Supplementary Materials

Synthesis of Fused-Ring Systems and Diarylmethane Flavonoids *via Ortho*-Quinone Methide Intermediates

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NMR Spectra

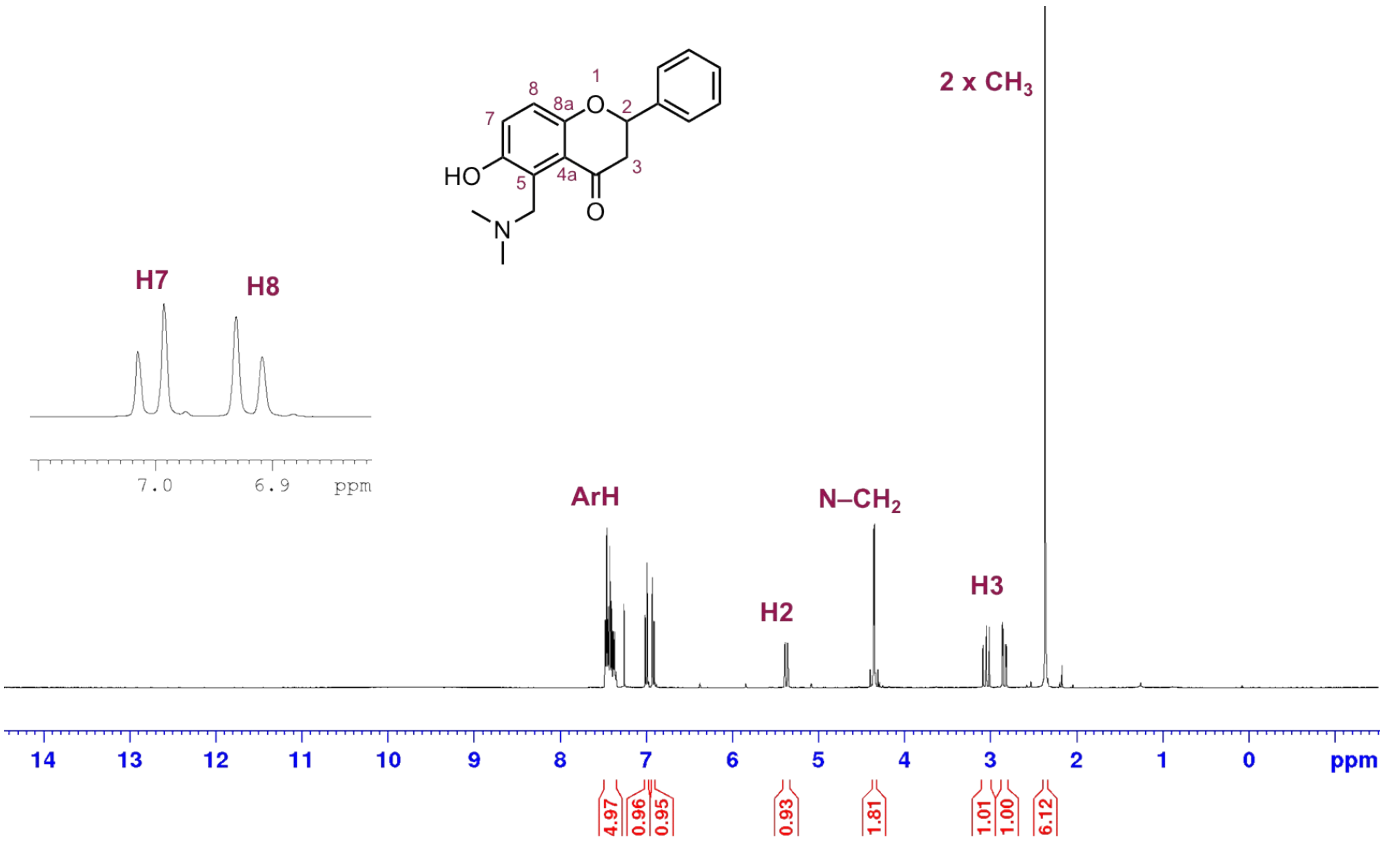

Figure S1. ^{1}H NMR (400 MHz, $CDCl_3$) spectrum of 5-((Dimethylamino)methyl)-6-hydroxy-2-phenylchroman-4-one (**9**)

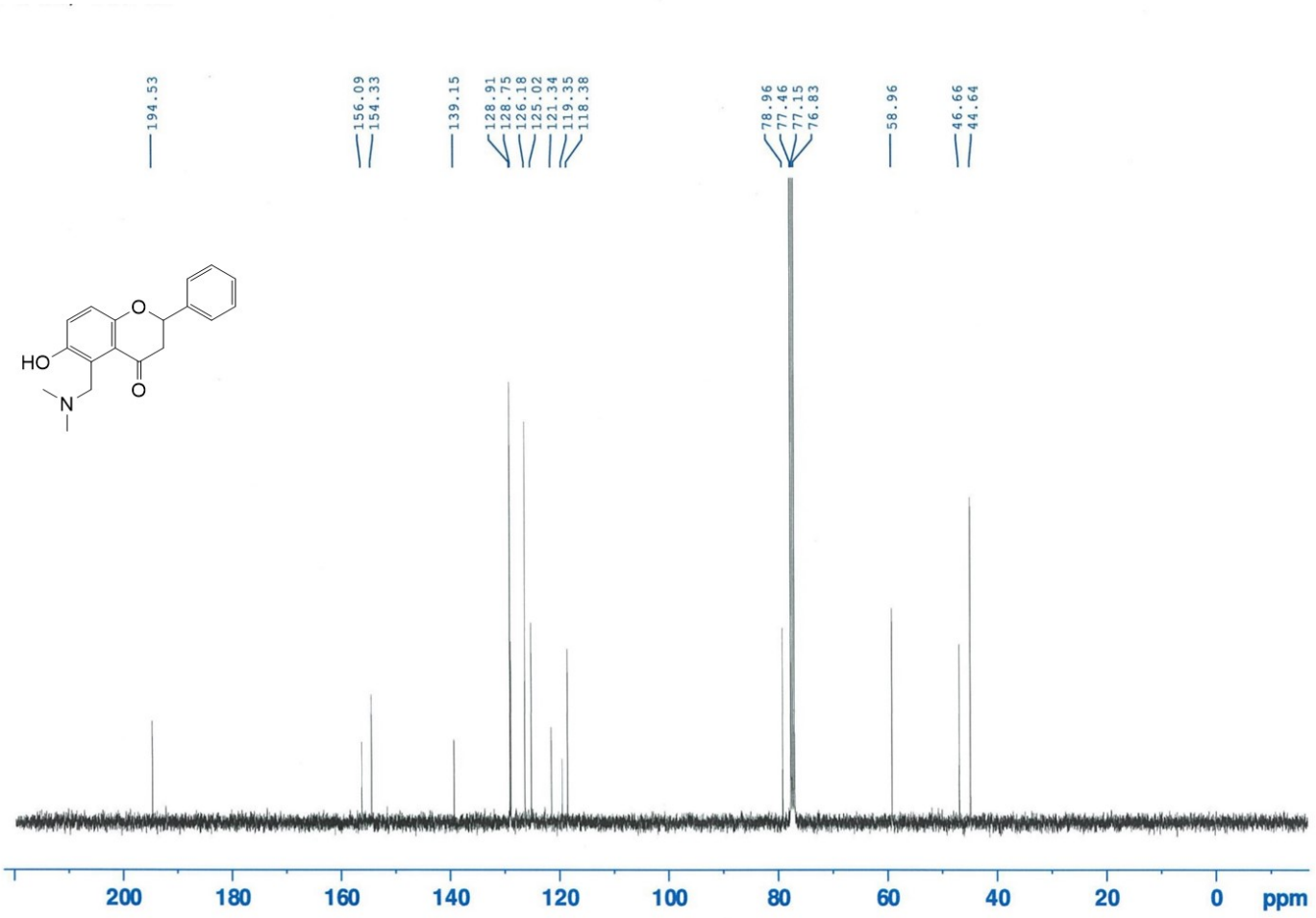

Figure S2. ^{13}C NMR (100 MHz, $CDCl_3$) spectrum of 5-((Dimethylamino)methyl)-6-hydroxy-2-phenylchroman-4-one (**9**)

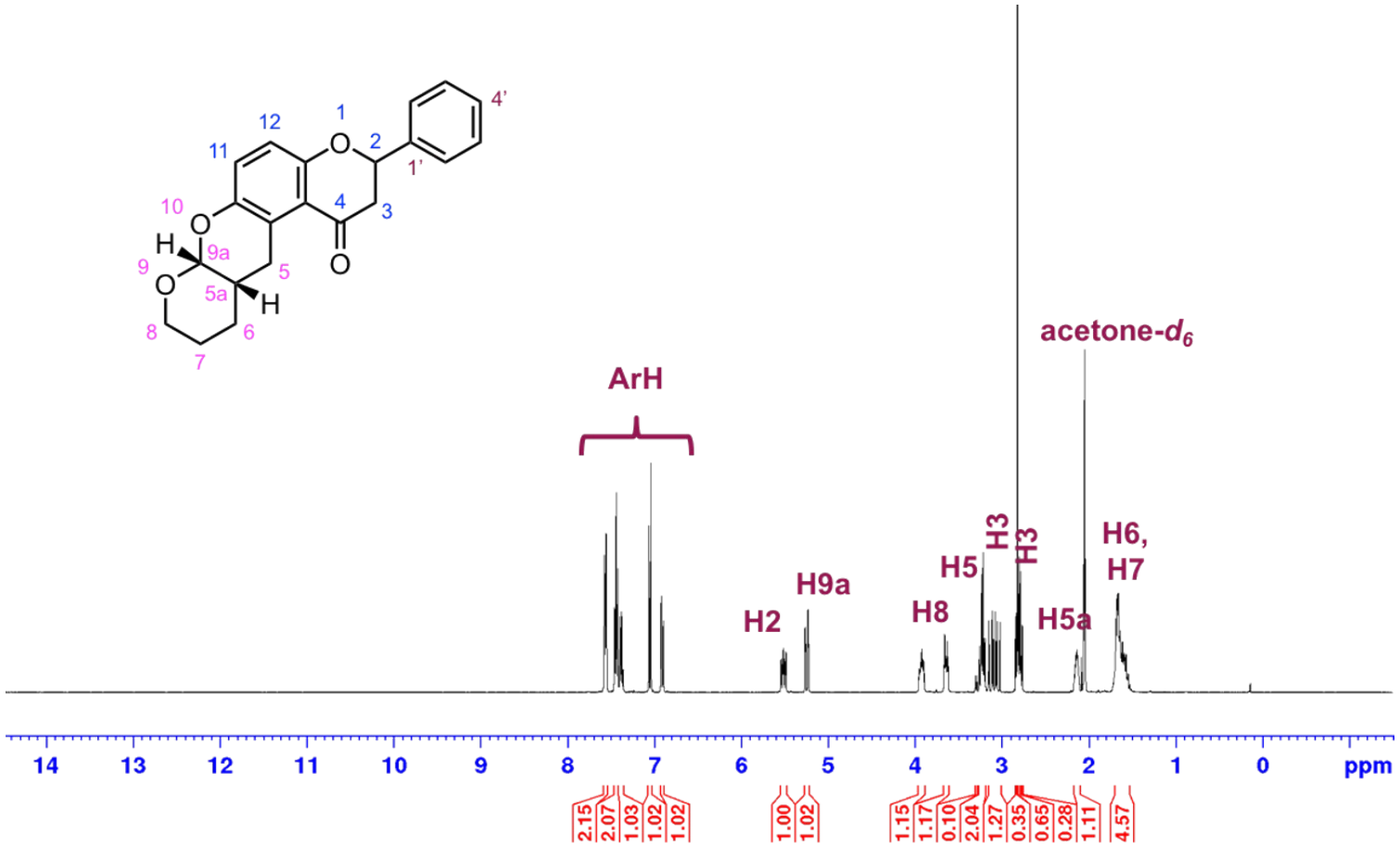

Figure S3. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 2-Phenyl-2,3,10,11,11a,12-hexahydro-9*H*-dipyrano[2,3-b:3',2'-f]chromen-1(7 a*H*)-one **(13a)**

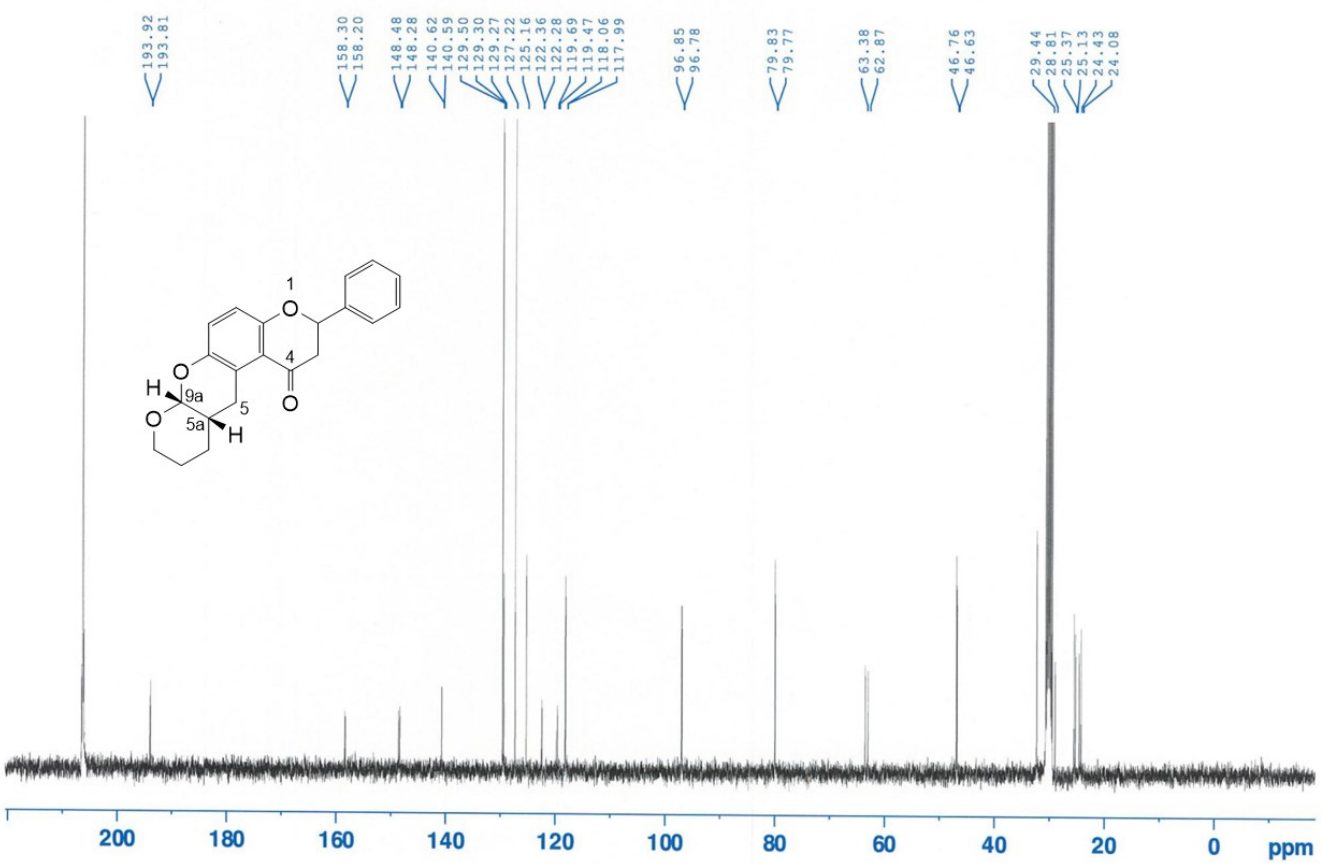

Figure S4. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 2-Phenyl-2,3,10,11,11a,12-hexahydro-9*H*-dipyrano[2,3-b:3',2'-f]chromen-1(7 a*H*)-one **(13a)**

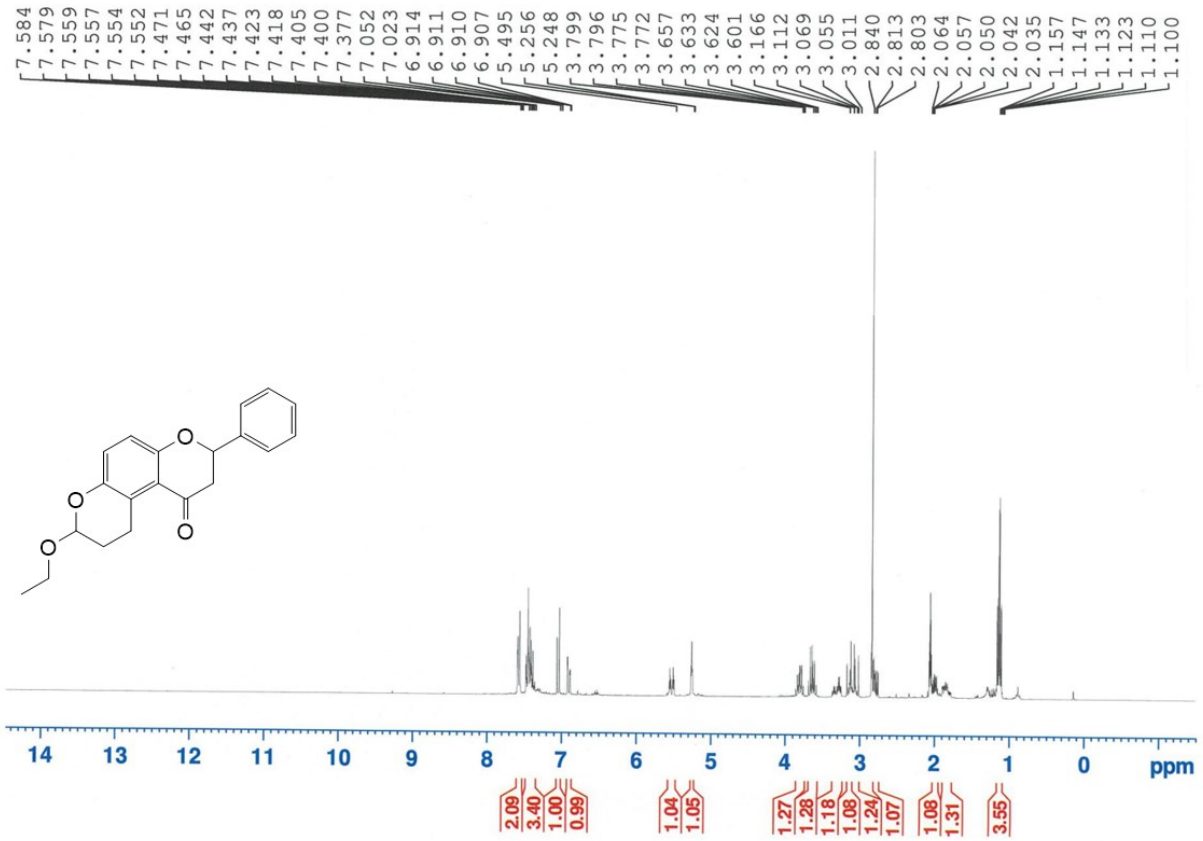

Figure S5. ^{1}H NMR (300 MHz, acetone-d_6) spectrum of 7-Ethoxy-2-phenyl-2,3,9,10-tetrahydropyrano[3,2-f]chromen-1(8*H*)-one (**13b**)

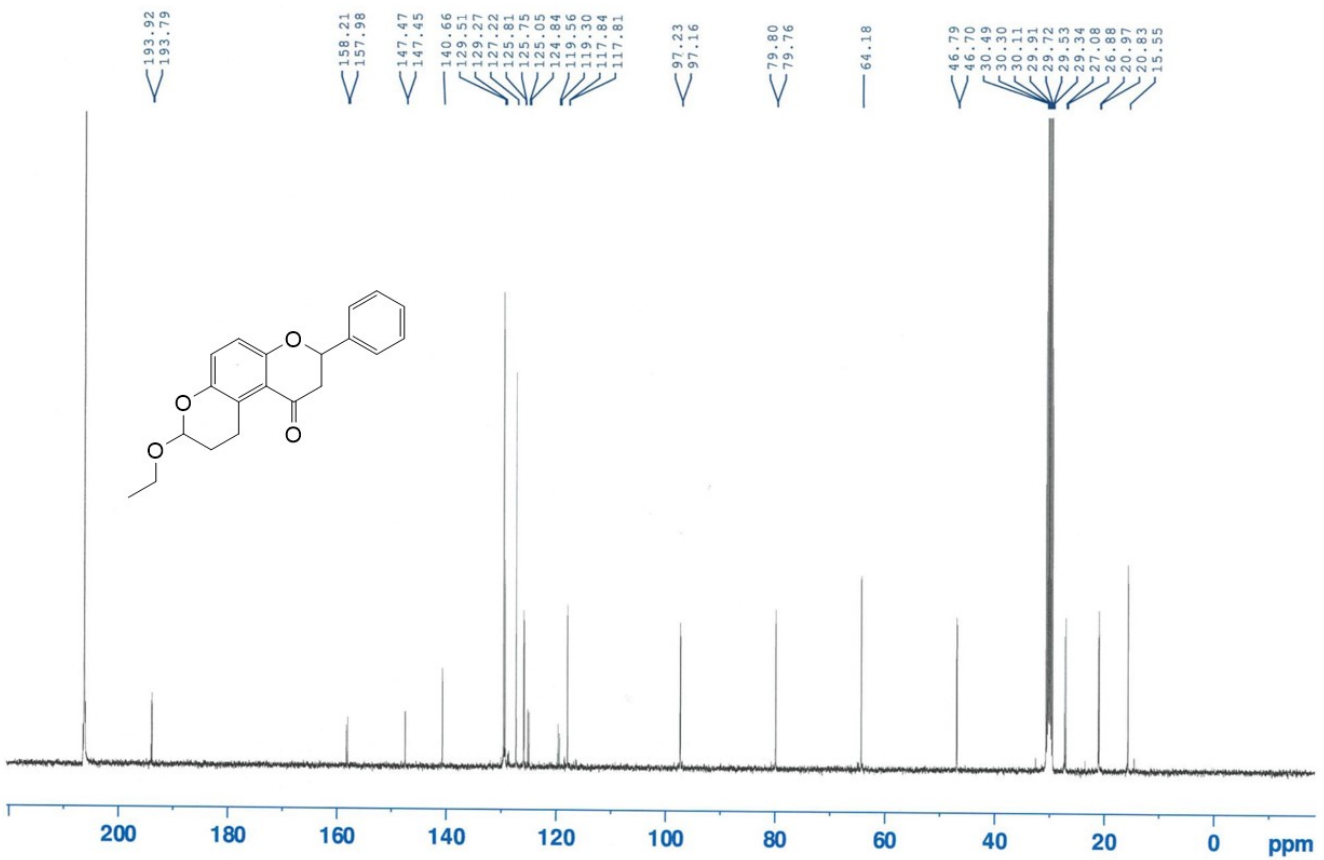

Figure S6. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 7-Ethoxy-2-phenyl-2,3,9,10-tetrahydropyrano[3,2-f]chromen-1(8*H*)-one (**13b**)

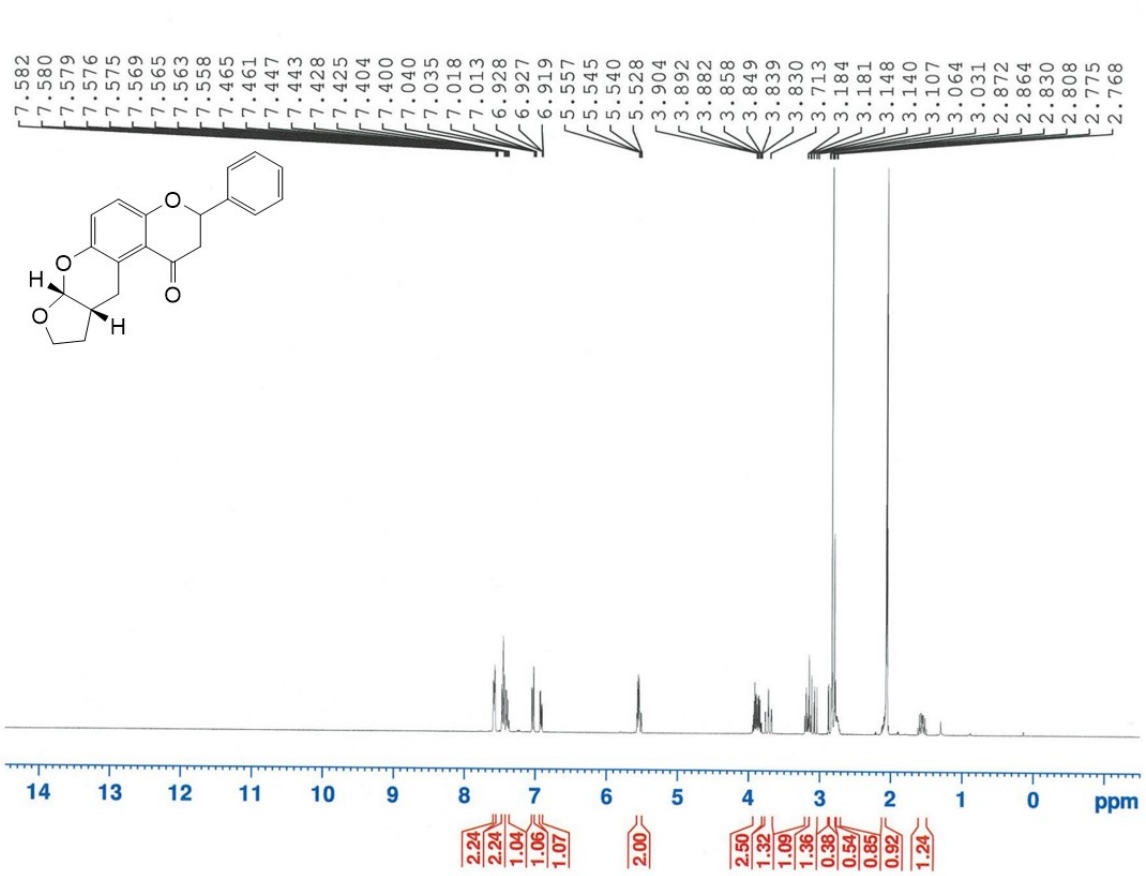

Figure S7. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 2-Phenyl-2,3,9,10,10a,11-hexahydrofuro[2,3-b]pyrano[3,2-f]chromen-1(7 a*H*)-one (**13c**)

