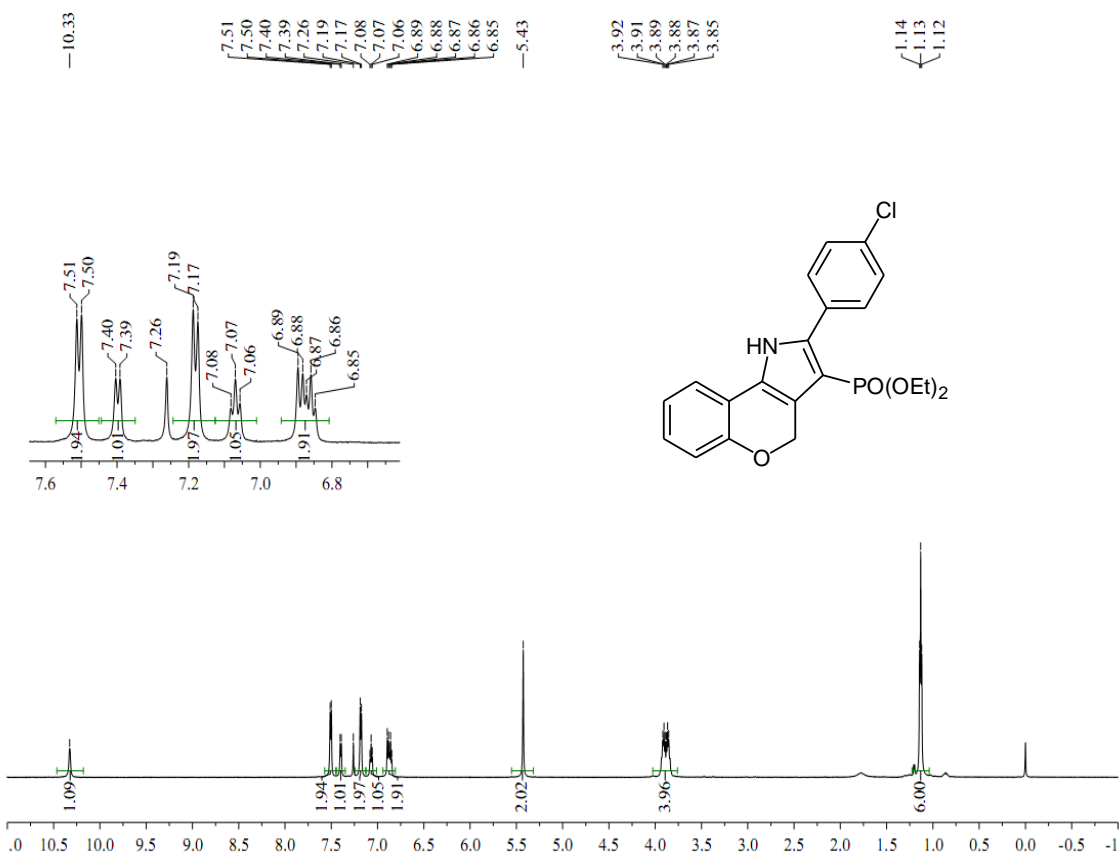


Figure S14. ^1H NMR spectrum (600 MHz, CDCl_3) of diethyl 2-(4-chlorophenyl)-1,4-dihydrochromeno [4,3-b]pyrrol-3-ylphosphonate (4)