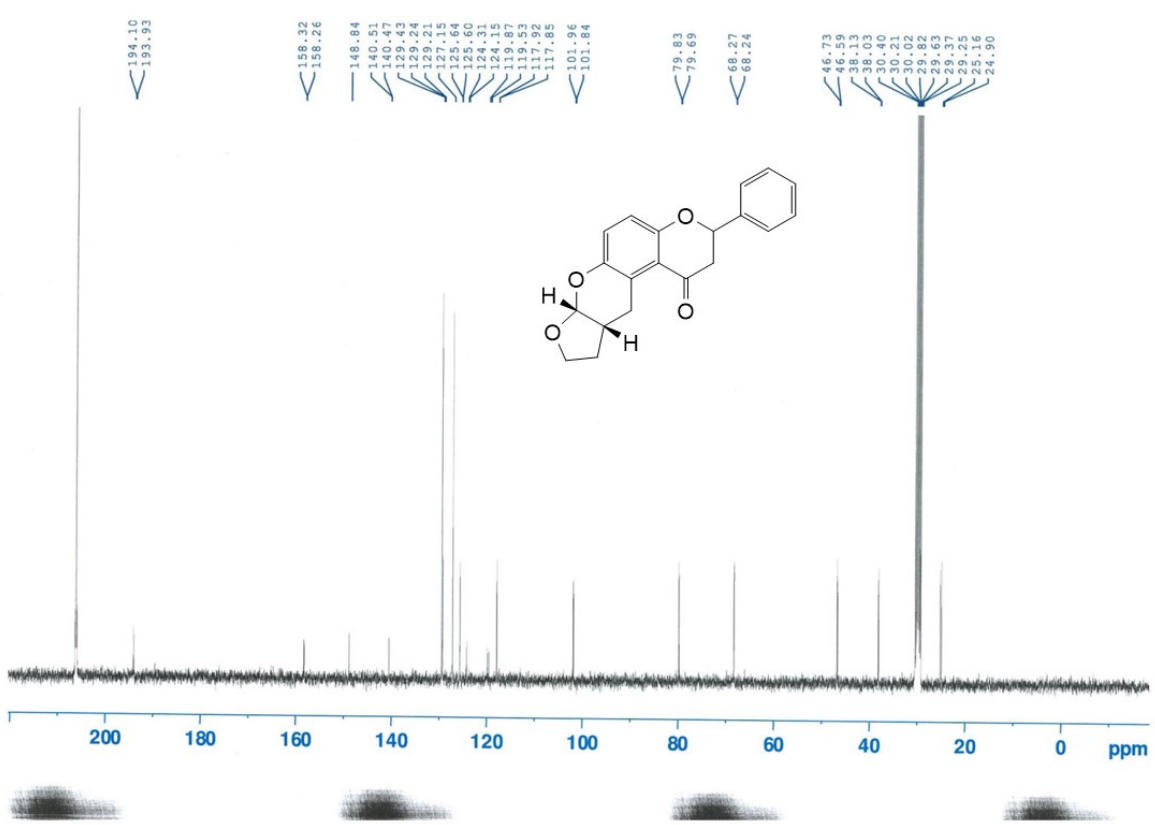

Figure S8. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 2-Phenyl-2,3,9,10,10a,11-hexahydrofuro[2,3-b]pyrano[3,2-f]chromen-1(7 a*H*)-one (**13c**)

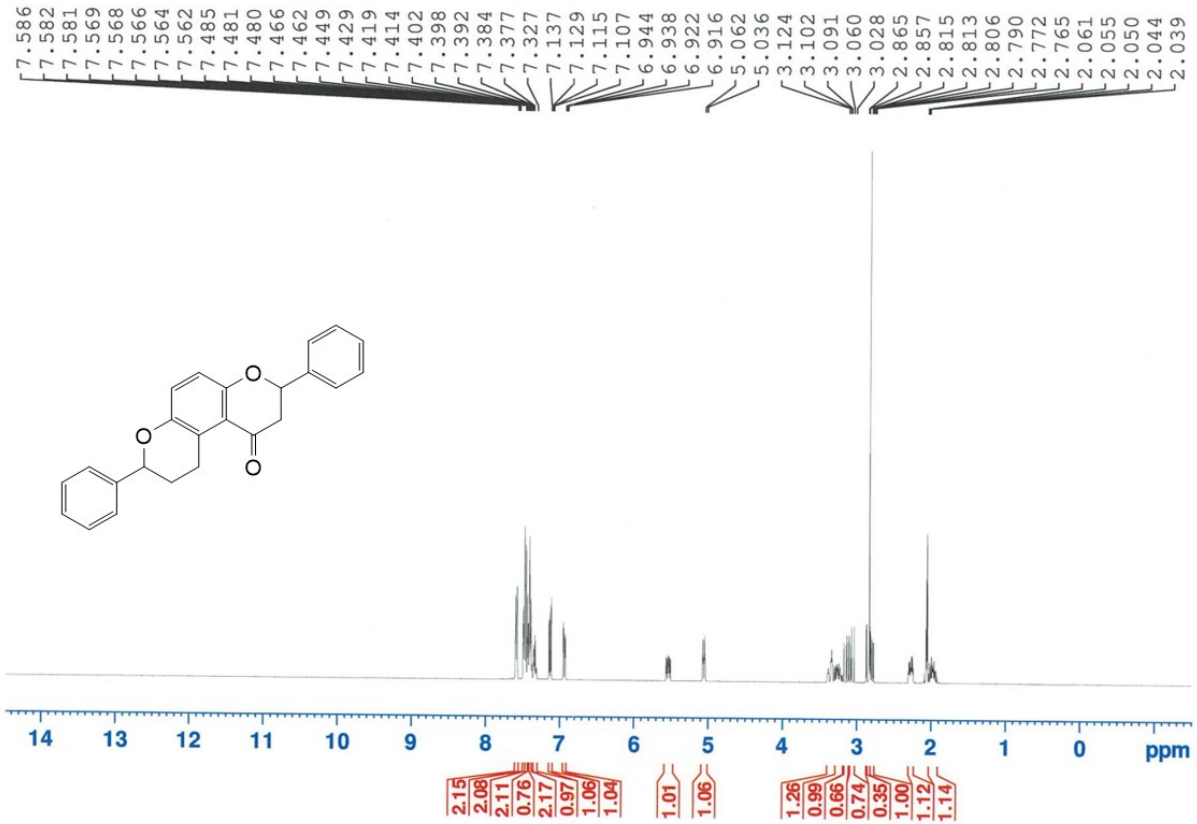

Figure S9. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 2,7-Diphenyl-2,3,9,10-tetrahydropyrano[3,2-f]chromen-1(8*H*)-one (**13d**)

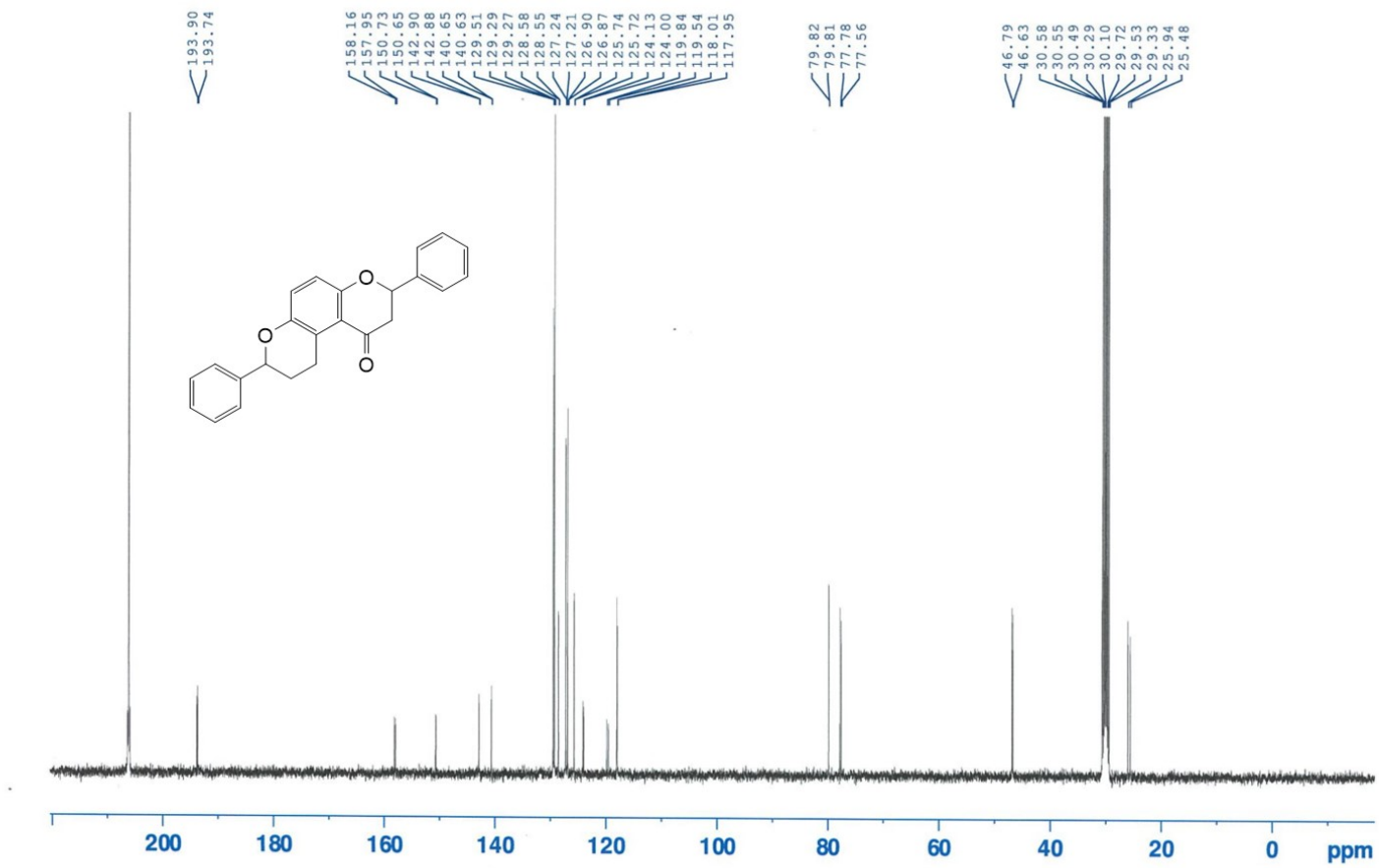

Figure S10. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 2,7-Diphenyl-2,3,9,10-tetrahydropyrano[3,2-f]chromen-1(8*H*)-one (**13d**)

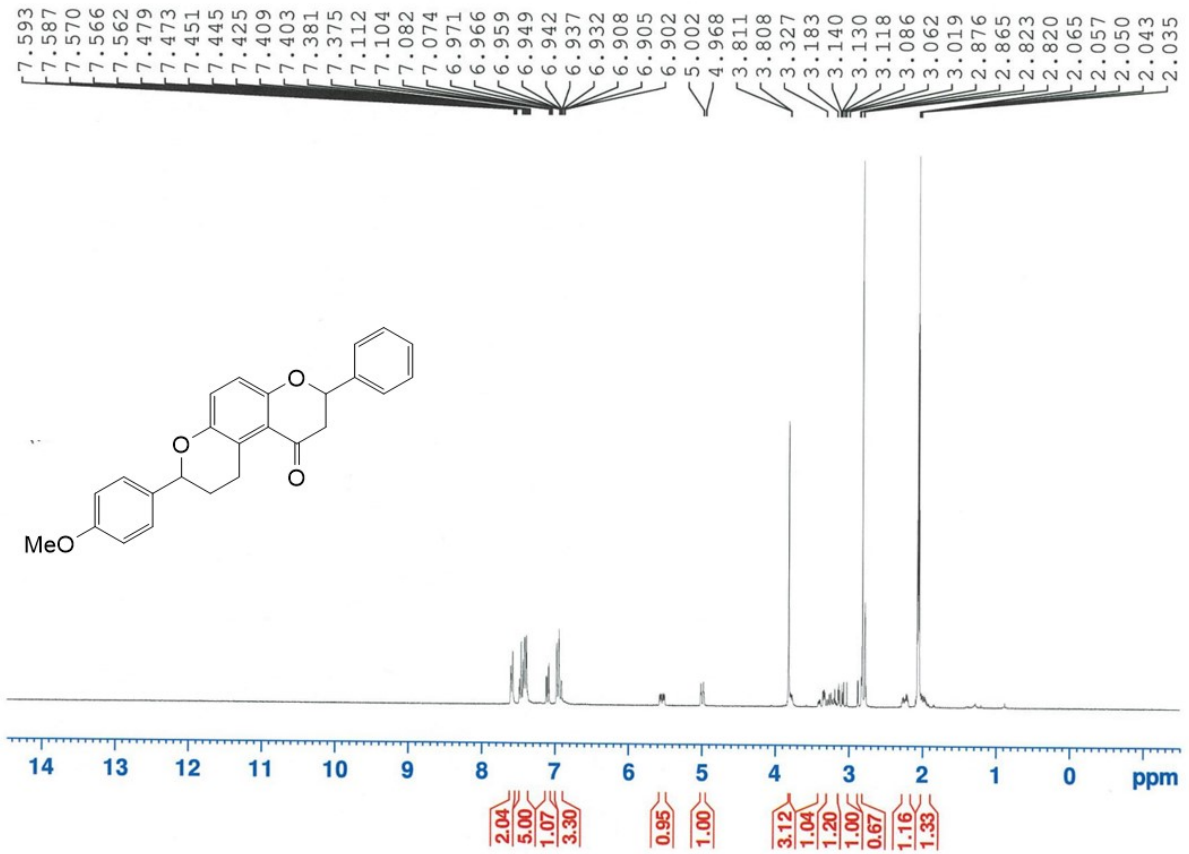

Figure S11. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 7-(4-Methoxyphenyl)-2-phenyl-2,3,9,10-tetrahydropyrano[3,2-f]chromen-1(8*H*)-one (**13e**)

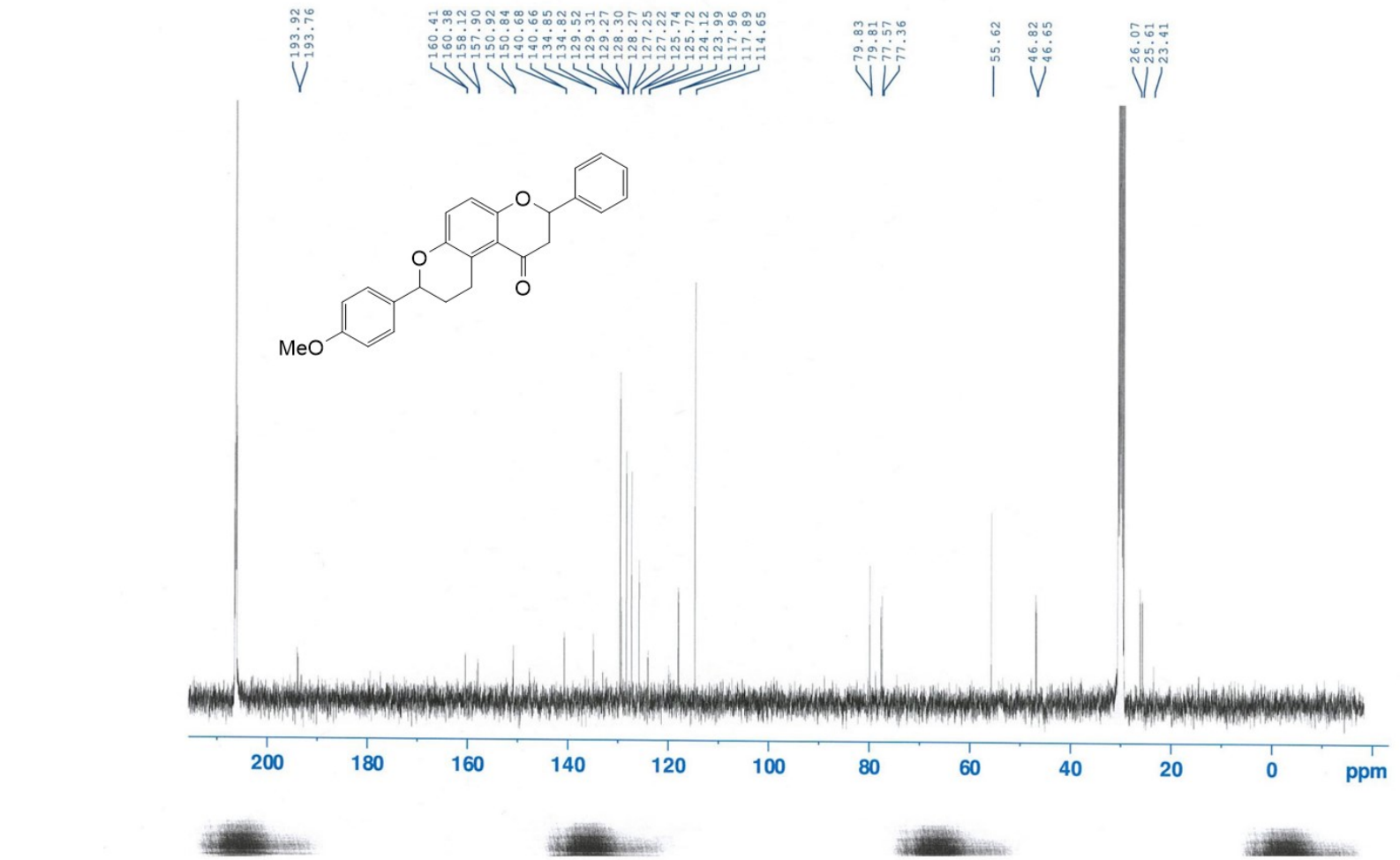

Figure S12. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 7-(4-Methoxyphenyl)-2-phenyl-2,3,9,10-tetrahydropyrano[3,2-f]chromen-1(8*H*)-one (**13e**)

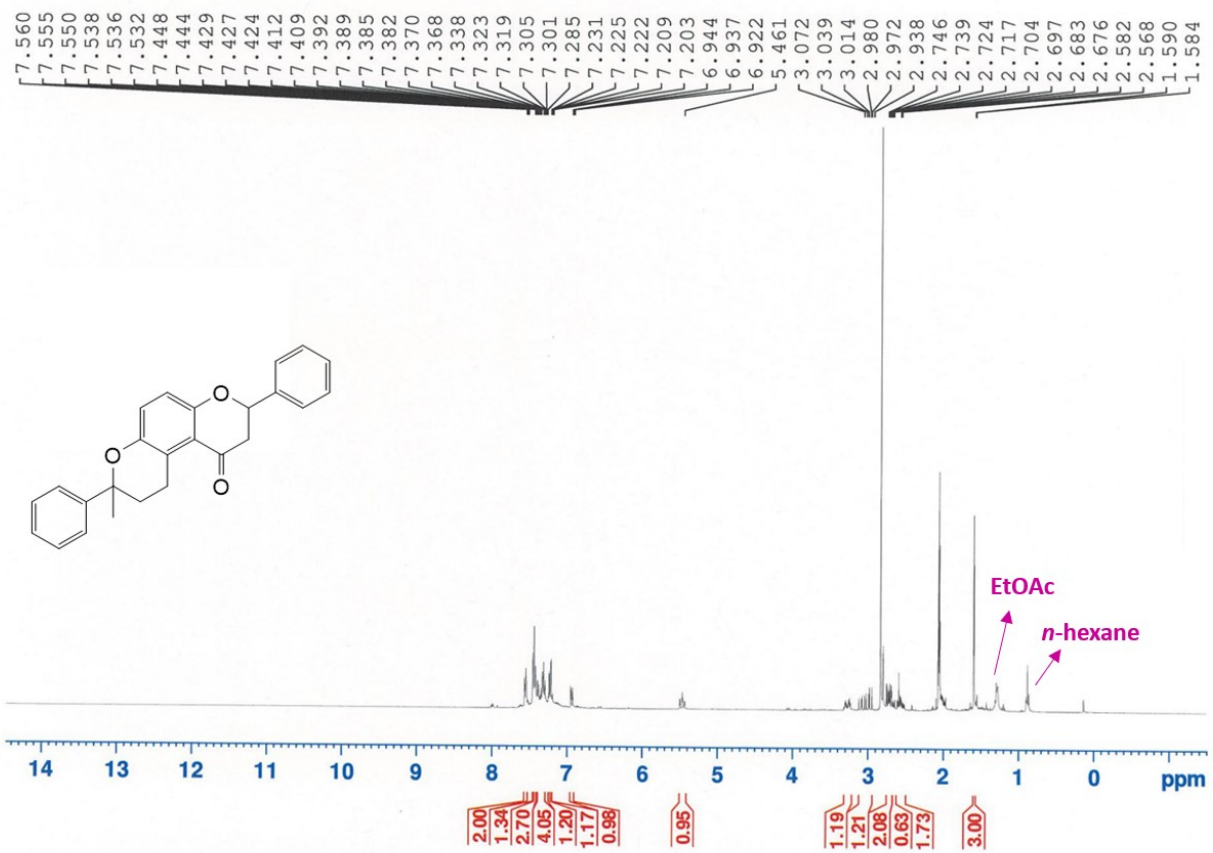

Figure S13. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 7-Methyl-2,7-diphenyl-2,3,9,10-tetrahydropyrano[3,2-f]chromen-1(8*H*)-one (**13f**)

Ethyl acetate and *n*-hexane are the solvents used for purification of **13f** using column chromatography.

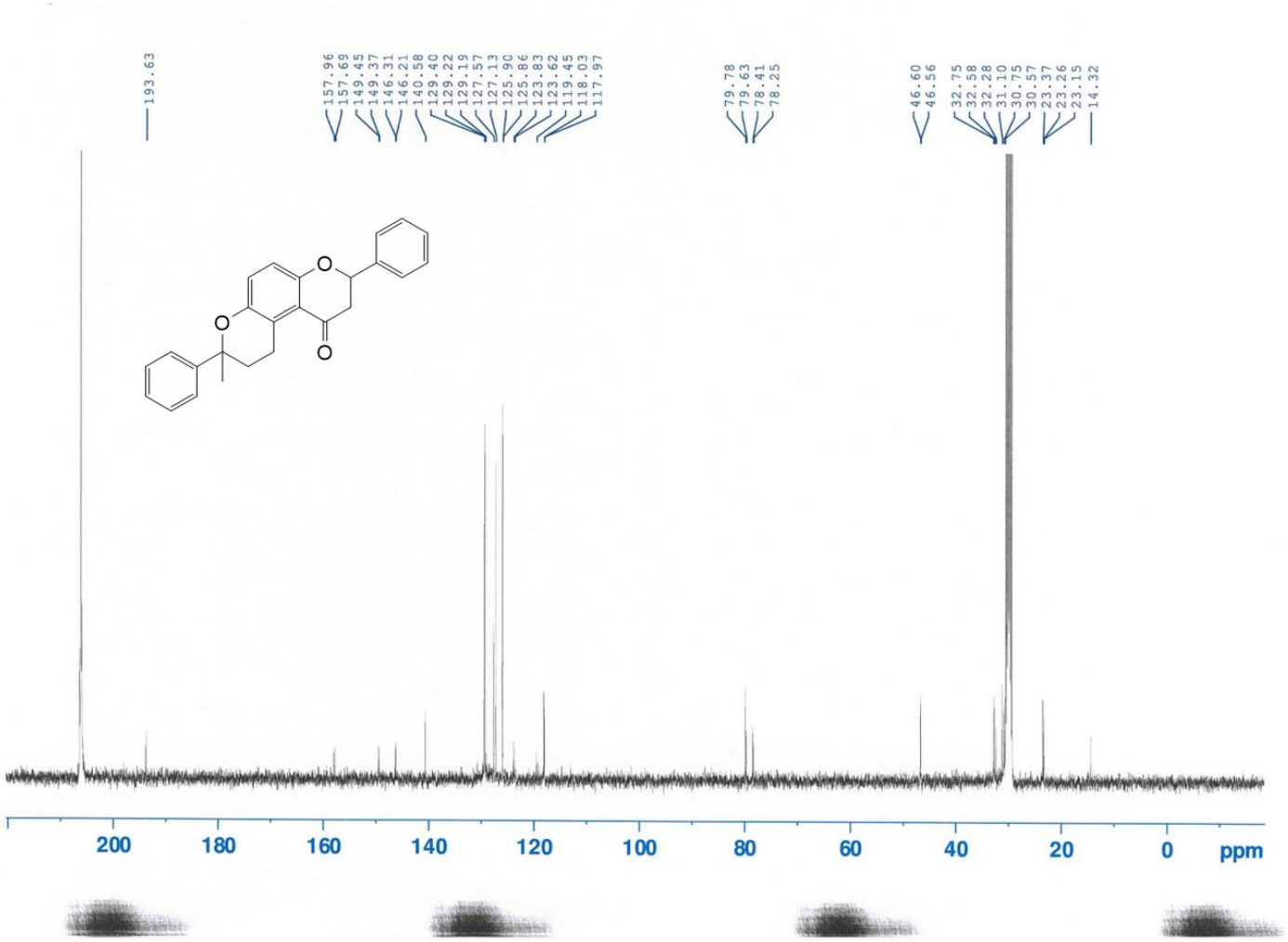

Figure **S14**. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 7-Methyl-2,7-diphenyl-2,3,9,10-tetrahydropyrano[3,2-f]chromen-1(8*H*)-one (**13f**)

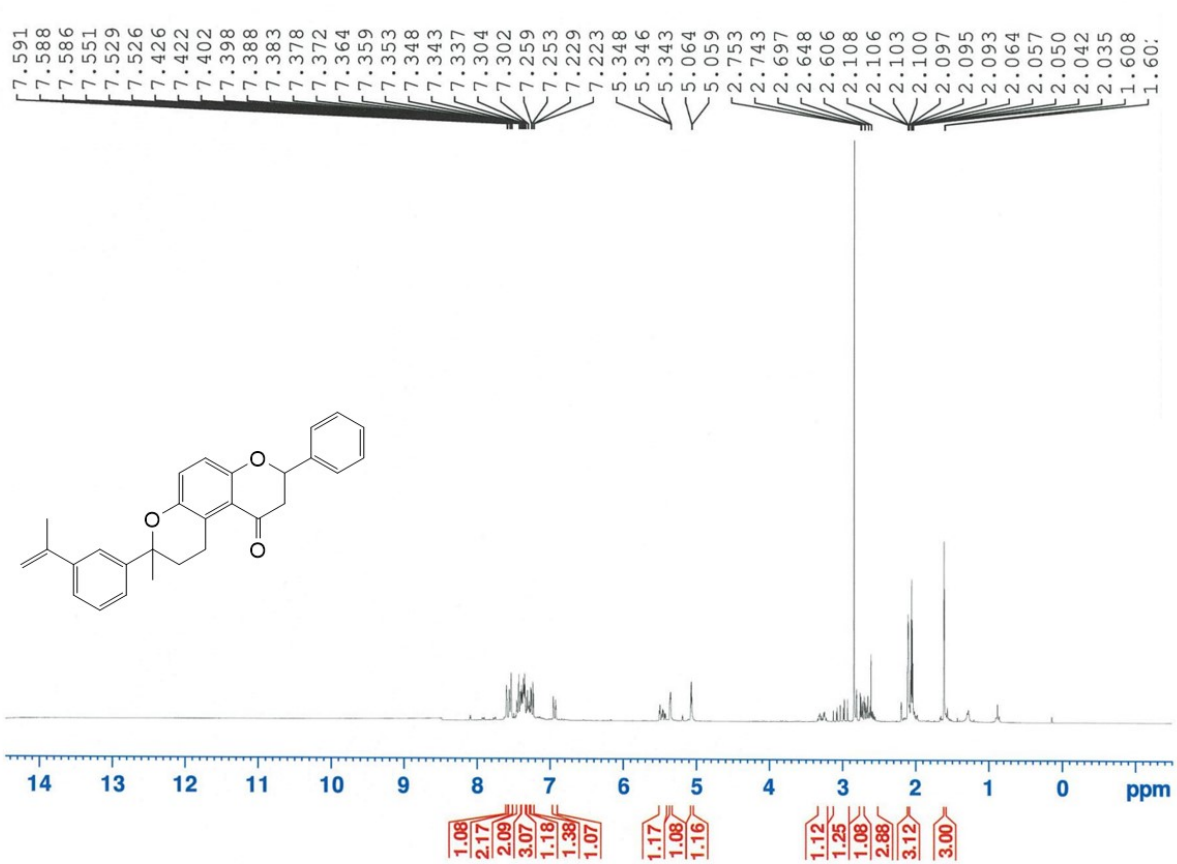

Figure S15. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 7-Methyl-2-phenyl-7-(3-(prop-1-en-2-yl)phenyl)-2,3,9,10-tetrahydropyrano[3,2-f]chromen-1(8*H*)-one (**13g**)

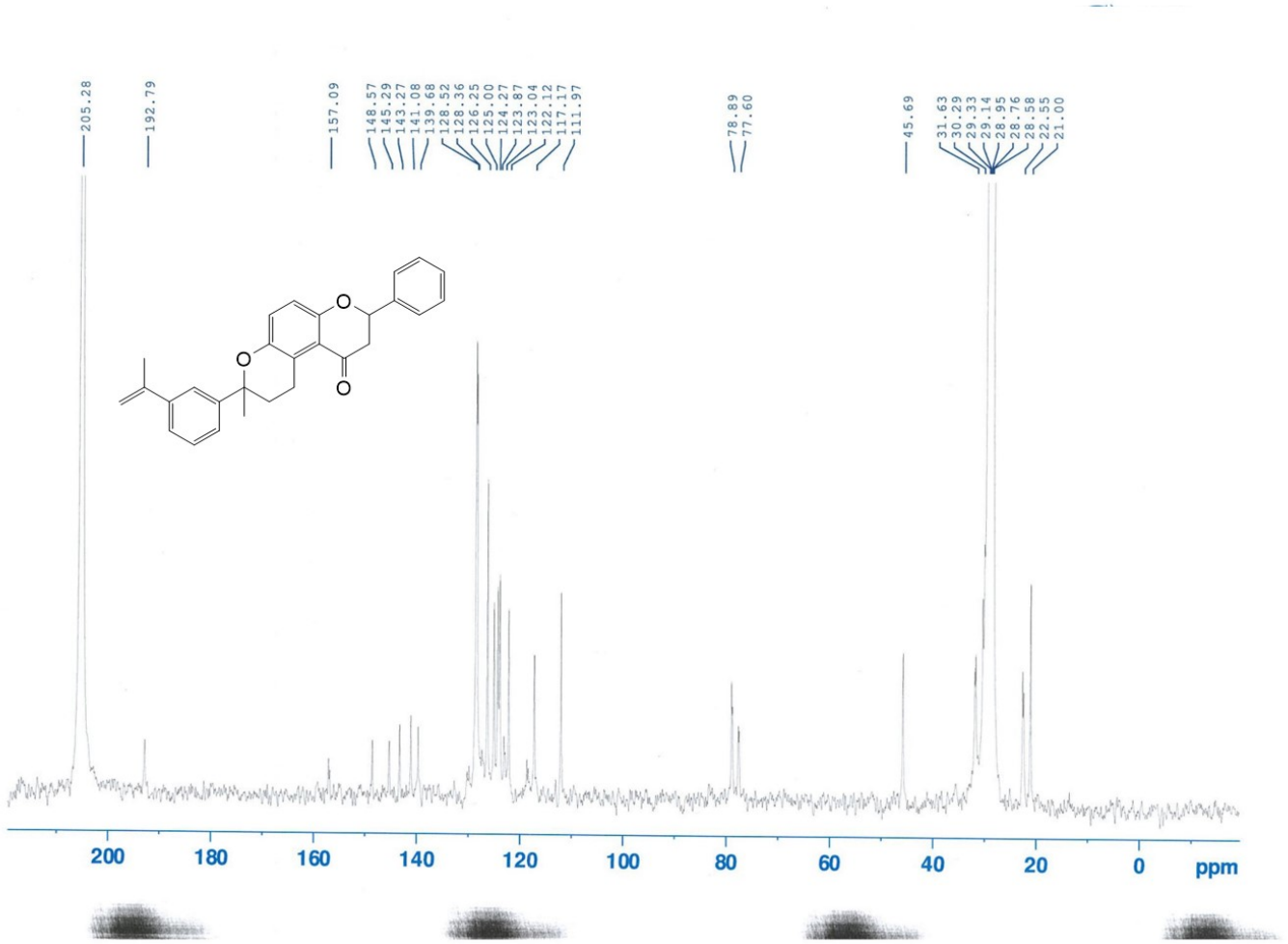

Figure S16. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 7-Methyl-2-phenyl-7-(3-(prop-1-en-2-yl)phenyl)-2,3,9,10-tetrahydropyrano[3,2-f]chromen-1(8*H*)-one (**13g**)

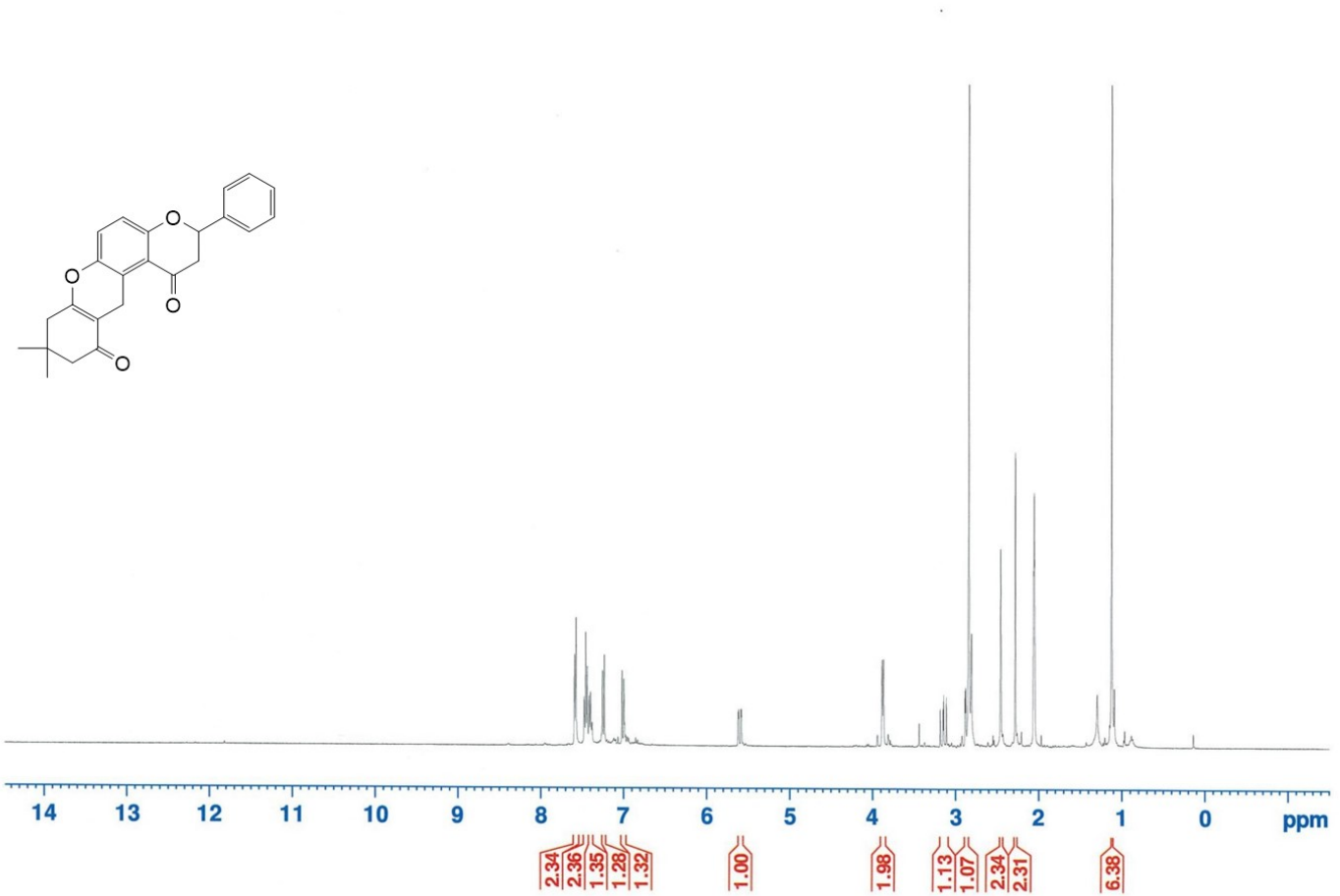

Figure S17. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 8,8-Dimethyl-2-phenyl-2,3,8,9,10,12-hexahydropyrano[3,2-a]xanthene-1,11-dione (**13h**)

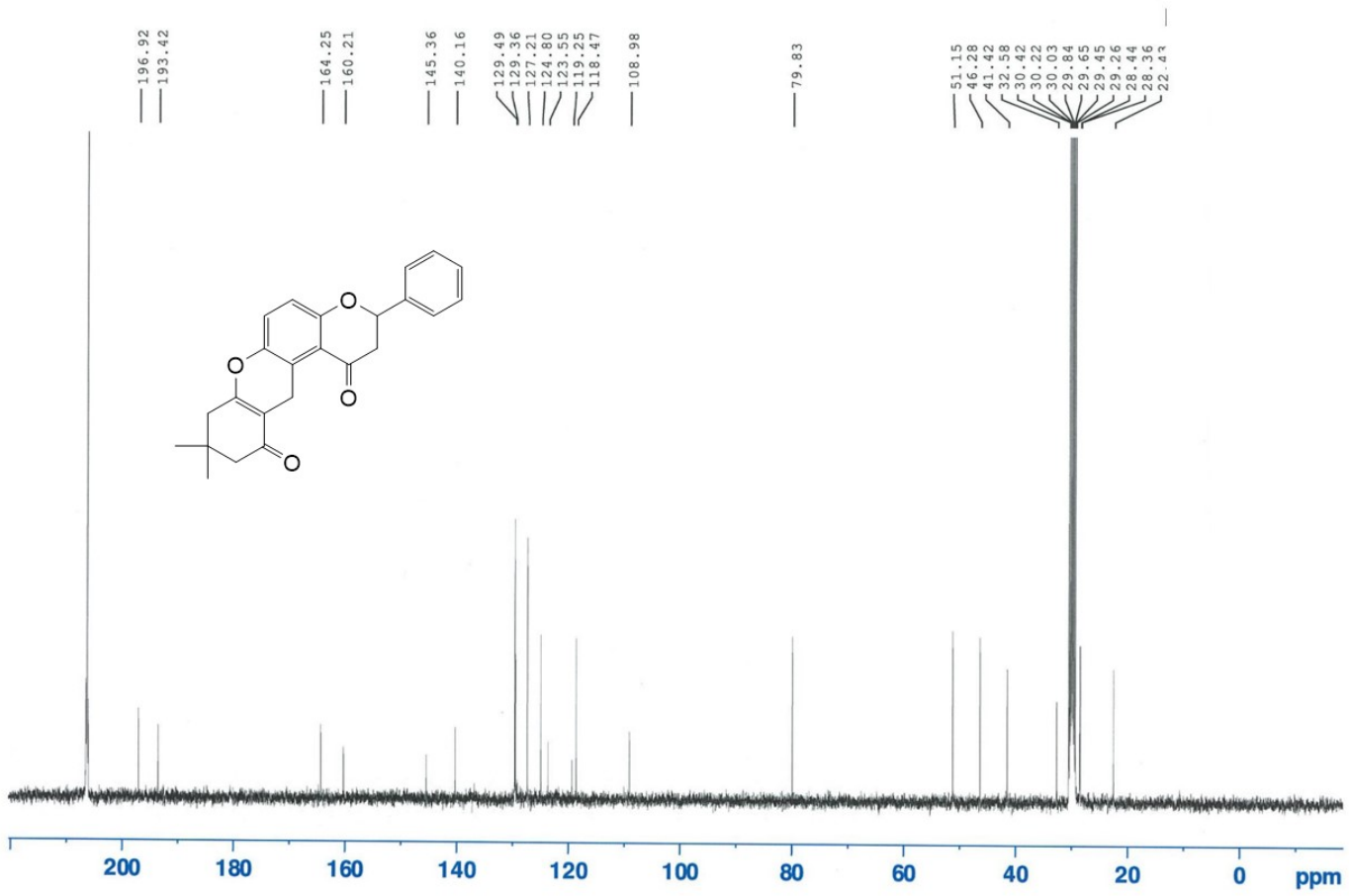

Figure S18. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 8,8-Dimethyl-2-phenyl-2,3,8,9,10,12-hexahydropyrano[3,2-a]xanthene-1,11-dione (**13h**)

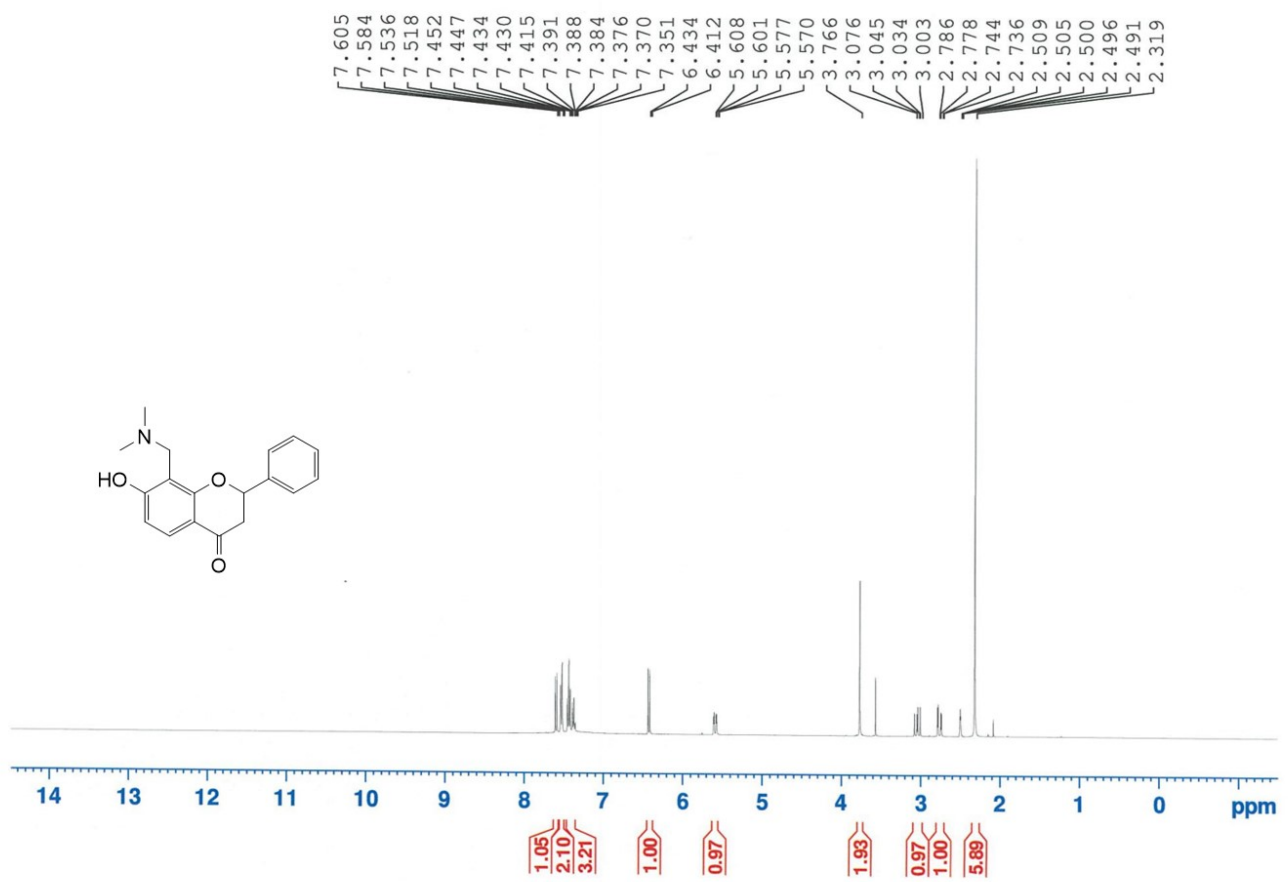

Figure S19. ^{1}H NMR (400 MHz, DMSO-d_6) spectrum of 8-((Dimethylamino)methyl)-7-hydroxy-2-phenylchroman-4-one (**10**)

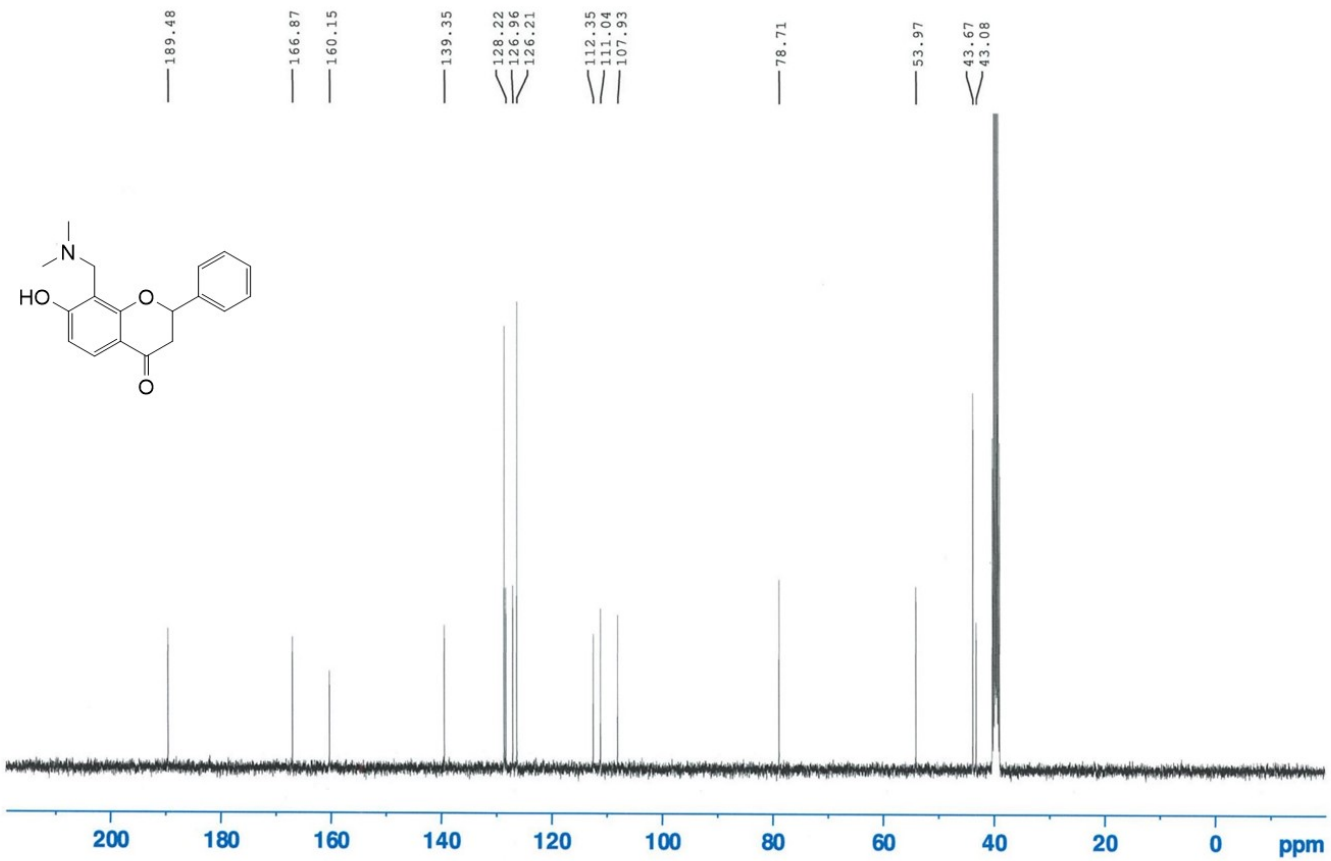

Figure S20. ^{13}C NMR (100 MHz, DMSO-d_6) spectrum of 8-((Dimethylamino)methyl)-7-hydroxy-2-phenylchroman-4-one (**10**)

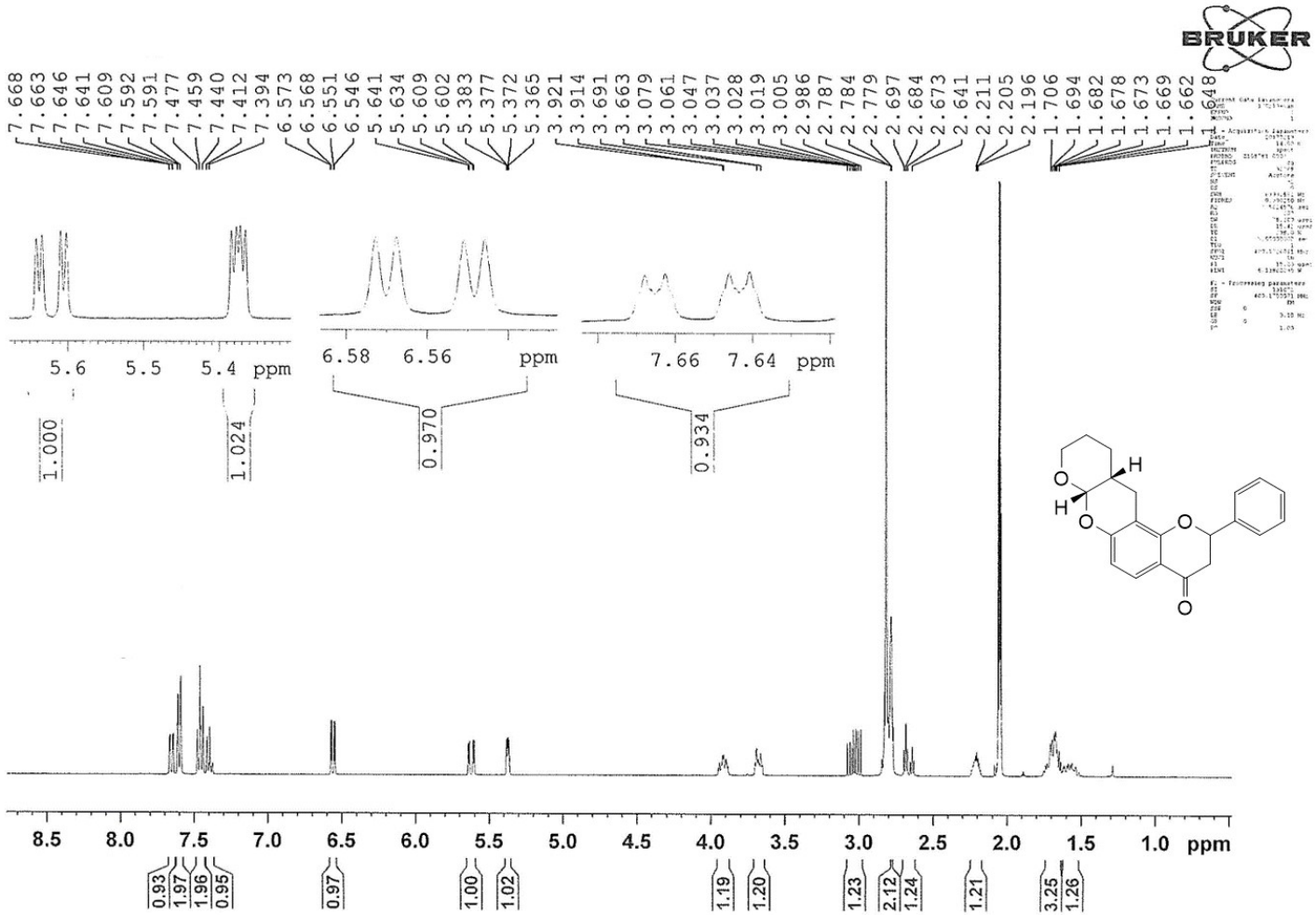

Figure S21. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 2-Phenyl-7-((tetrahydro-2*H*-pyran-2-yl)oxy)chroman-4-one (**15a**)

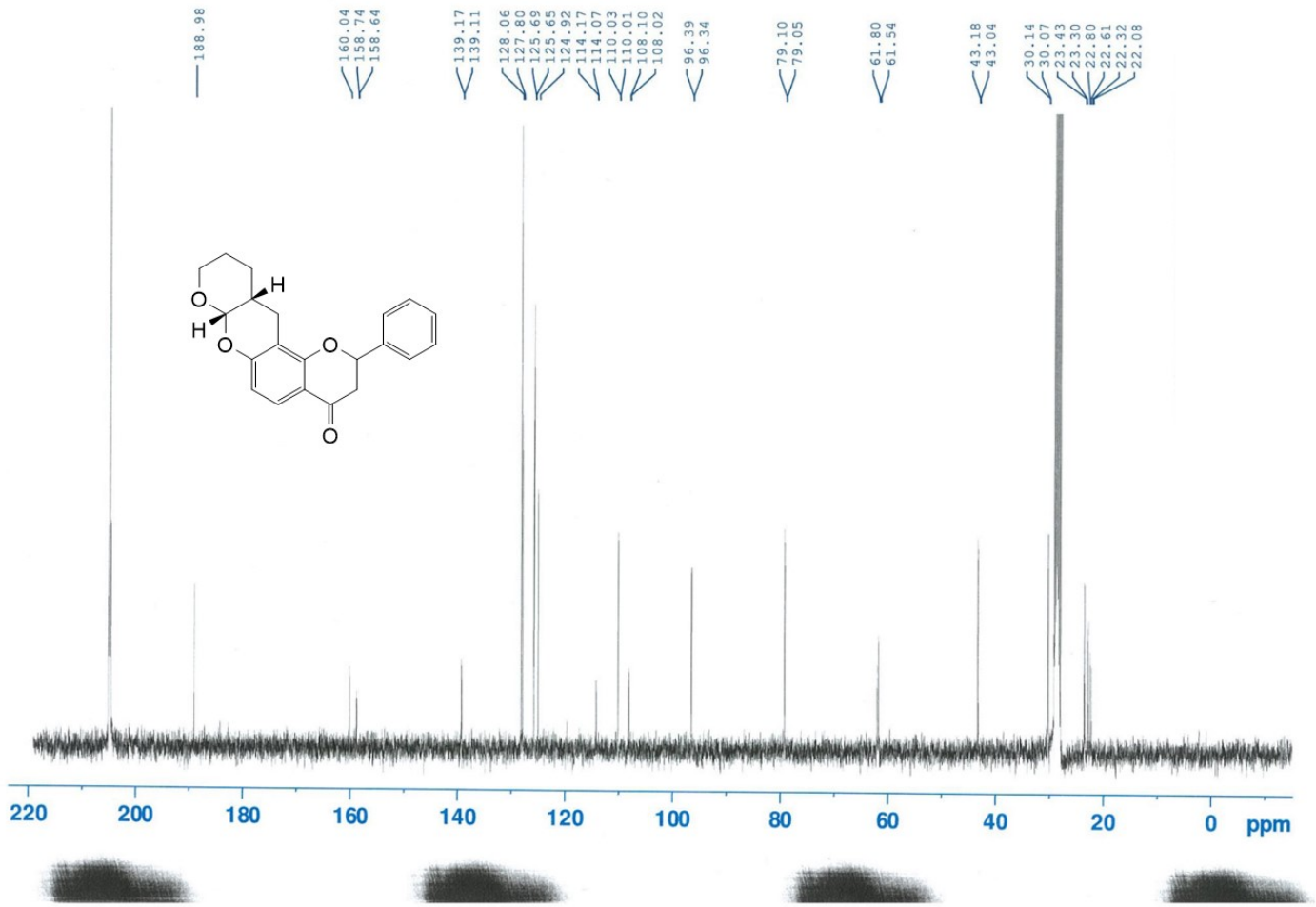

Figure S22. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 2-Phenyl-7-((tetrahydro-2*H*-pyran-2-yl)oxy)chroman-4-one (**15a**)

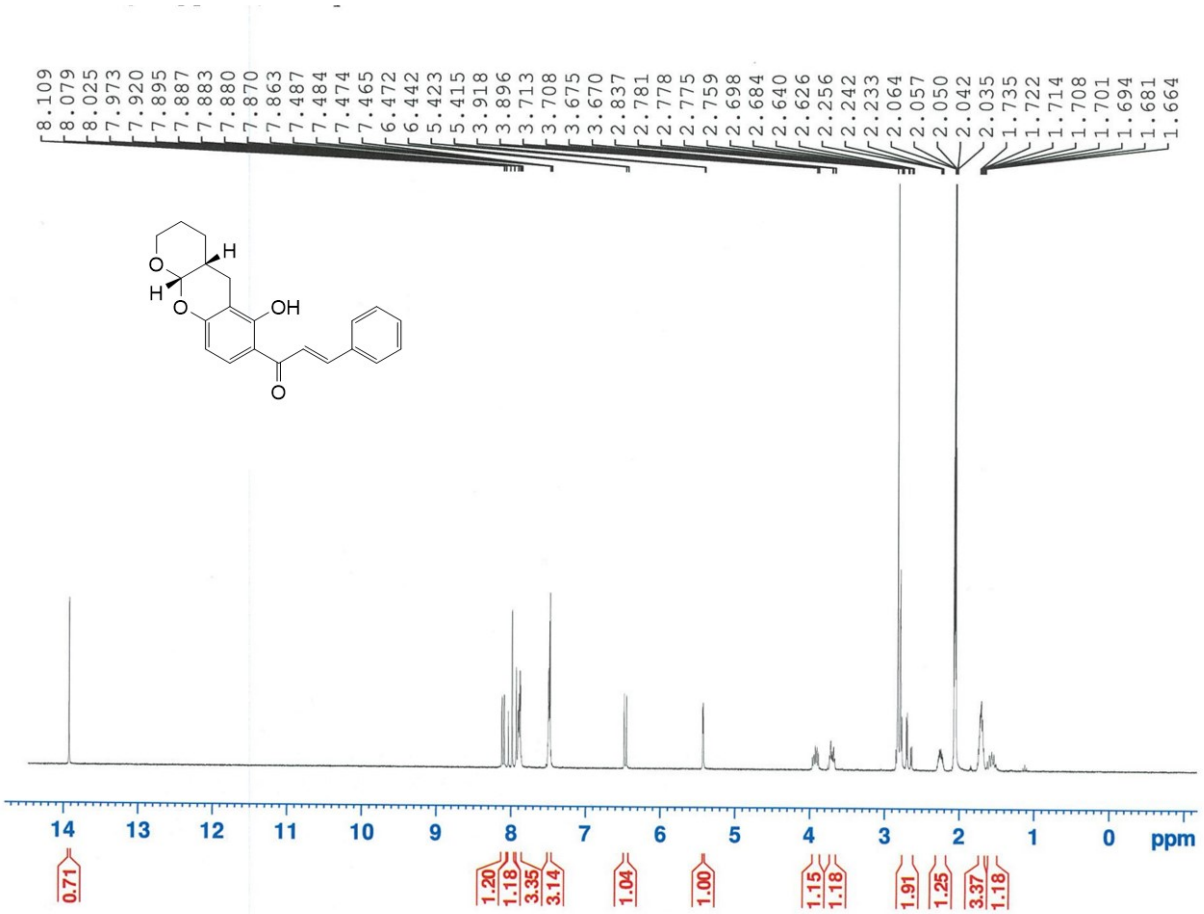

Figure S23. ^{1}H NMR (300 MHz, acetone-d_6) spectrum of (*E*)-1-(6-Hydroxy-3,4,4a,10a-tetrahydro-2*H*,5*H*-pyrano[2,3-b]chromen-7-yl)-3-phenylprop-2-en-1-one (**16a**)

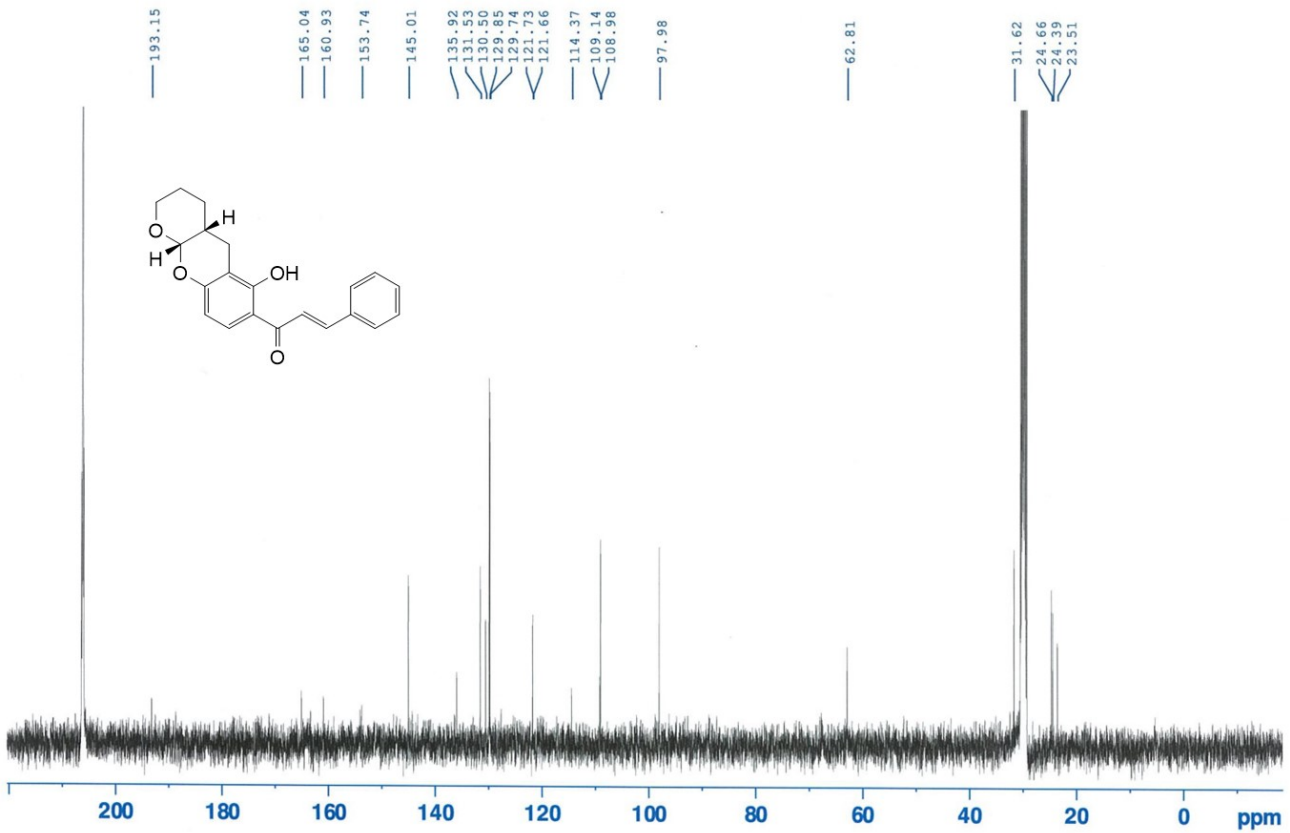

Figure S24. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of (*E*)-1-(6-Hydroxy-3,4,4a,10a-tetrahydro-2*H*,5*H*-pyrano[2,3-b]chromen-7-yl)-3-phenylprop-2-en-1-one (**16a**)

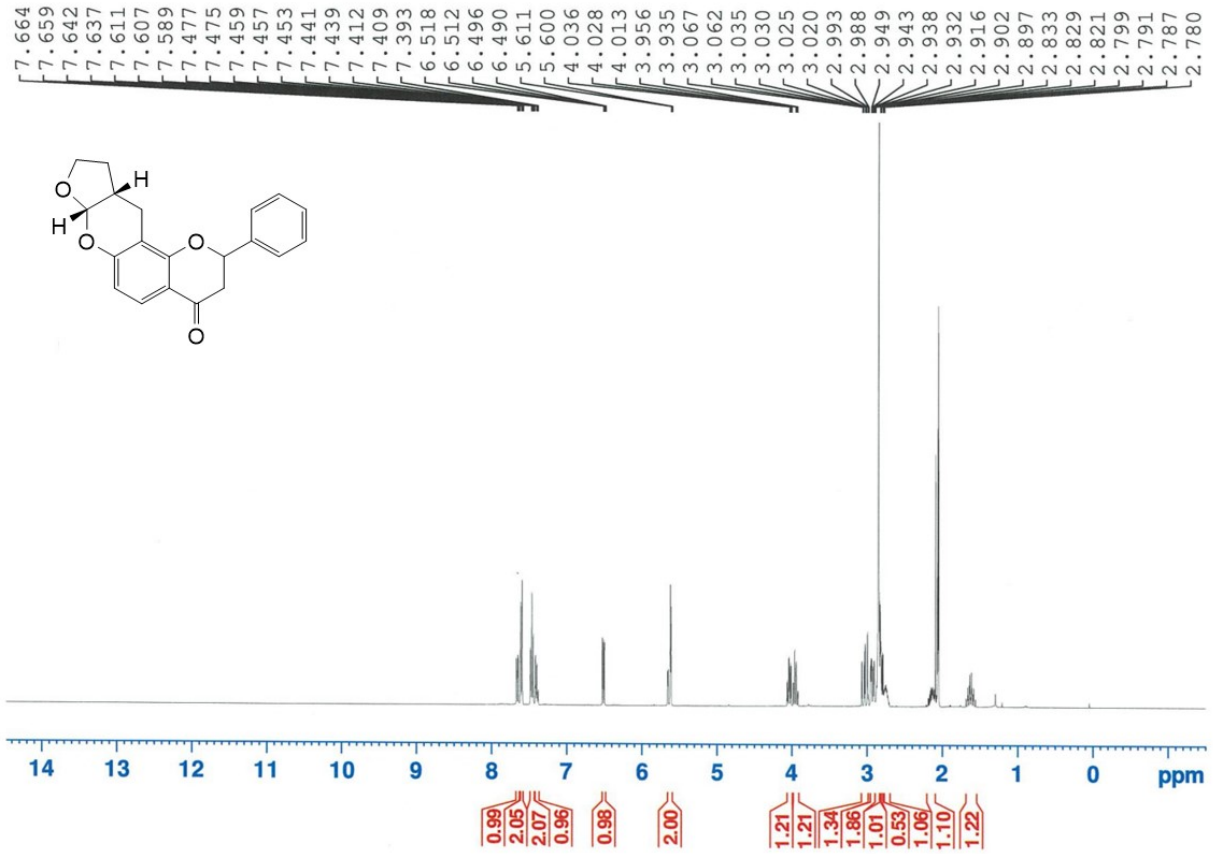

Figure S25. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 2-Phenyl-2,3,7a,9,10,10a-hexahydro-4*H*,11*H*-furo[2,3-b]pyrano[2,3-f]chromen-4-one (**15b**)

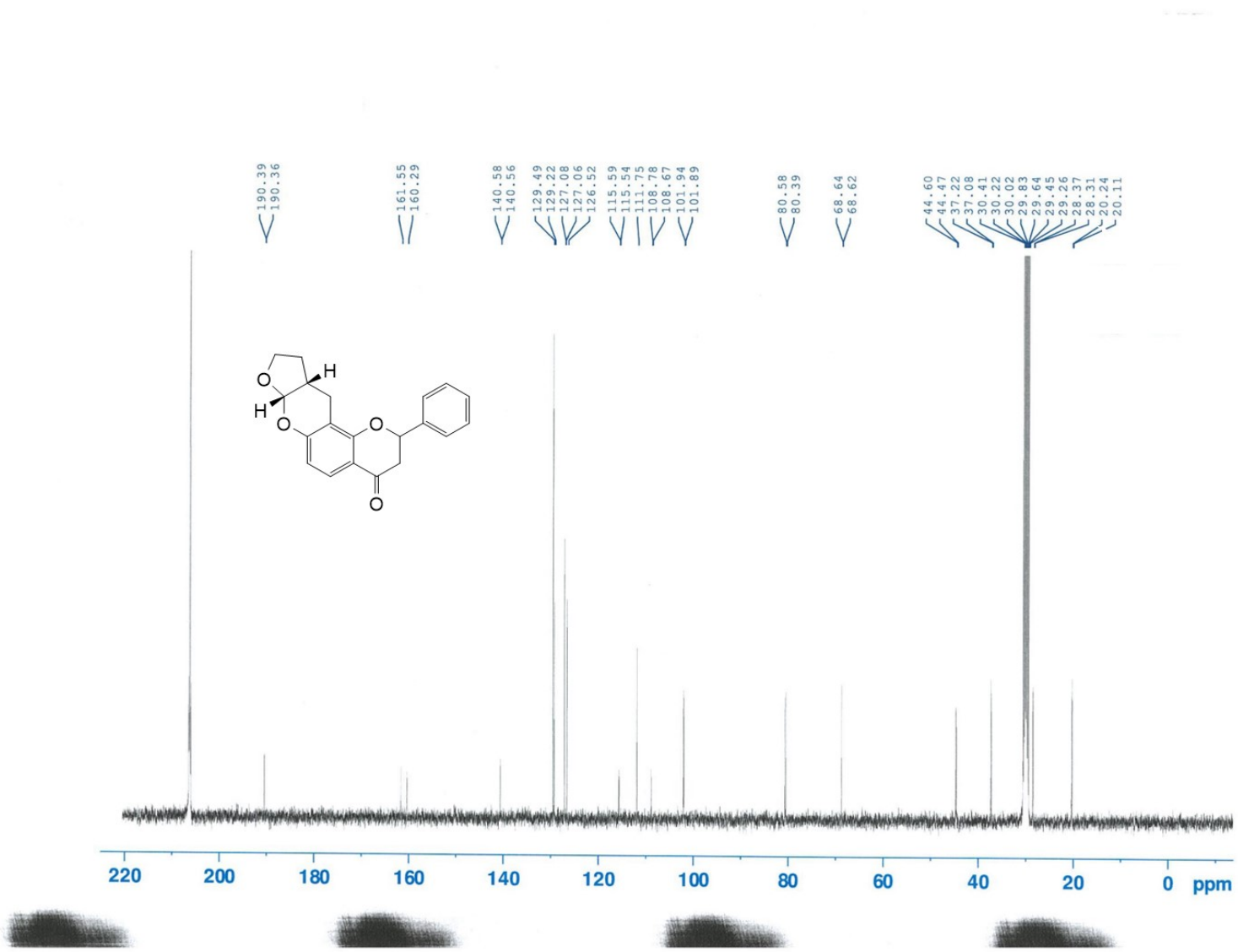

Figure S26. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 2-Phenyl-2,3,7a,9,10,10a-hexahydro-4*H*,11*H*-furo[2,3-b]pyrano[2,3-f]chromen-4-one (**15b**)

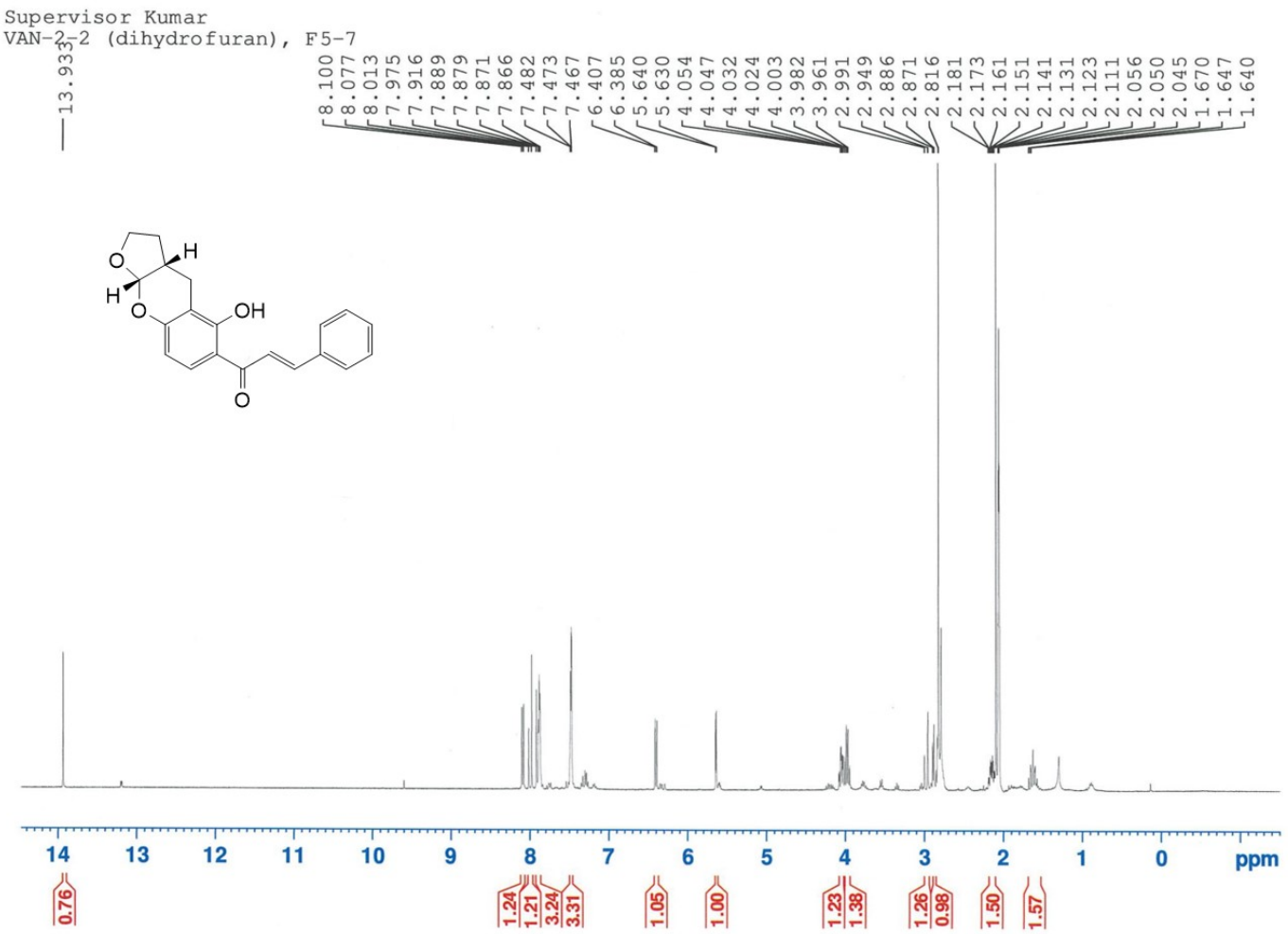

Figure S27. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of (*E*)-1-(5-Hydroxy-2,3,3a,9a-tetrahydro-4*H*-furo[2,3-b]chromen-6-yl)-3-phenylprop-2-en-1-one (**16b**)

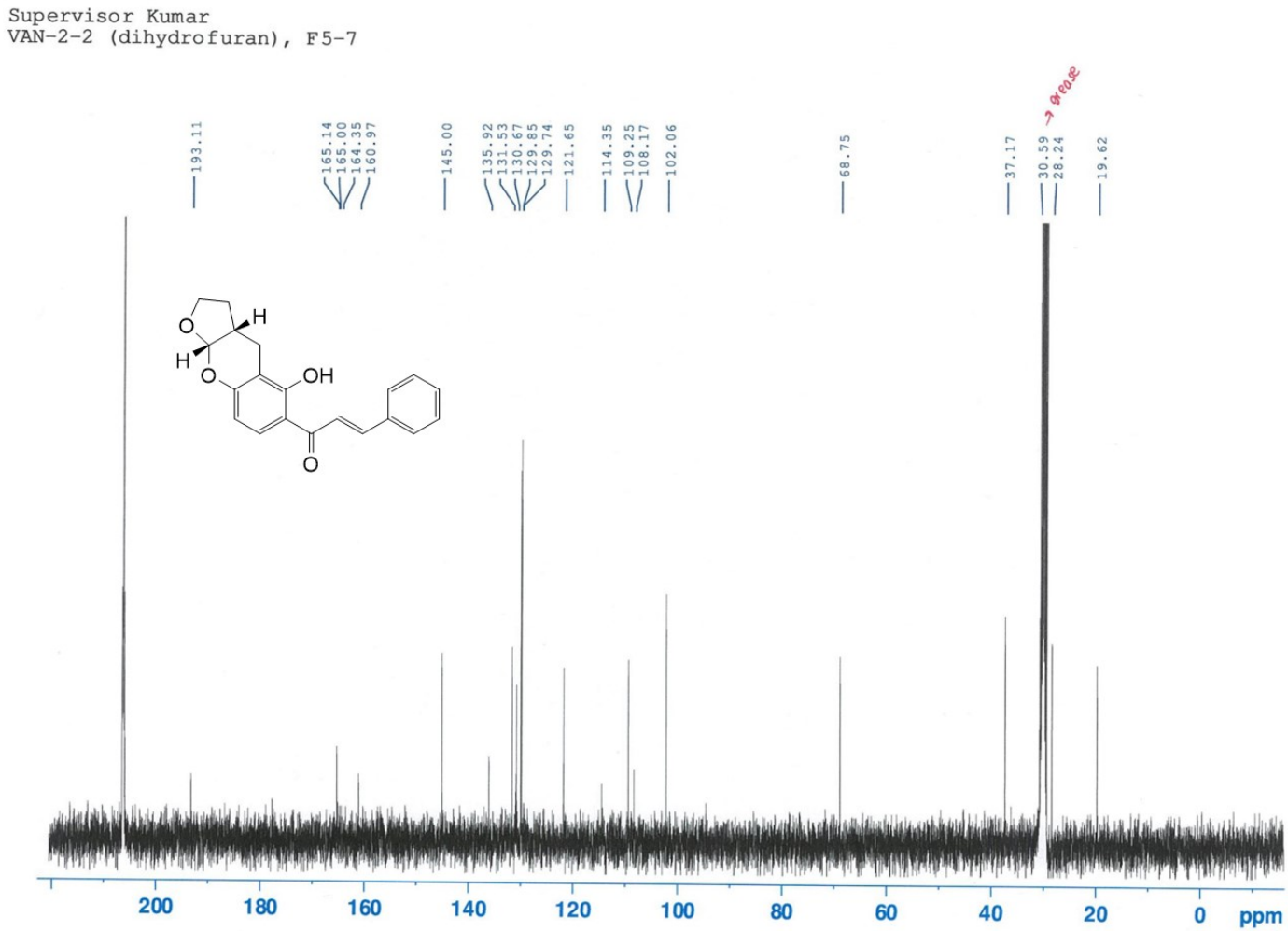

Figure S28. ^{13}C NMR (100 MHz, acetone-d_6) of (*E*)-1-(5-Hydroxy-2,3,3a,9a-tetrahydro-4*H*-furo[2,3-b]chromen-6-yl)-3-phenylprop-2-en-1-one (**16b**)

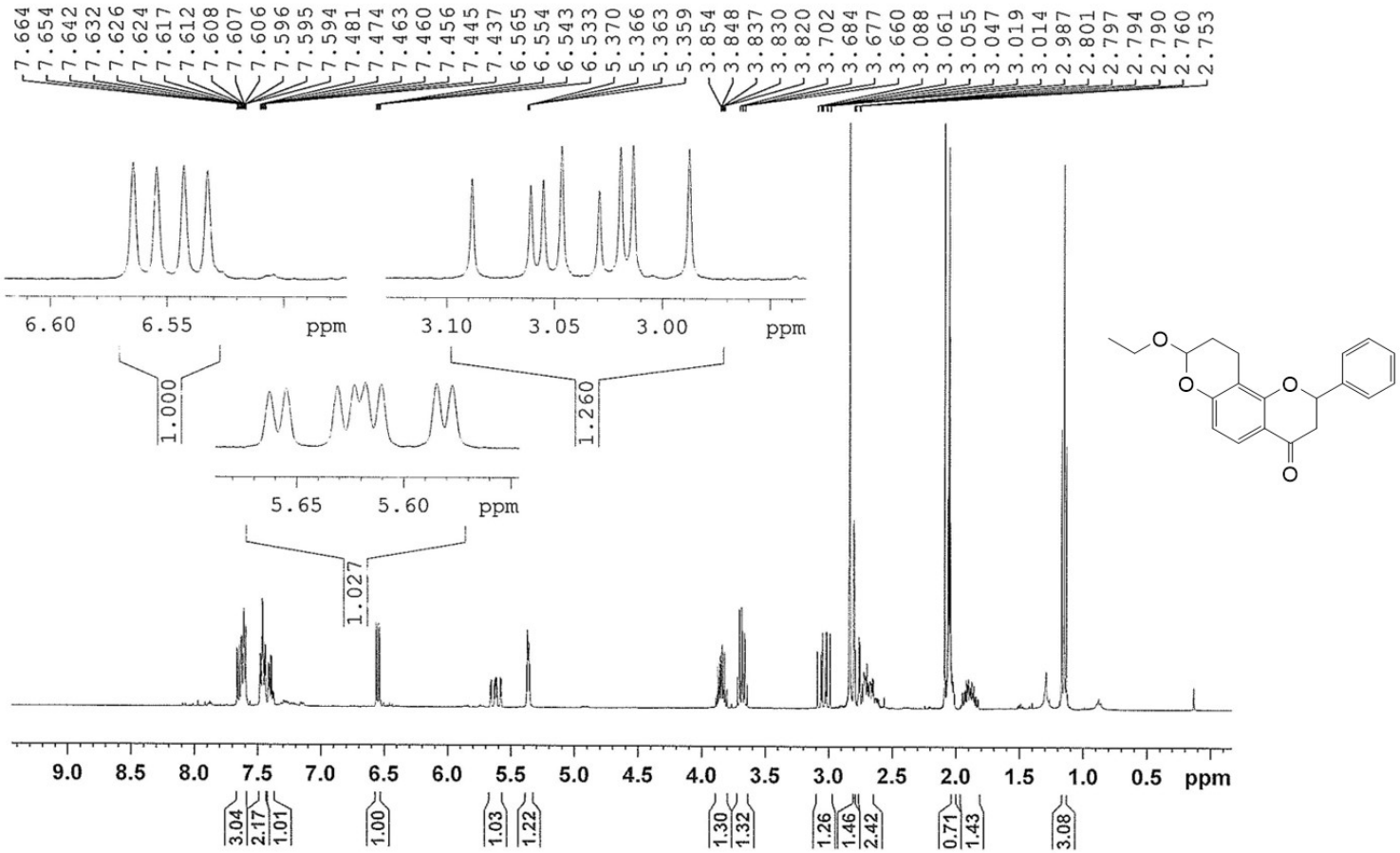

Figure S29. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 8-Ethoxy-2-phenyl-2,3,9,10-tetrahydro-4*H*,8*H*-pyrano[2,3-f]chromen-4-one (**15c**)

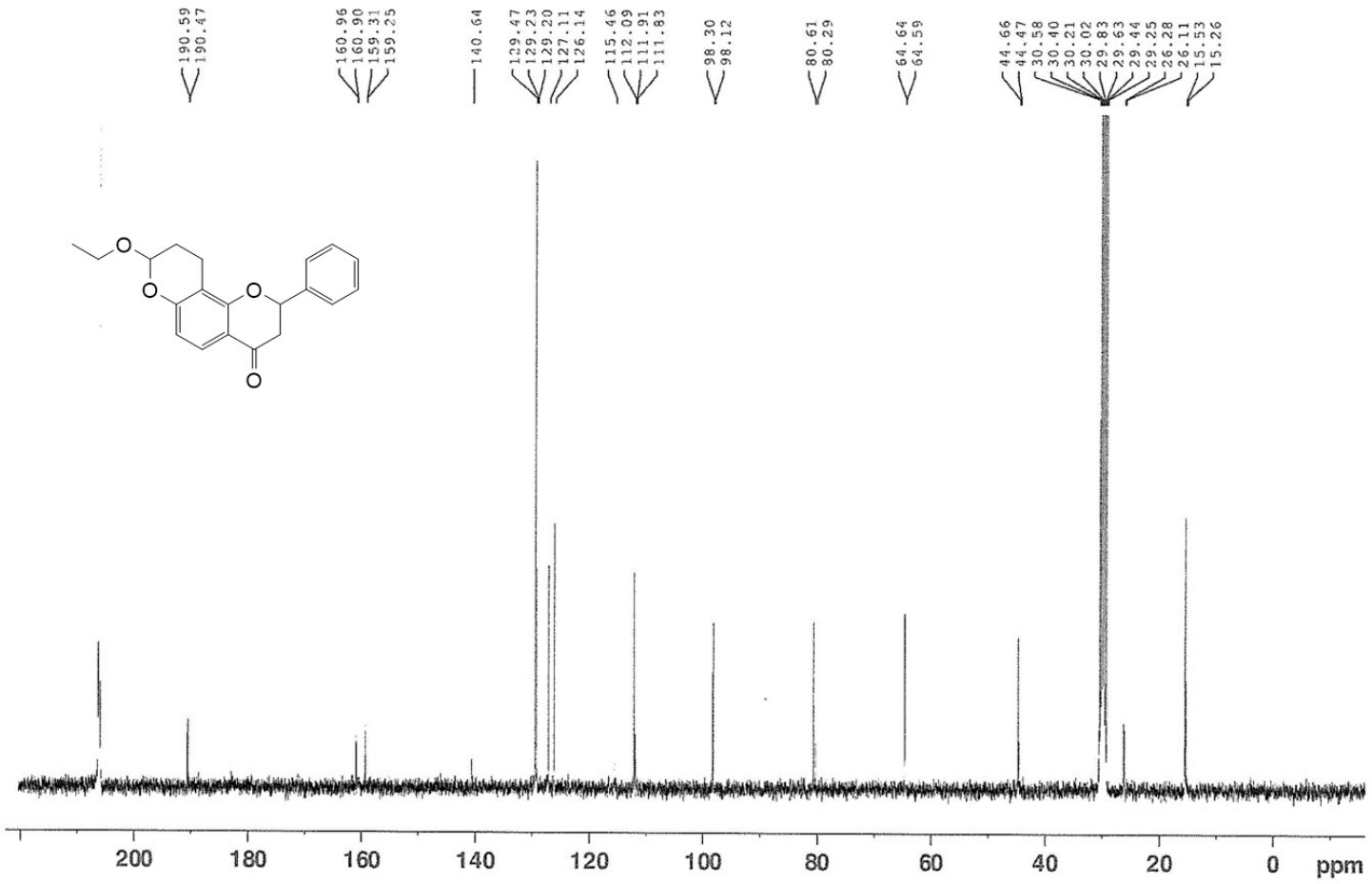

Figure S30. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 8-Ethoxy-2-phenyl-2,3,9,10-tetrahydro-4*H*,8*H*-pyrano[2,3-f]chromen-4-one (**15c**)

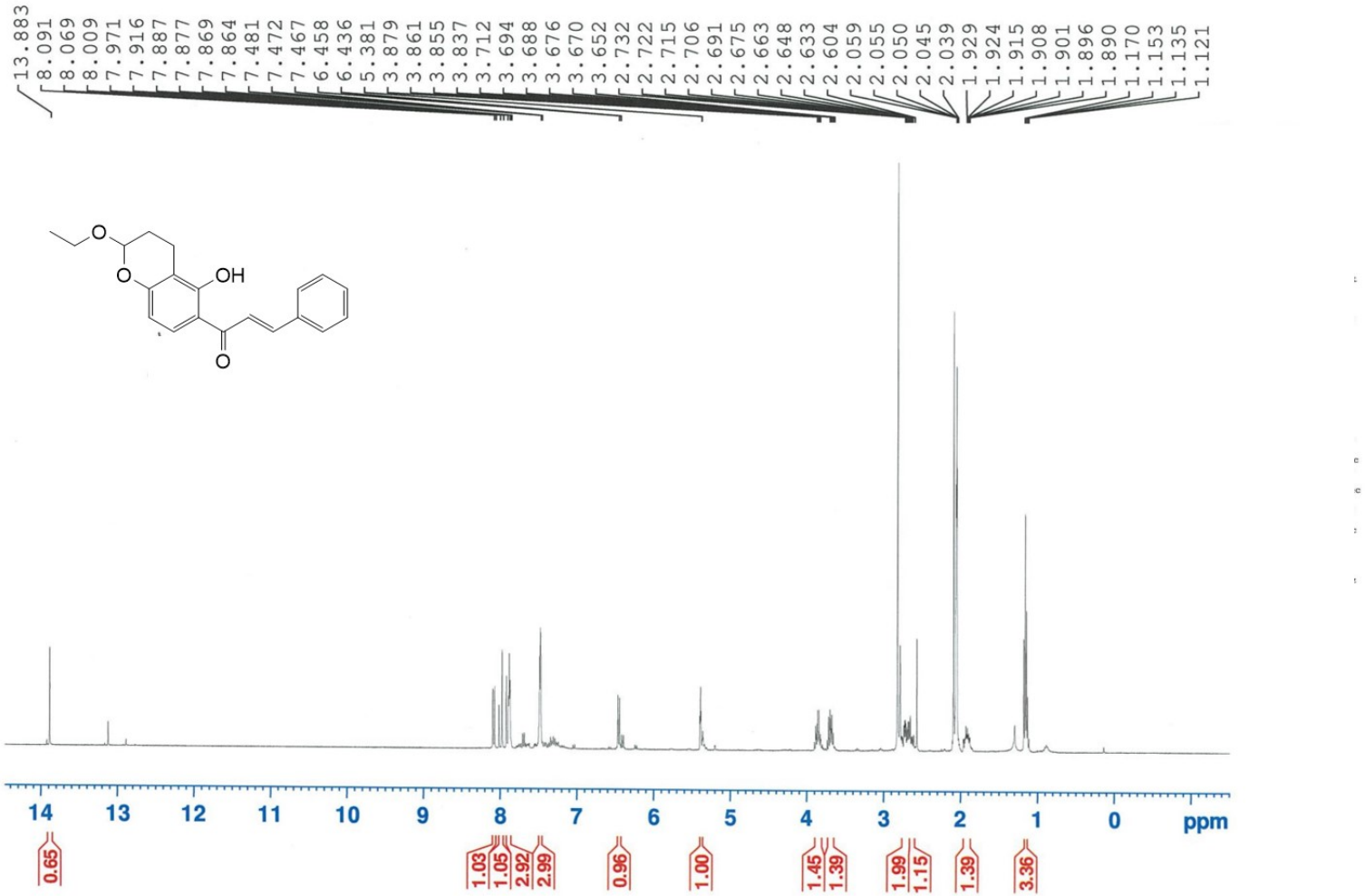

Figure S31. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of (*E*)-1-(2-Ethoxy-5-hydroxychroman-6-yl)-3-phenylprop-2-en-1-one (**16c**)

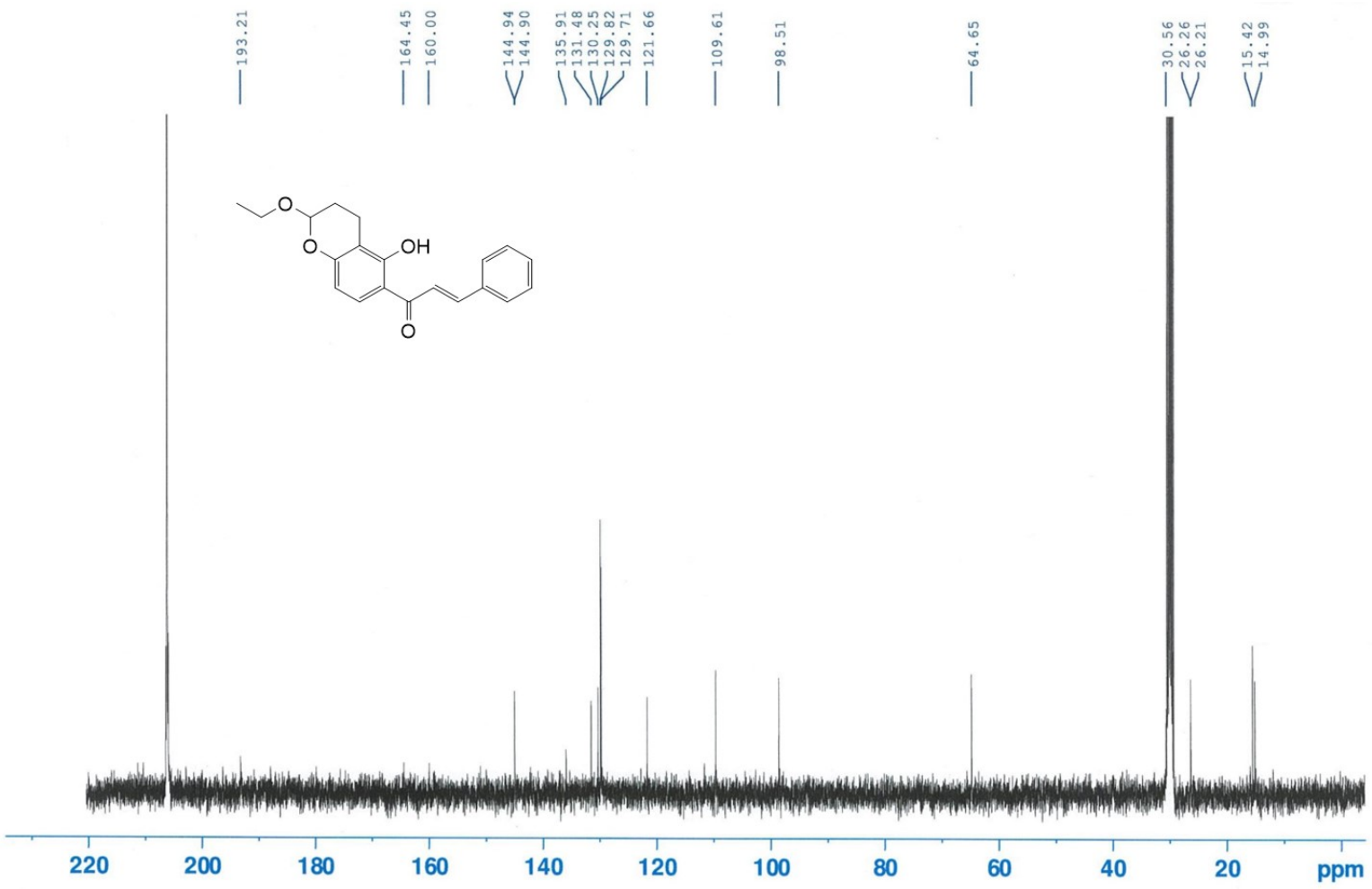

Figure S32. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of (*E*)-1-(2-Ethoxy-5-hydroxychroman-6-yl)-3-phenylprop-2-en-1-one (**16c**)

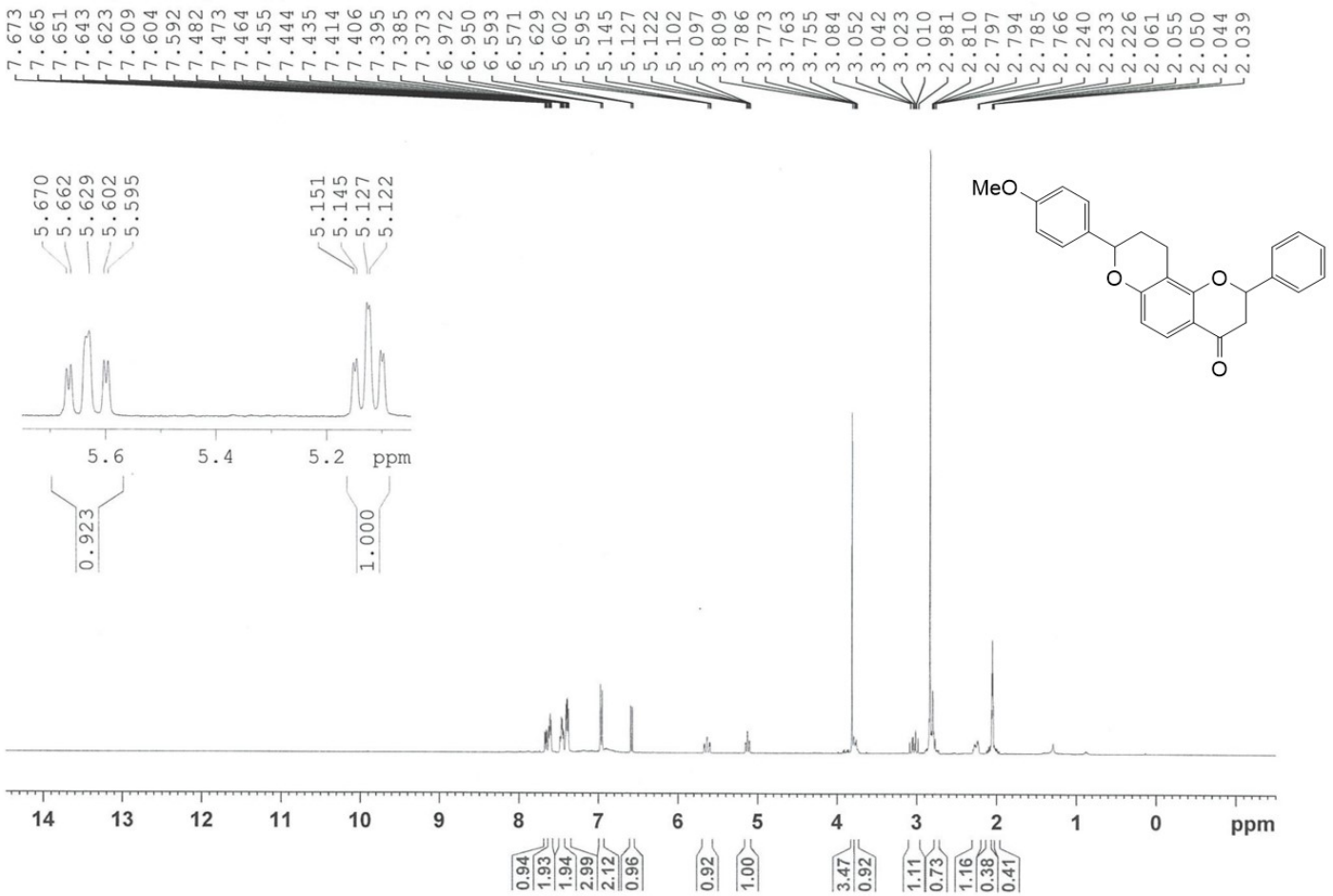

Figure S33. [1]H NMR (400 MHz, acetone-d_6) spectrum of 8-(4-Methoxyphenyl)-2-phenyl-2,3,9,10-tetrahydro-4*H*,8*H*-pyrano[2,3-f]chromen-4-one (**15d**)

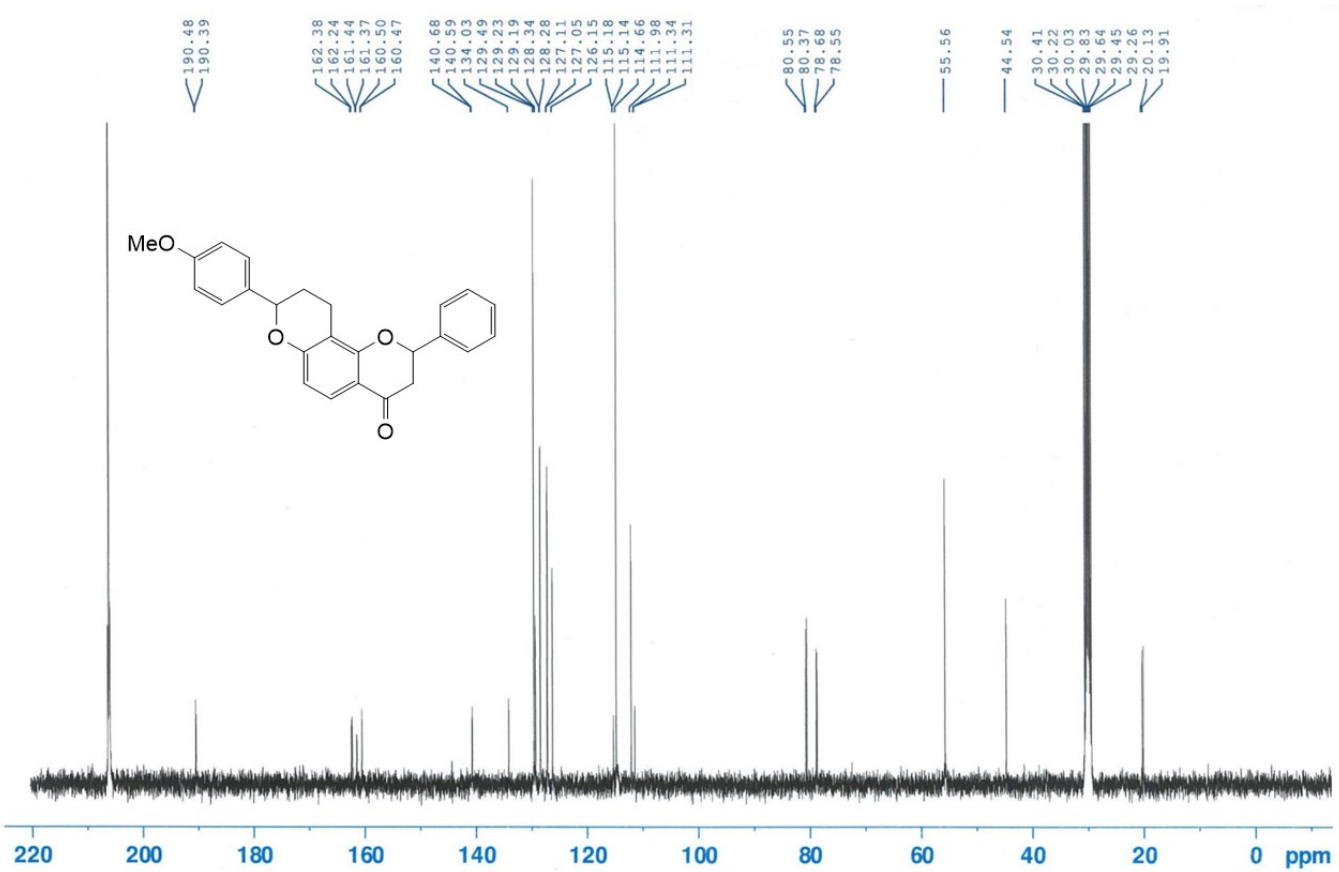

Figure S34. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 8-(4-Methoxyphenyl)-2-phenyl-2,3,9,10-tetrahydro-4*H*,8*H*-pyrano[2,3-f]chromen-4-one (**15d**)

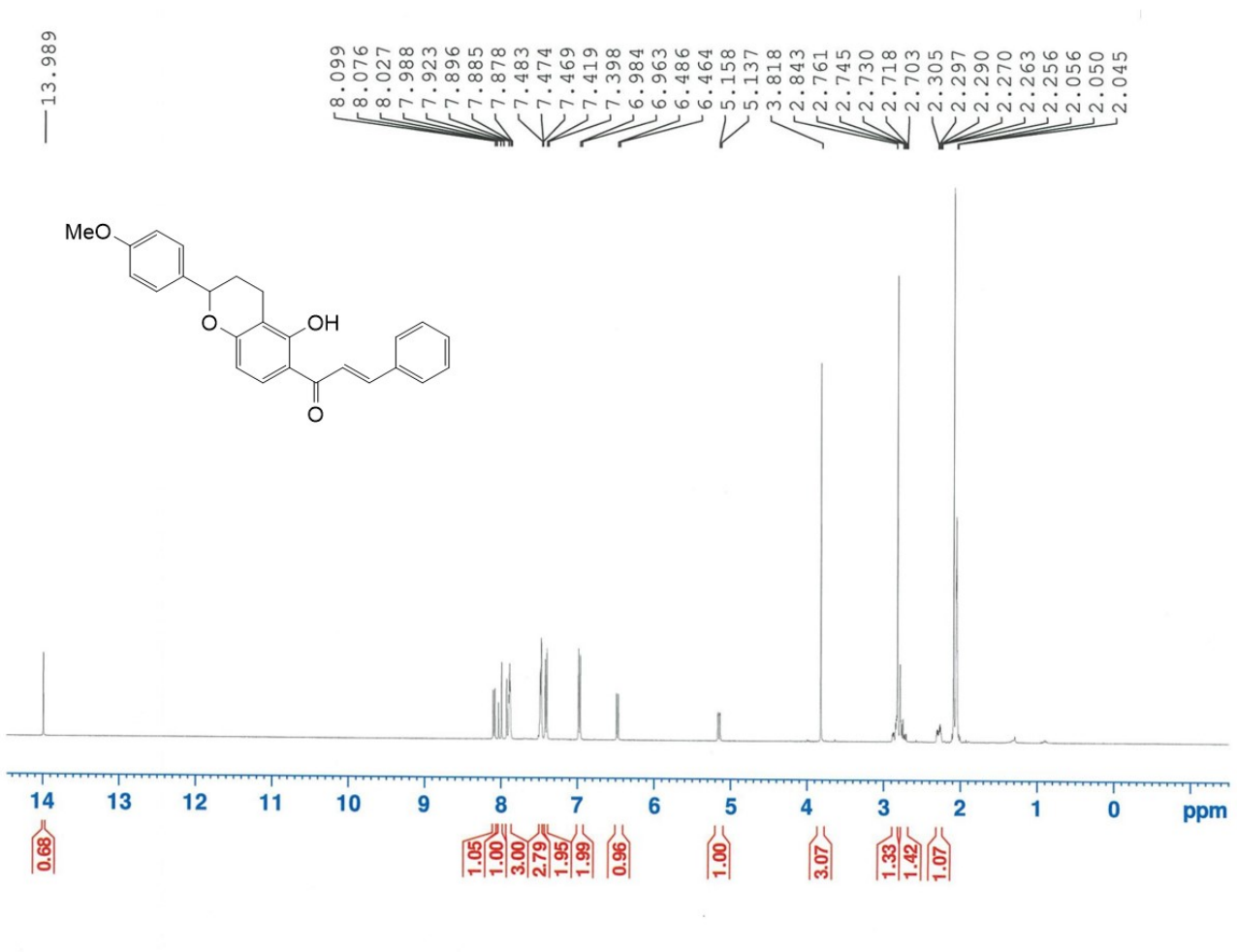

Figure S35. [1]H NMR (400 MHz, acetone-d_6) spectrum of (*E*)-1-(5-Hydroxy-2-(4-methoxyphenyl)chroman-6-yl)-3-phenylprop-2-en-1-one (**16d**)

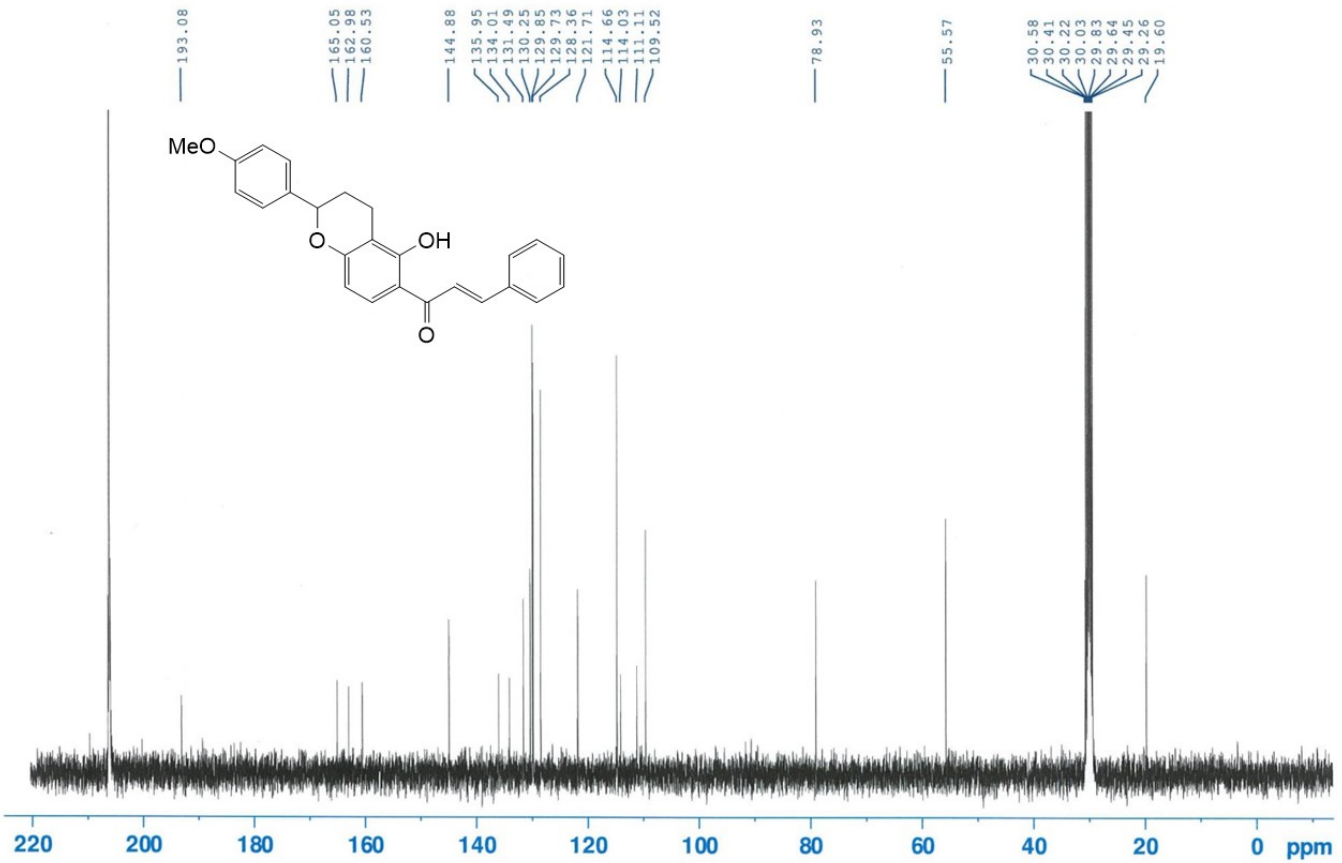

Figure S36. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of (*E*)-1-(5-Hydroxy-2-(4-methoxyphenyl)chroman-6-yl)-3-phenylprop-2-en-1-one (**16d**)

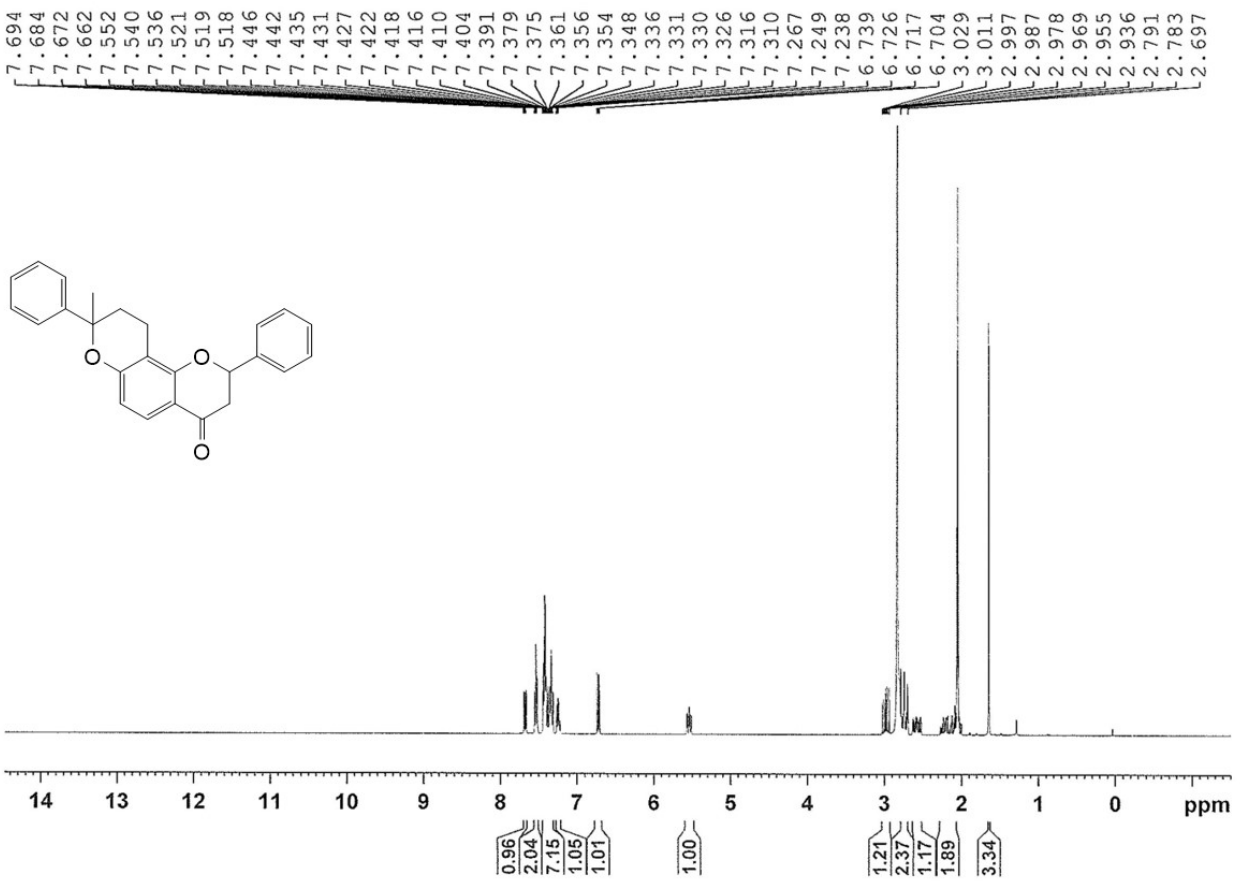

Figure S37. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 8-Methyl-2,8-diphenyl-2,3,9,10-tetrahydro-4*H*,8*H*-pyrano[2,3-f]chromen-4-one (**15e**)

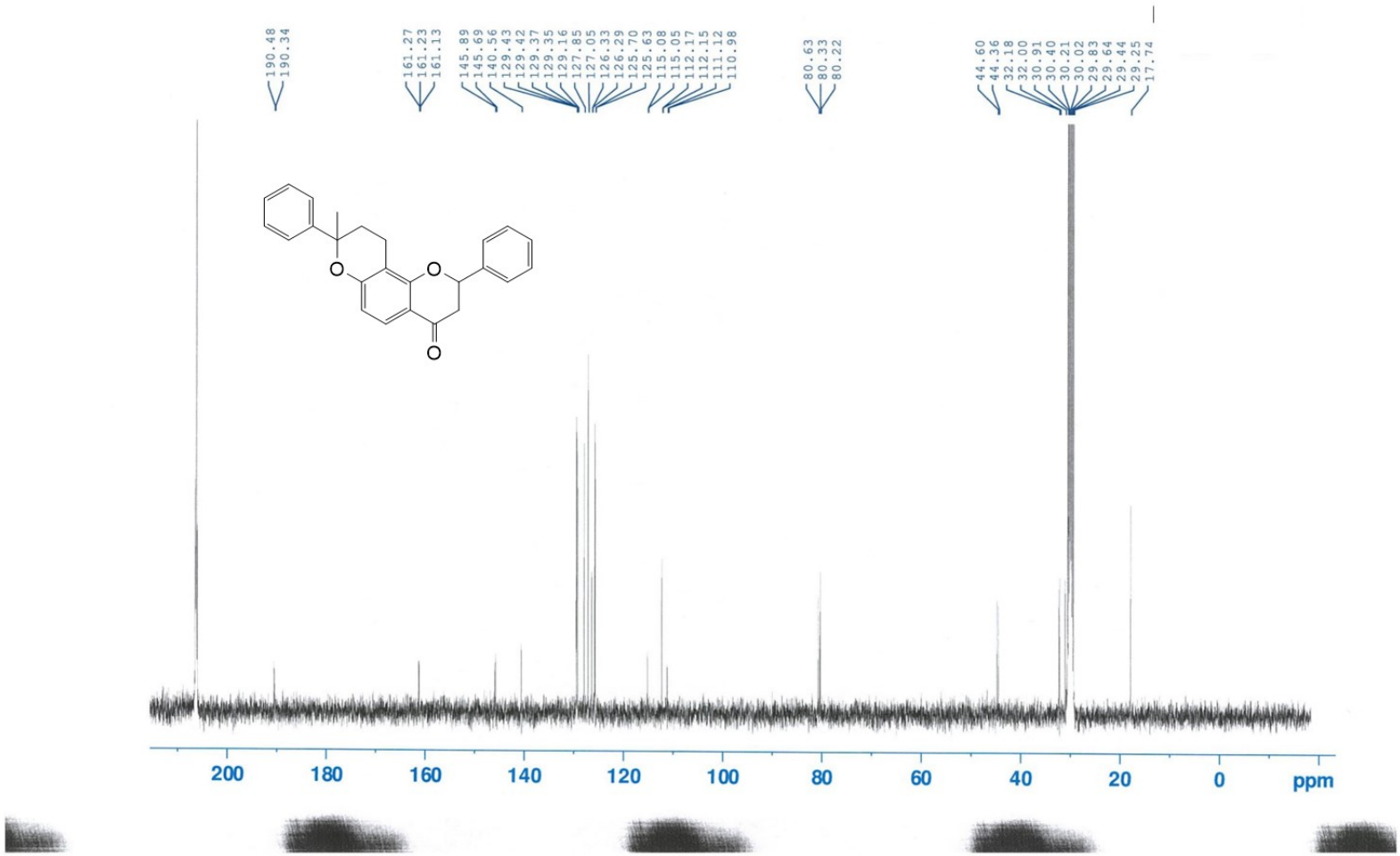

Figure S38. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 8-Methyl-2,8-diphenyl-2,3,9,10-tetrahydro-4*H*,8*H*-pyrano[2,3-f]chromen-4-one (**15e**)

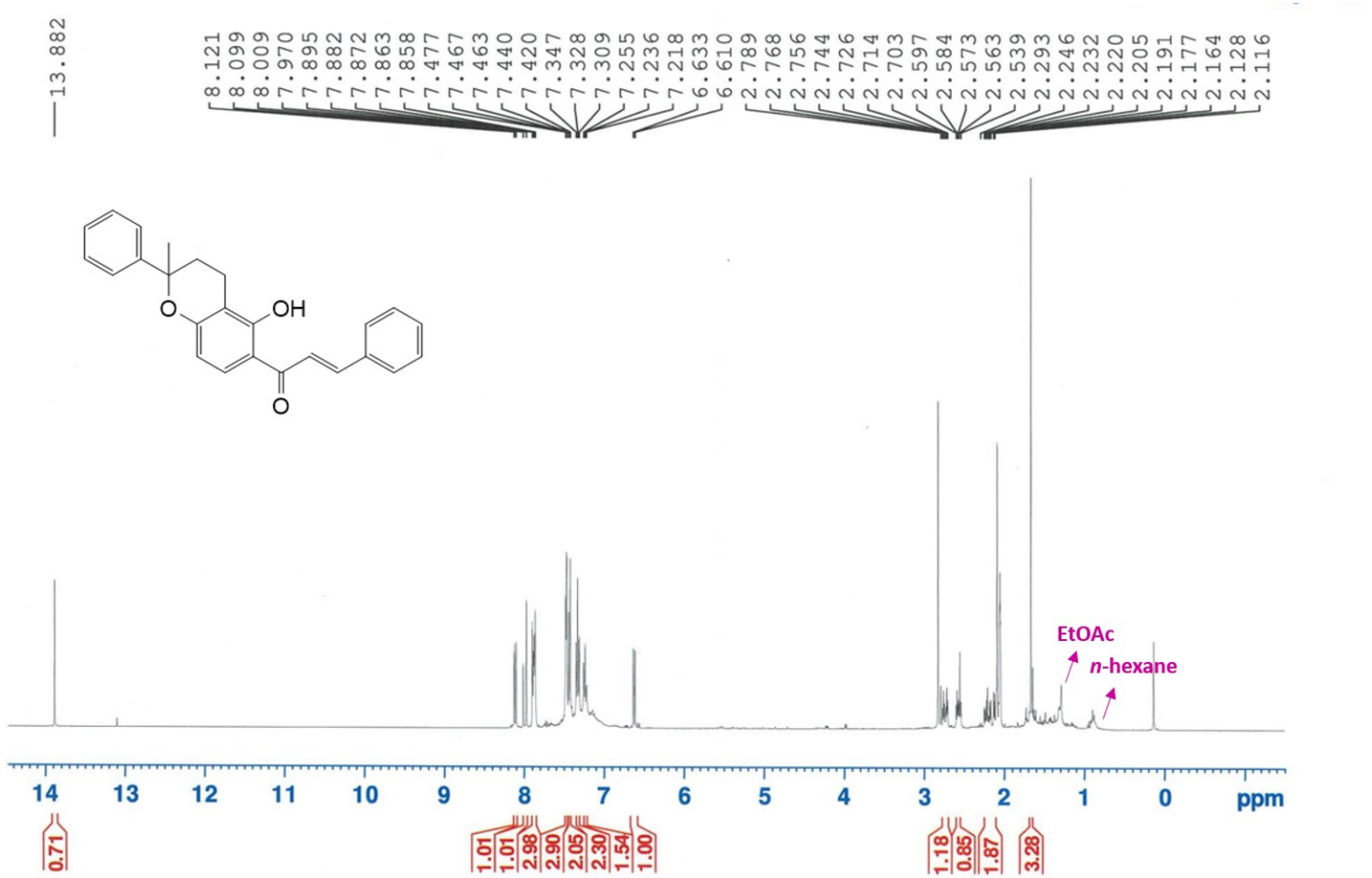

Figure S39. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of (*E*)-1-(5-Hydroxy-2-methyl-2-phenylchroman-6-yl)-3-phenylprop-2-en-1-one (**16e**)

Ethyl acetate and *n*-hexane are the solvents used for purification of **16e** using column chromatography

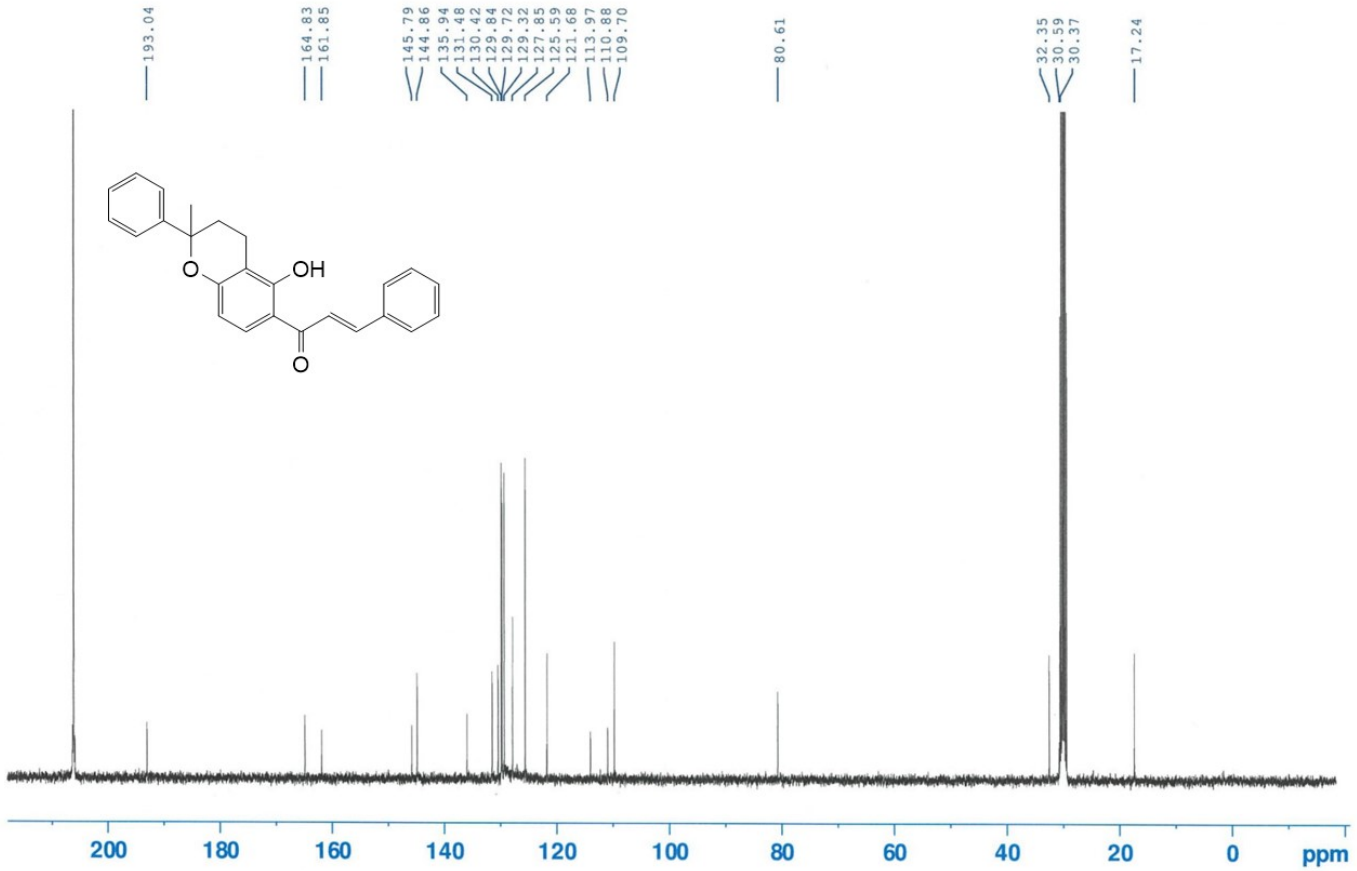

Figure S40. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of (*E*)-1-(5-Hydroxy-2-methyl-2-phenylchroman-6-yl)-3-phenylprop-2-en-1-one (**16e**)

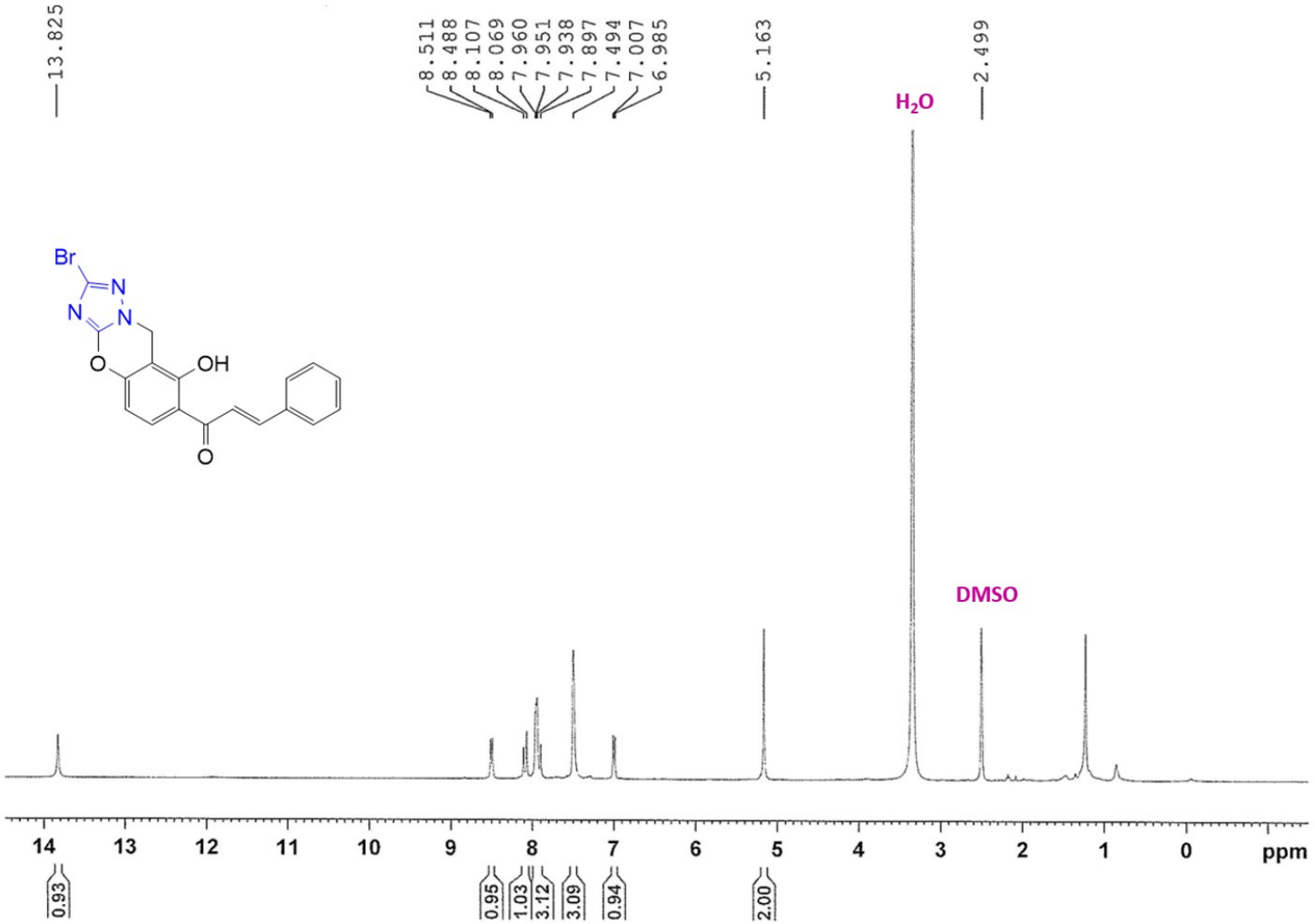

Figure S41. ^{1}H NMR (400 MHz, DMSO-d_6) spectrum of (*E*)-1-(2-Bromo-8-hydroxy-9H-benzo[e][1,2,4]triazolo[5,1-b][1,3]oxazin-7-yl)-3-phenylprop-2-en-1-one (**18**)

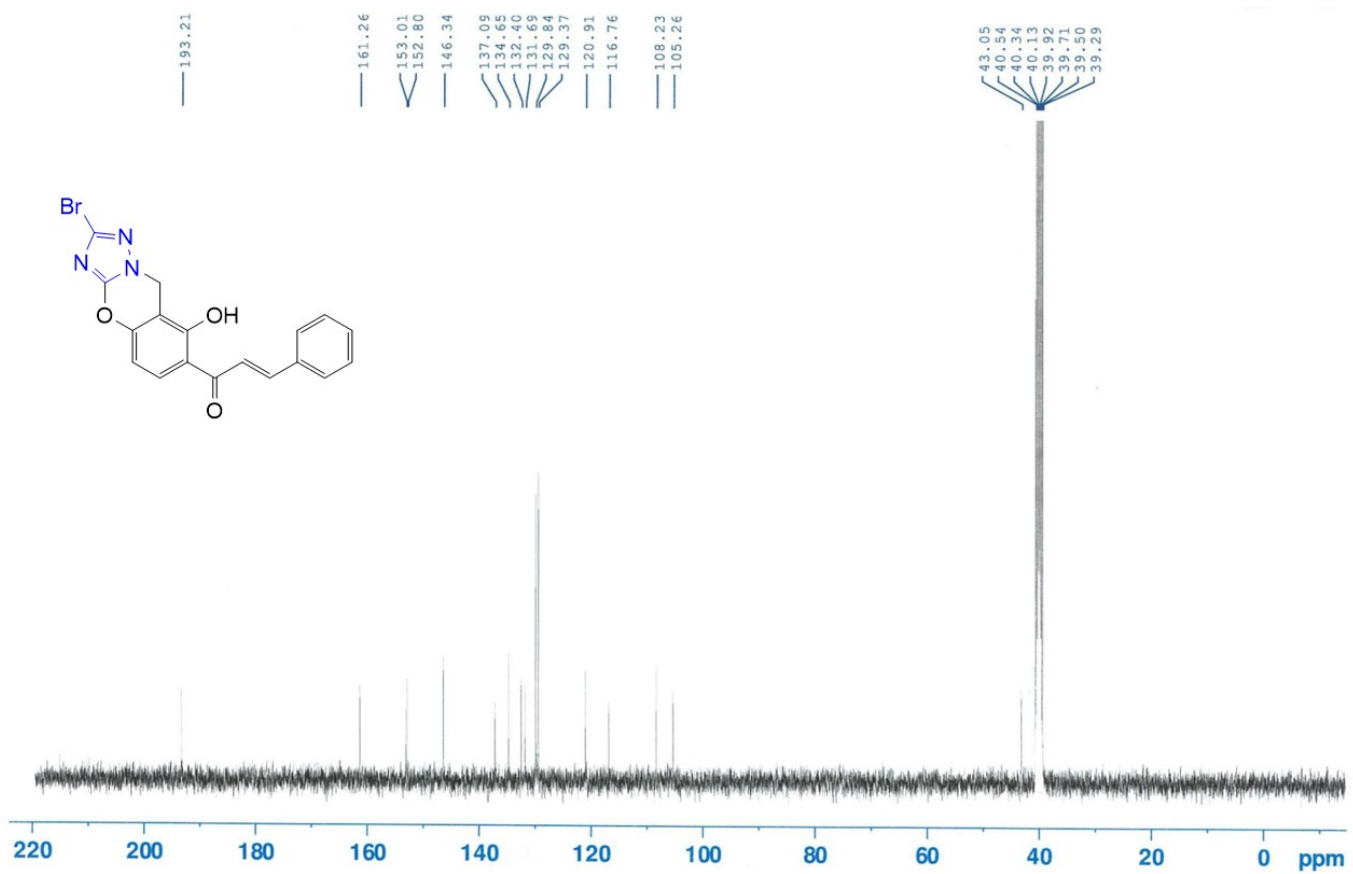

Figure S42. ^{13}C NMR (100 MHz, DMSO-d_6) spectrum of (*E*)-1-(2-Bromo-8-hydroxy-9H-benzo[e][1,2,4]triazolo[5,1-b][1,3]oxazin-7-yl)-3-phenylprop-2-en-1-one (**18**)

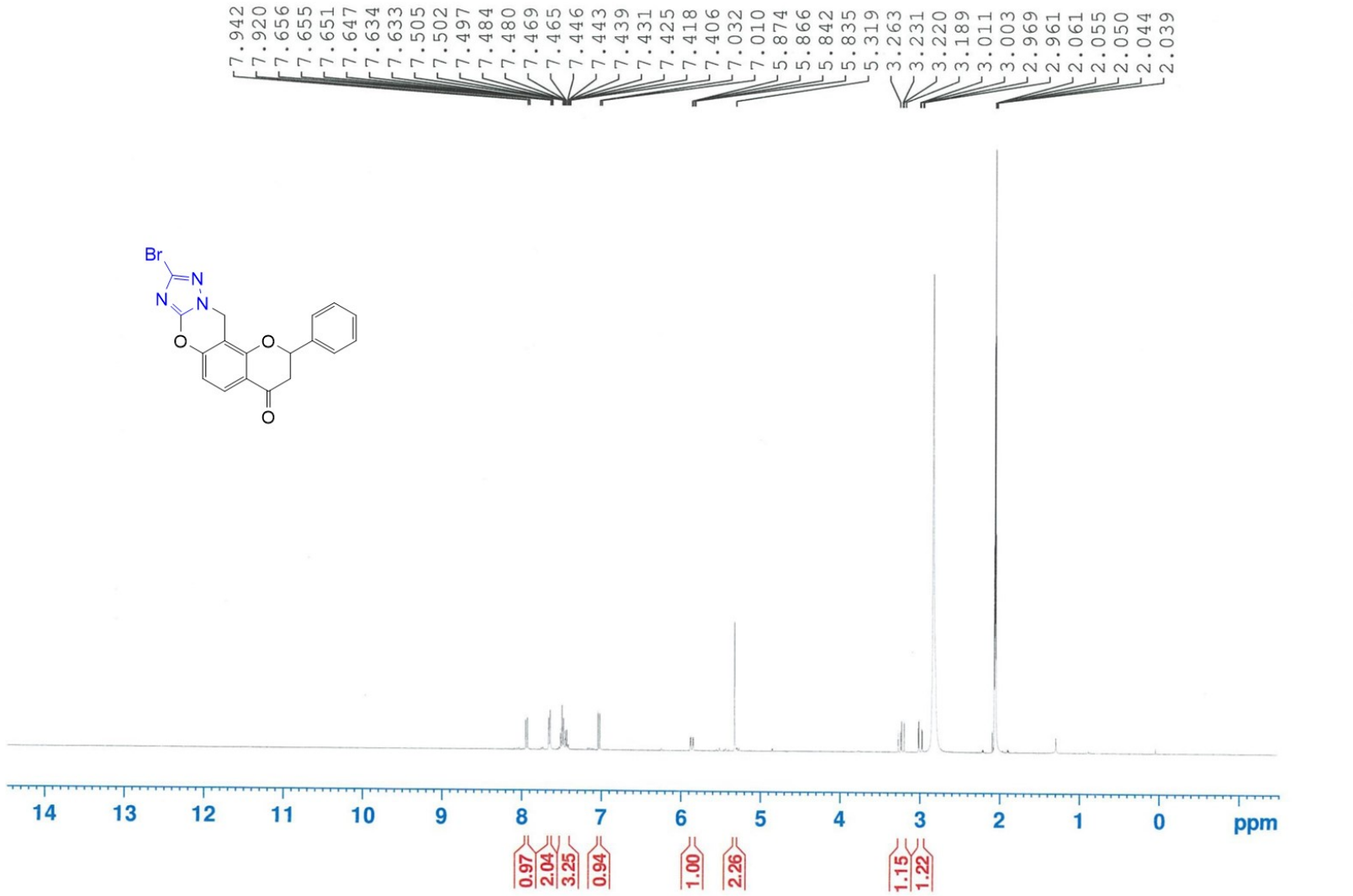

Figure S43. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 9-Bromo-2-phenyl-2,3-dihydro-4*H*,12*H*-chromeno[8,7-e][1,2,4]triazolo[5,1-b][1,3]oxazin-4-one (**19**)

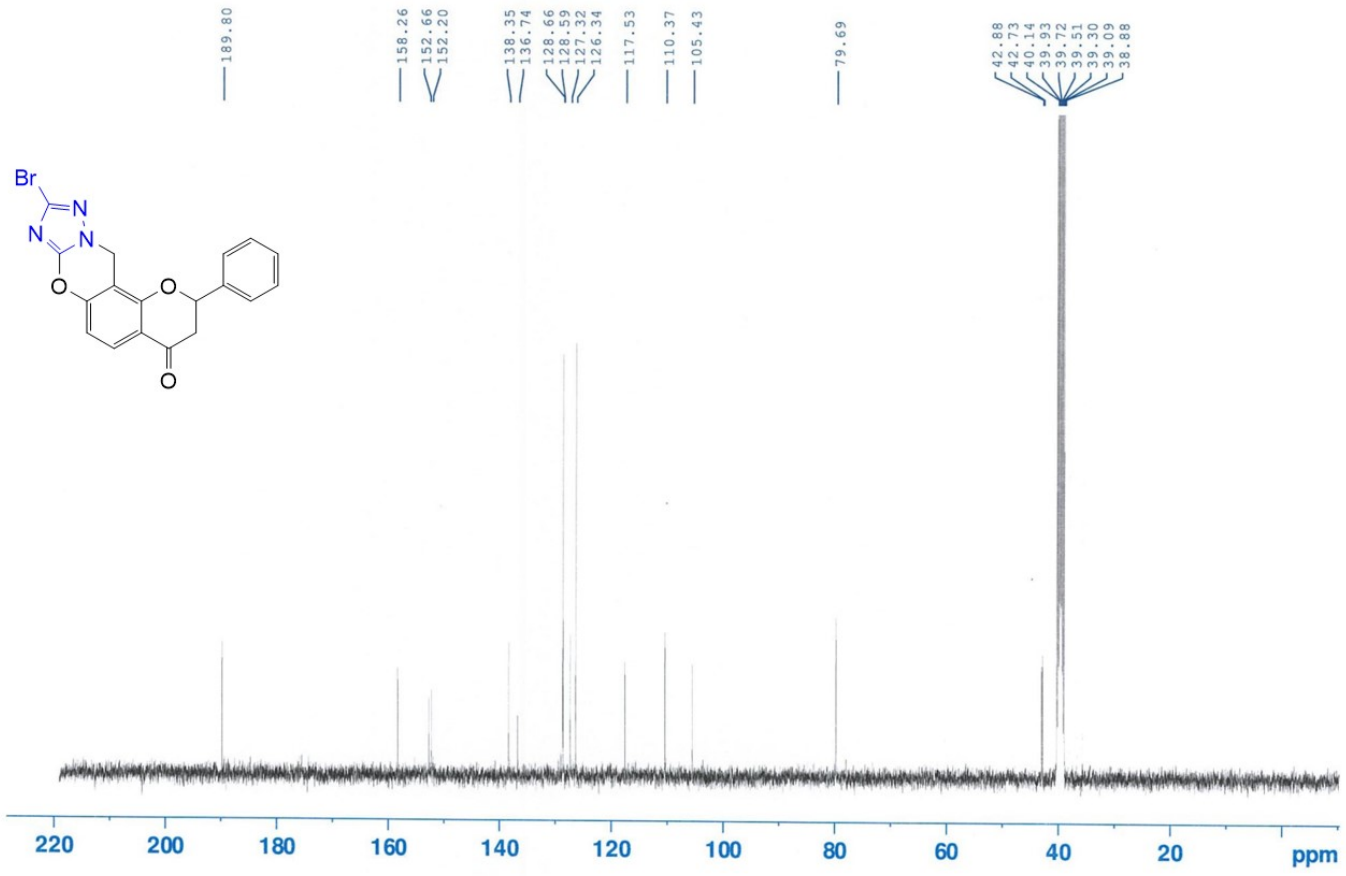

Figure S44. ^{13}C NMR (100 MHz, DMSO-d_6) spectrum of 9-Bromo-2-phenyl-2,3-dihydro-4*H*,12*H*-chromeno[8,7-e][1,2,4]triazolo[5,1-b][1,3]oxazin-4-one (**19**)

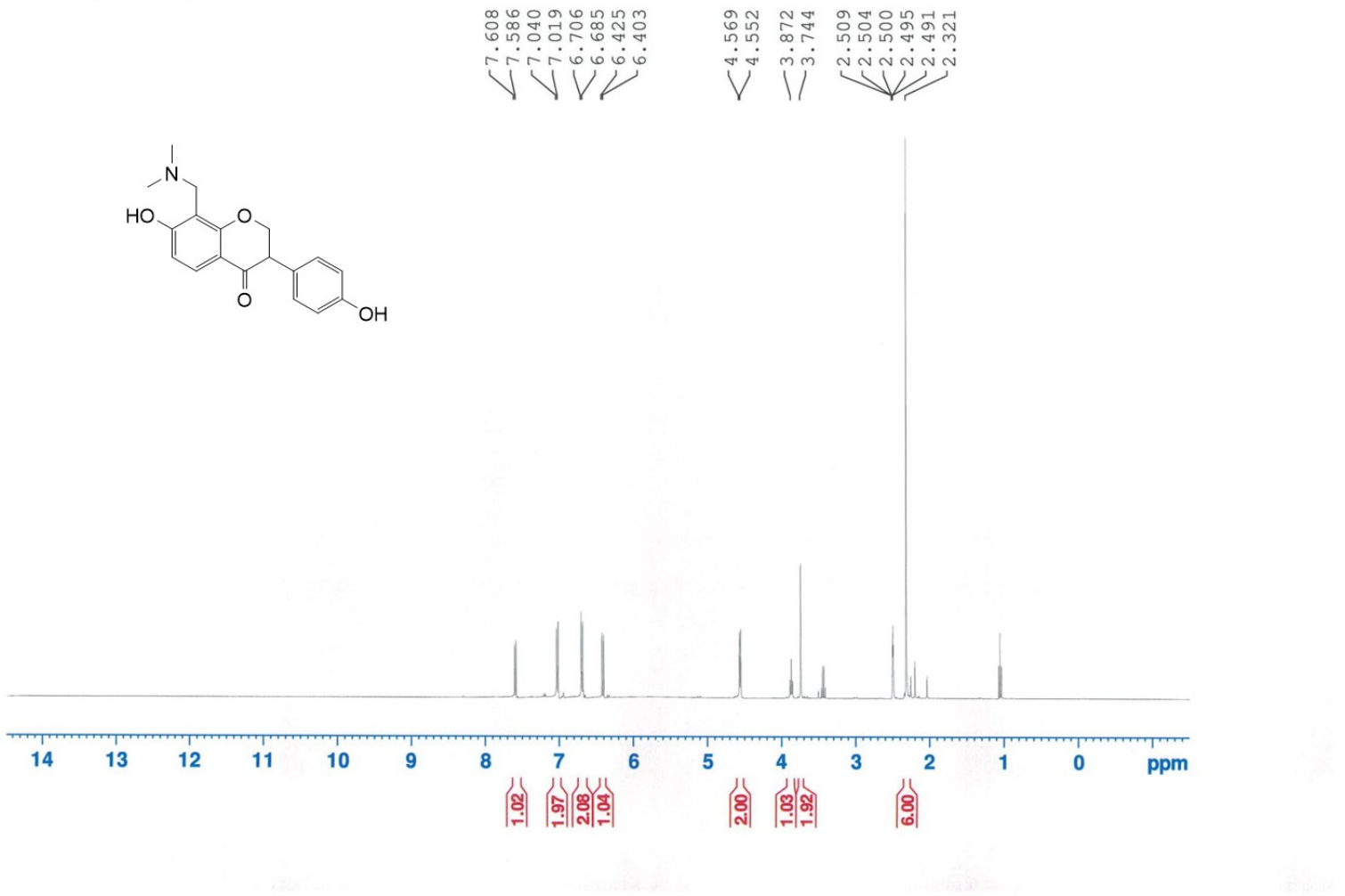

Figure S45. ^{1}H NMR (400 MHz, DMSO-d_6) spectrum of 8-((Dimethylamino)methyl)-7-hydroxy-3-(4-hydroxyphenyl)chroman-4-one (**11**)

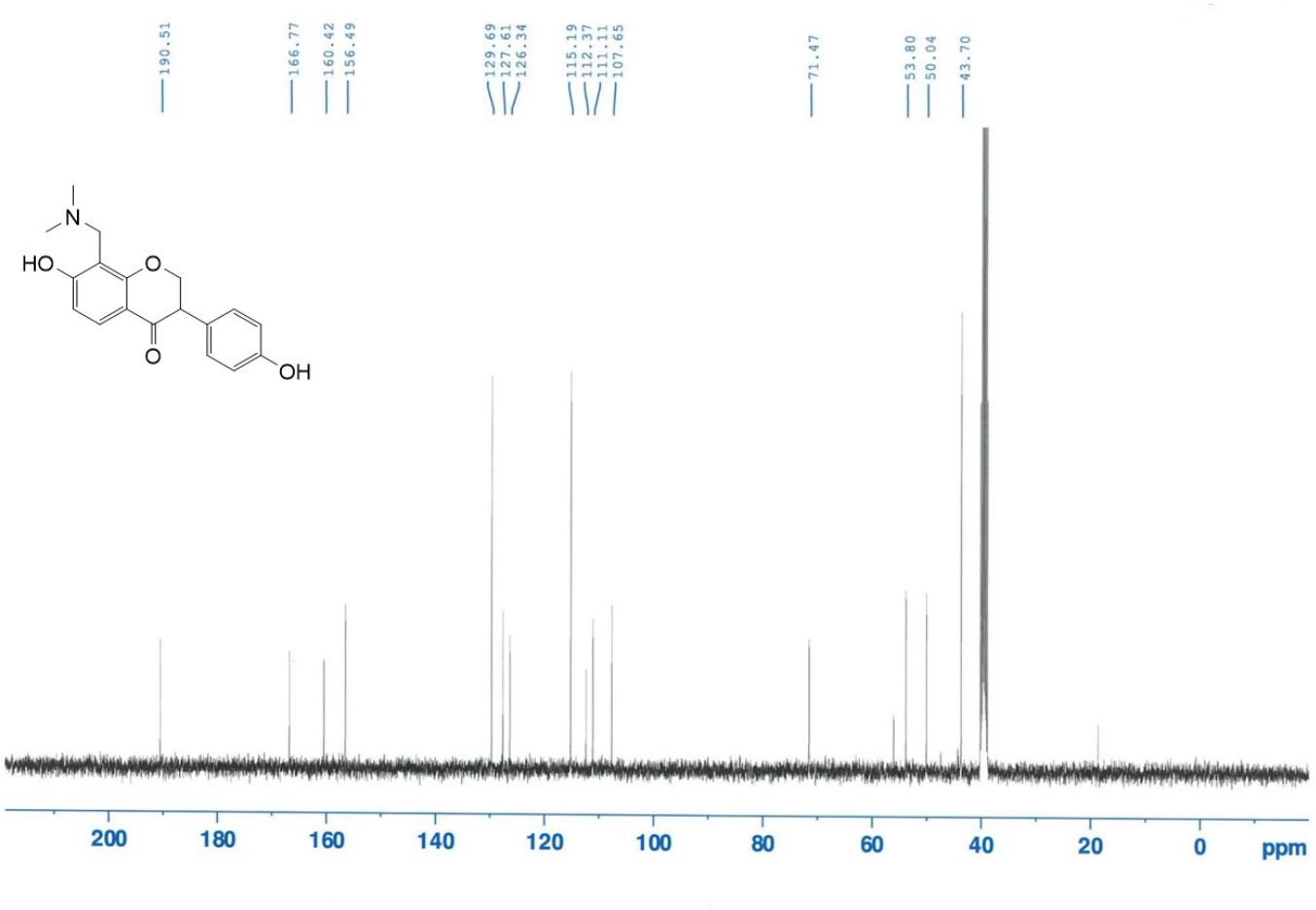

Figure S46. ^{13}C NMR (100 MHz, DMSO-d_6) spectrum of 8-((Dimethylamino)methyl)-7-hydroxy-3-(4-hydroxyphenyl)chroman-4-one (**11**)

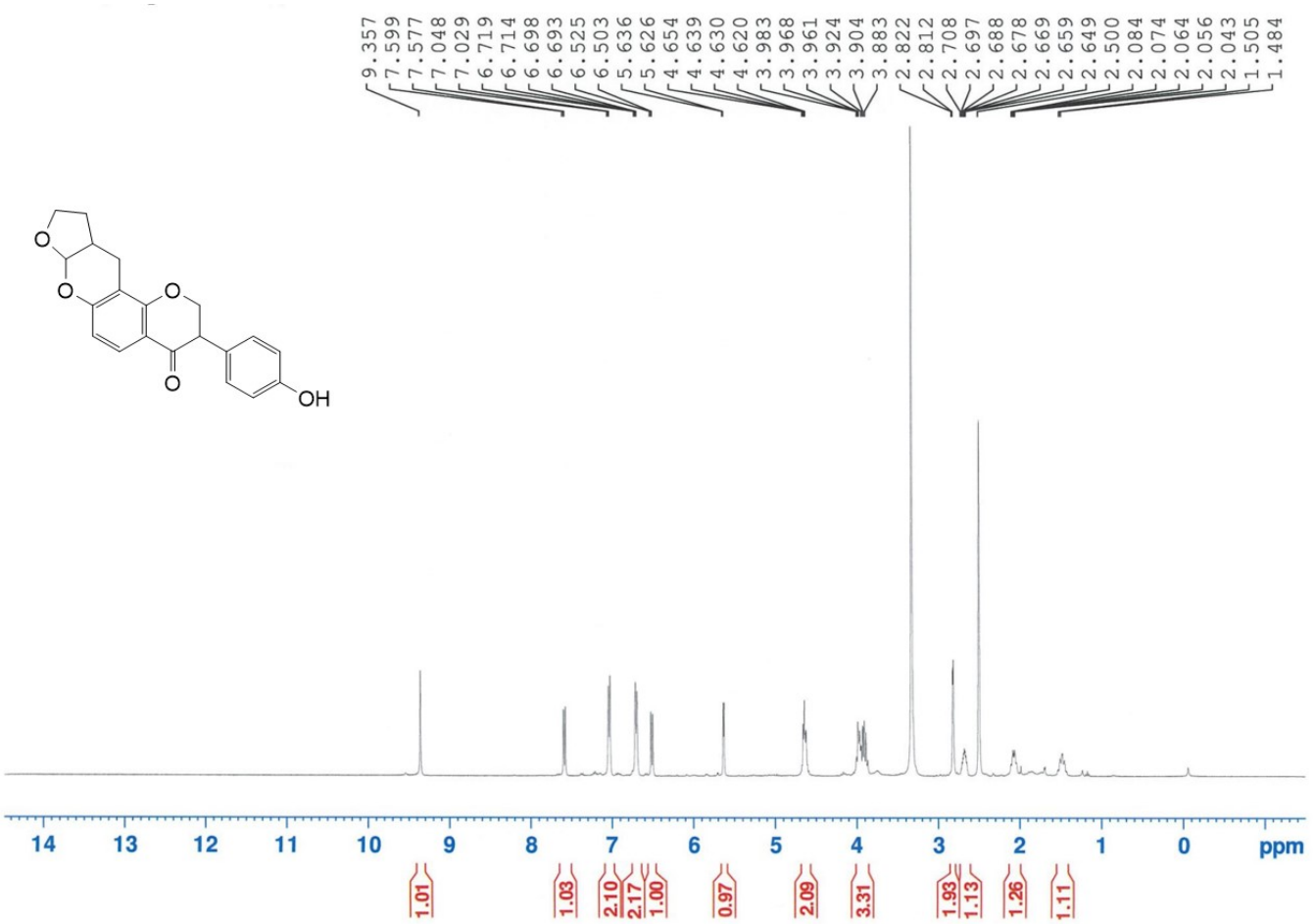

Figure S47. ^{1}H NMR (400 MHz, DMSO-d_6) spectrum of 3-(4-Hydroxyphenyl)-2,3,7a,9,10,10a-hexahydro-4*H*,11*H*-furo[2,3-b]pyrano[2,3-f]chromen-4-one (**21a**)

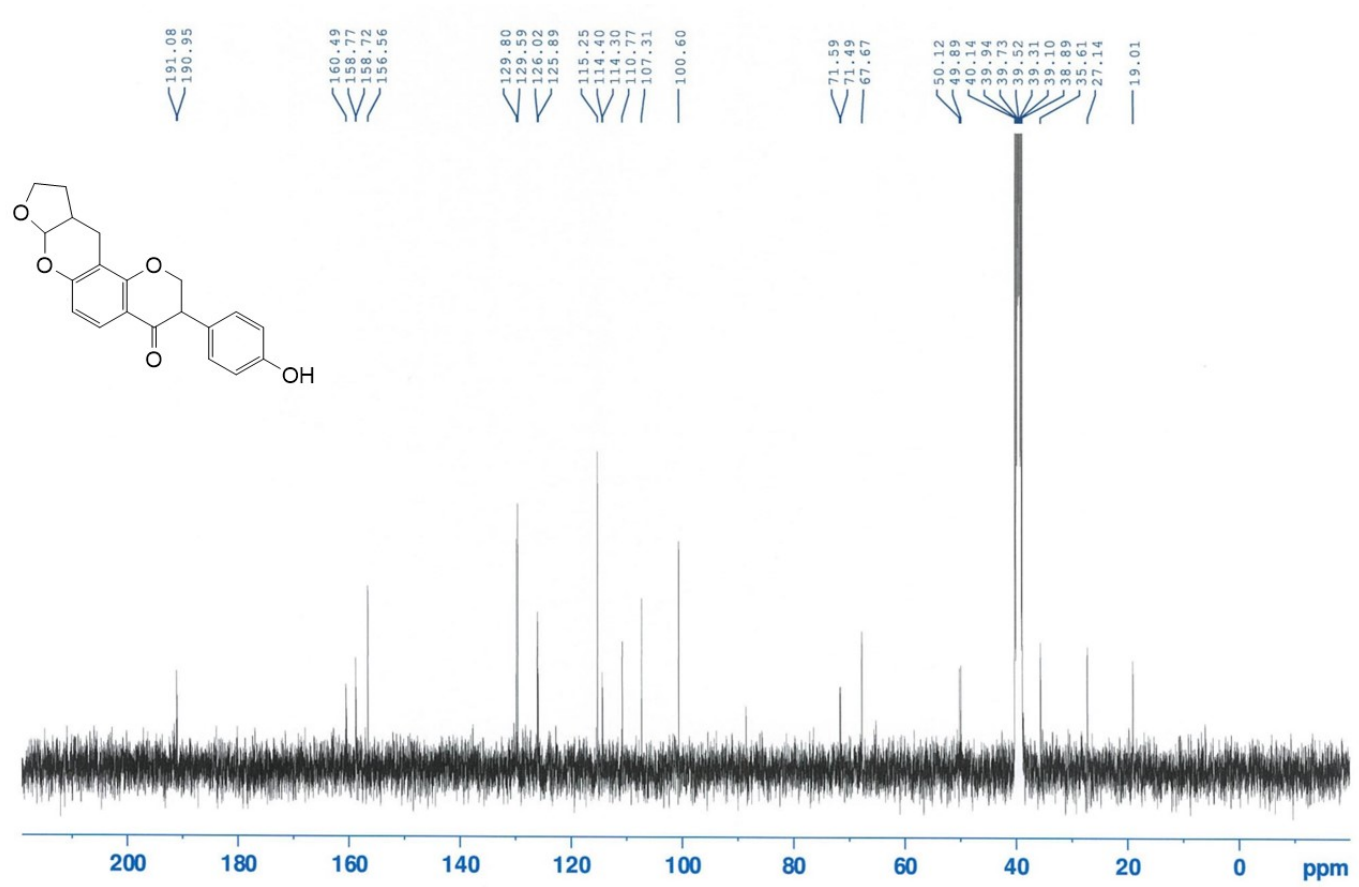

Figure S48. ^{13}C NMR (100 MHz, DMSO-d_6) spectrum of 3-(4-Hydroxyphenyl)-2,3,7a,9,10,10a-hexahydro-4*H*,11*H*-furo[2,3-b]pyrano[2,3-f]chromen-4-one (**21a**)

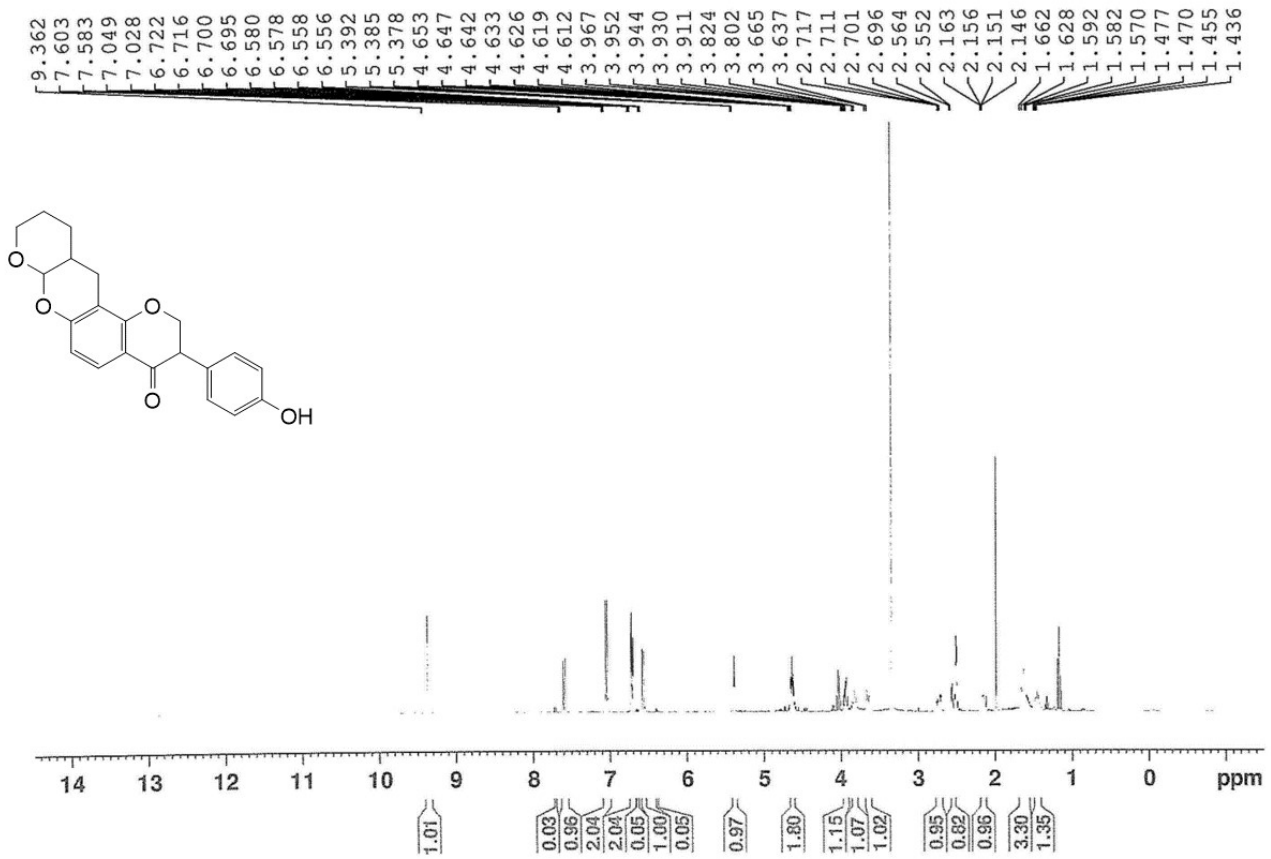

Figure S49. ^{1}H NMR (400 MHz, DMSO-d_6) spectrum of 3-(4-Hydroxyphenyl)-2,3,7a,10,11,11a-hexahydro-4*H*,9*H*,12*H*-dipyrano[2,3-b:2',3'-f]chromen-4-one (**21b**)

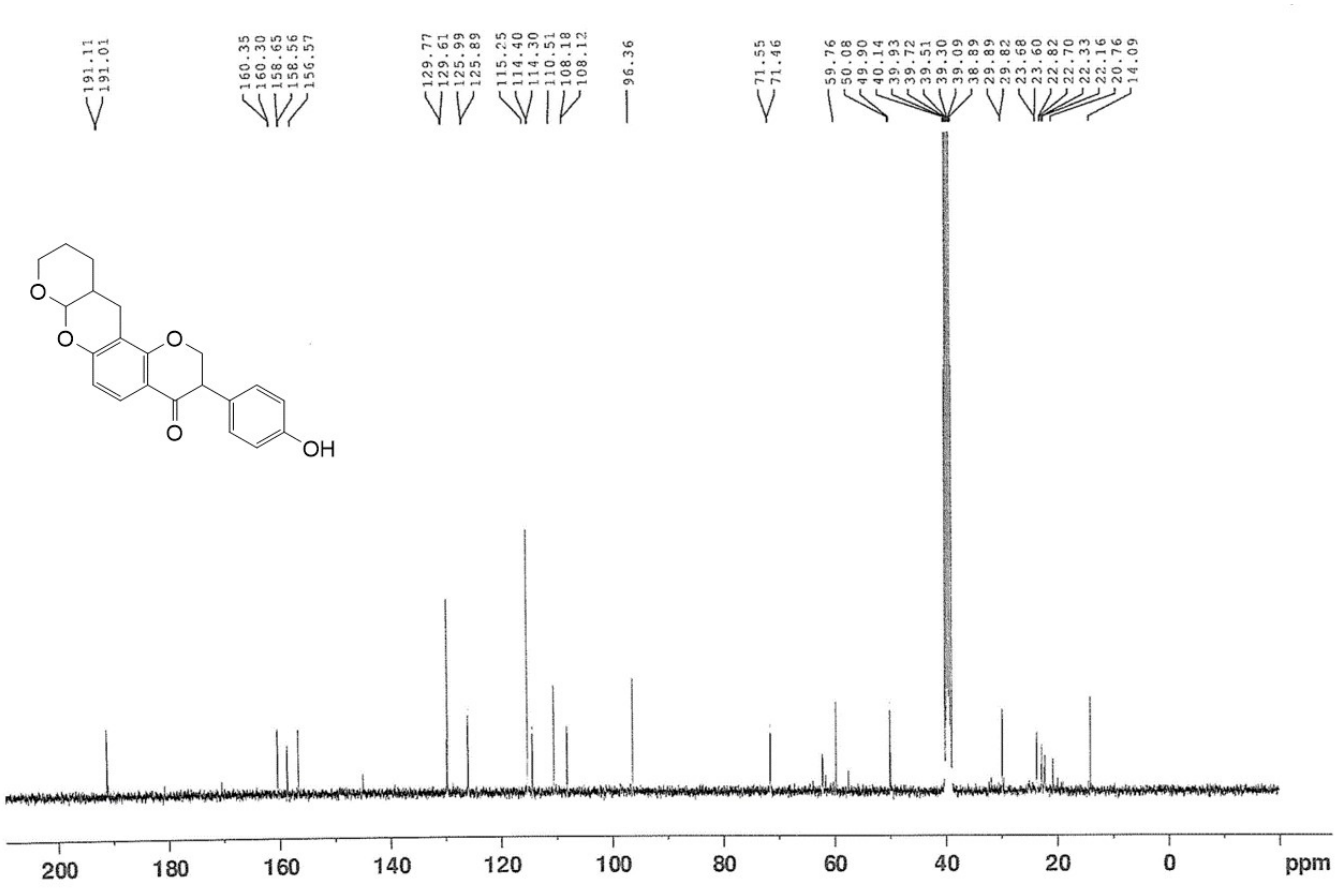

Figure S50. ^{13}C NMR (100 MHz, DMSO-d_6) spectrum of 3-(4-Hydroxyphenyl)-2,3,7a,10,11,11a-hexahydro-4*H*,9*H*,12*H*-dipyrano[2,3-b:2',3'-f]chromen-4-one (**21b**)

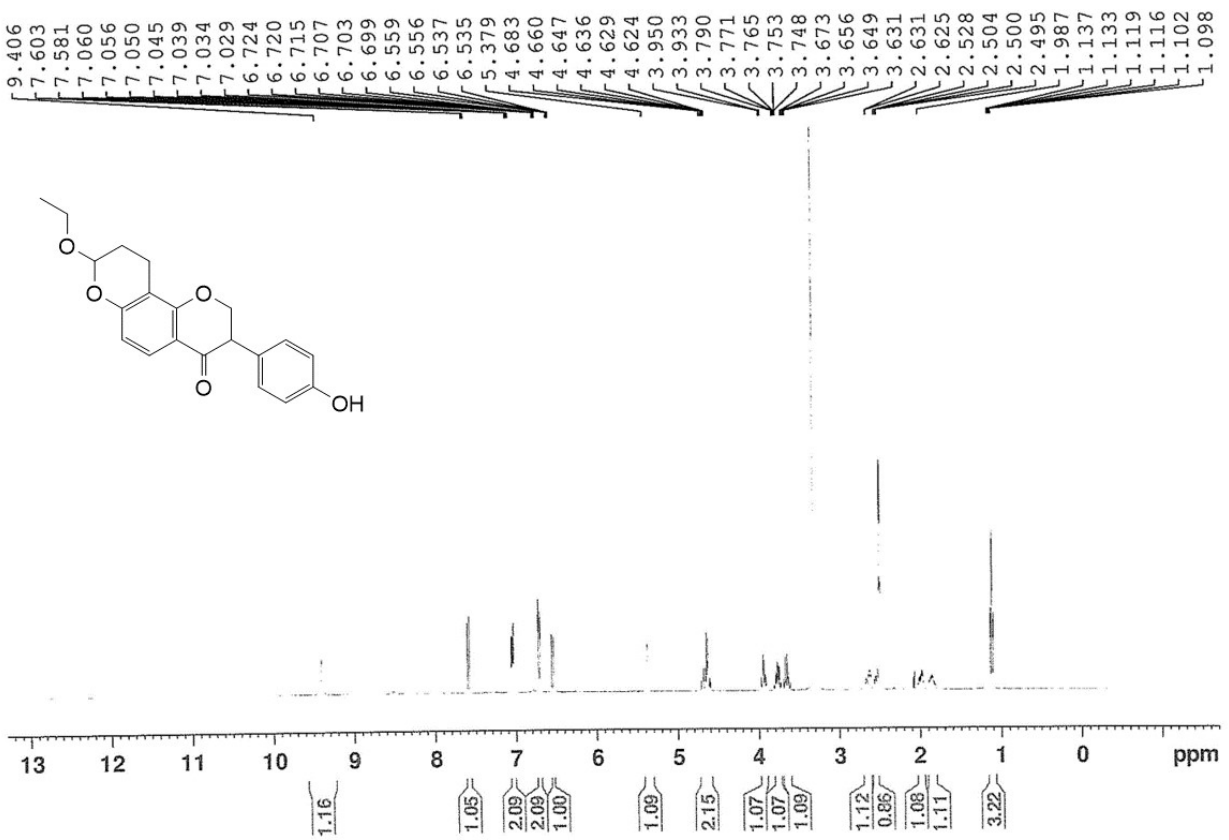

Figure S51. ^{1}H NMR (400 MHz, DMSO-d_6) of 8-Ethoxy-3-(4-hydroxyphenyl)-2,3,9,10-tetrahydro-4*H*,8*H*-pyrano[2,3-f]chromen-4-one (**21c**)

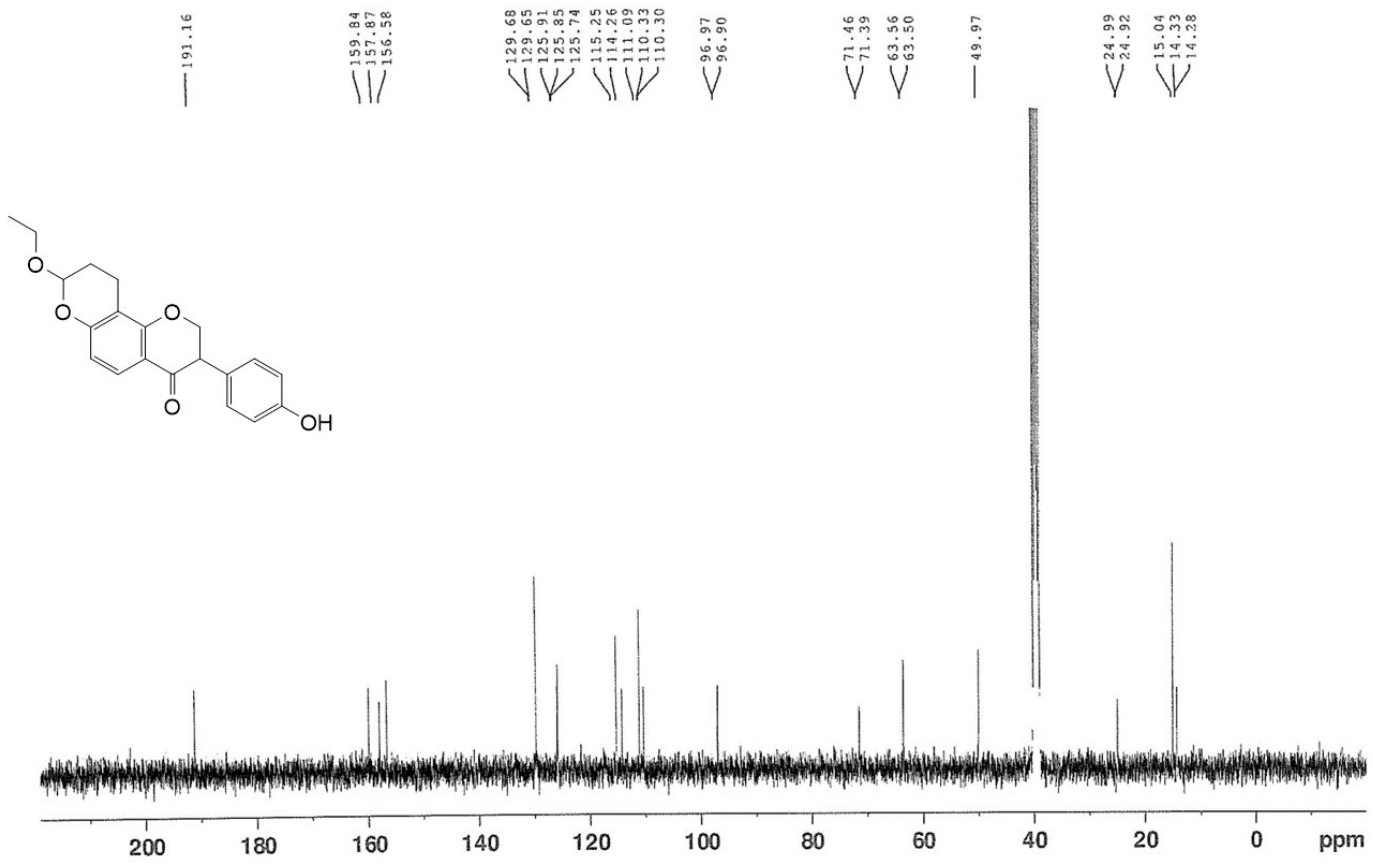

Figure S52. ^{13}C NMR (100 MHz, DMSO-d_6) spectrum of 8-Ethoxy-3-(4-hydroxyphenyl)-2,3,9,10-tetrahydro-4*H*,8*H*-pyrano[2,3-f]chromen-4-one (**21c**)

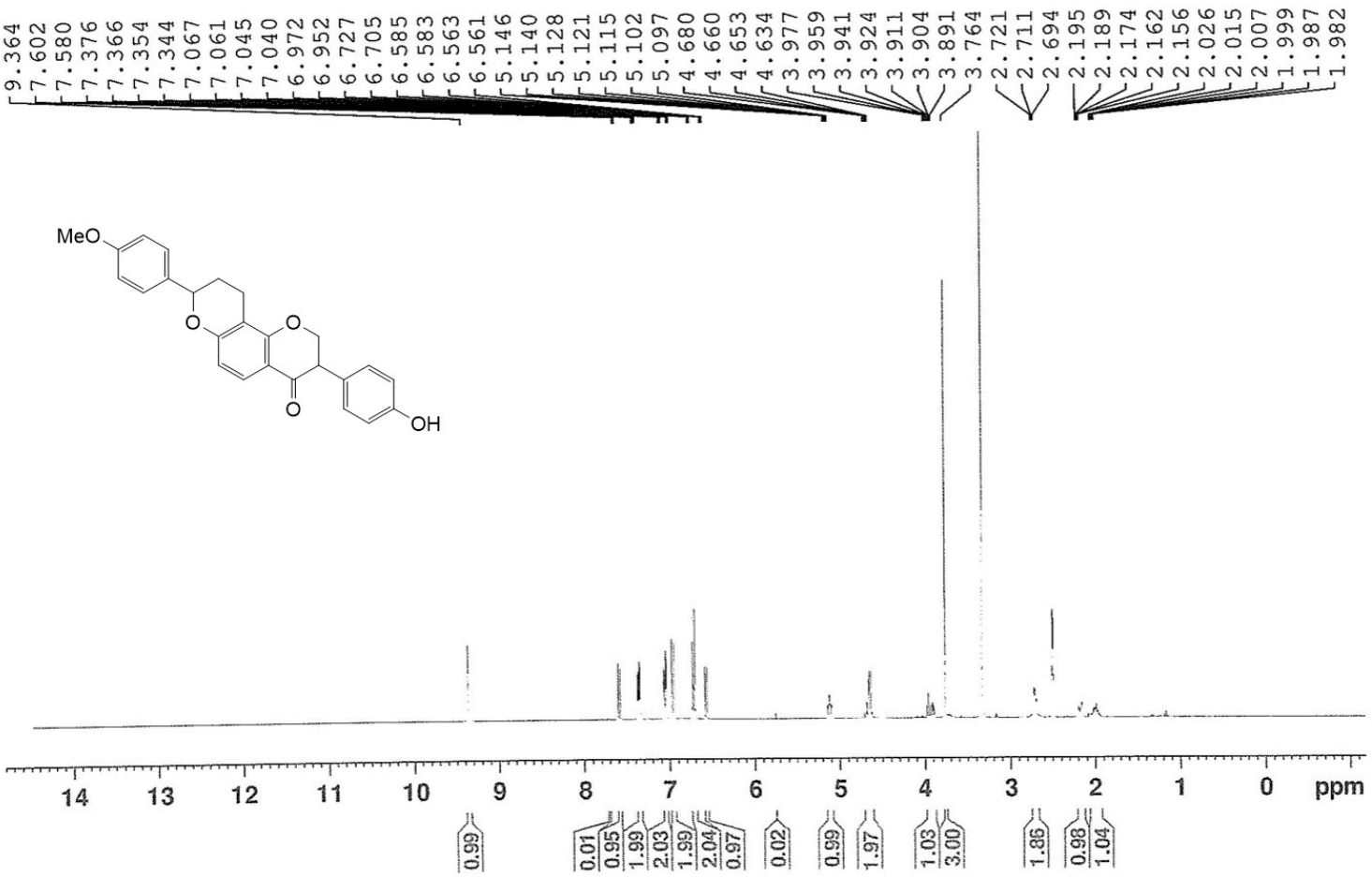

Figure S53. ^{1}H NMR (400 MHz, DMSO-d_6) spectrum of 3-(4-Hydroxyphenyl)-8-(4-methoxyphenyl)-2,3,9,10-tetrahydro-4*H*,8*H*-pyrano[2,3-f]chromen-4-one (**21d**)

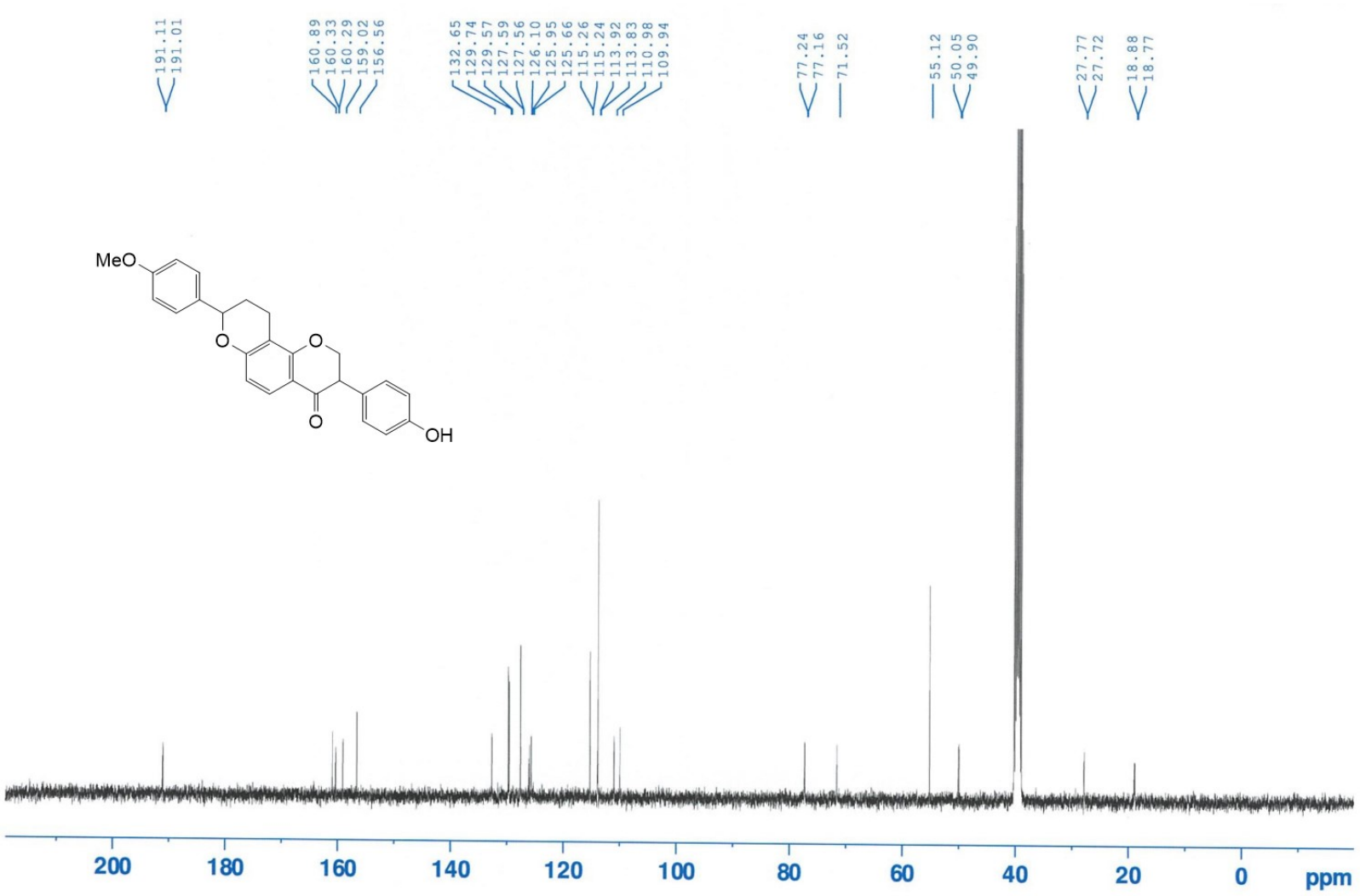

Figure S54. ^{13}C NMR (100 MHz, DMSO-d_6) spectrum of 3-(4-Hydroxyphenyl)-8-(4-methoxyphenyl)-2,3,9,10-tetrahydro-4*H*,8*H*-pyrano[2,3-f]chromen-4-one (**21d**)

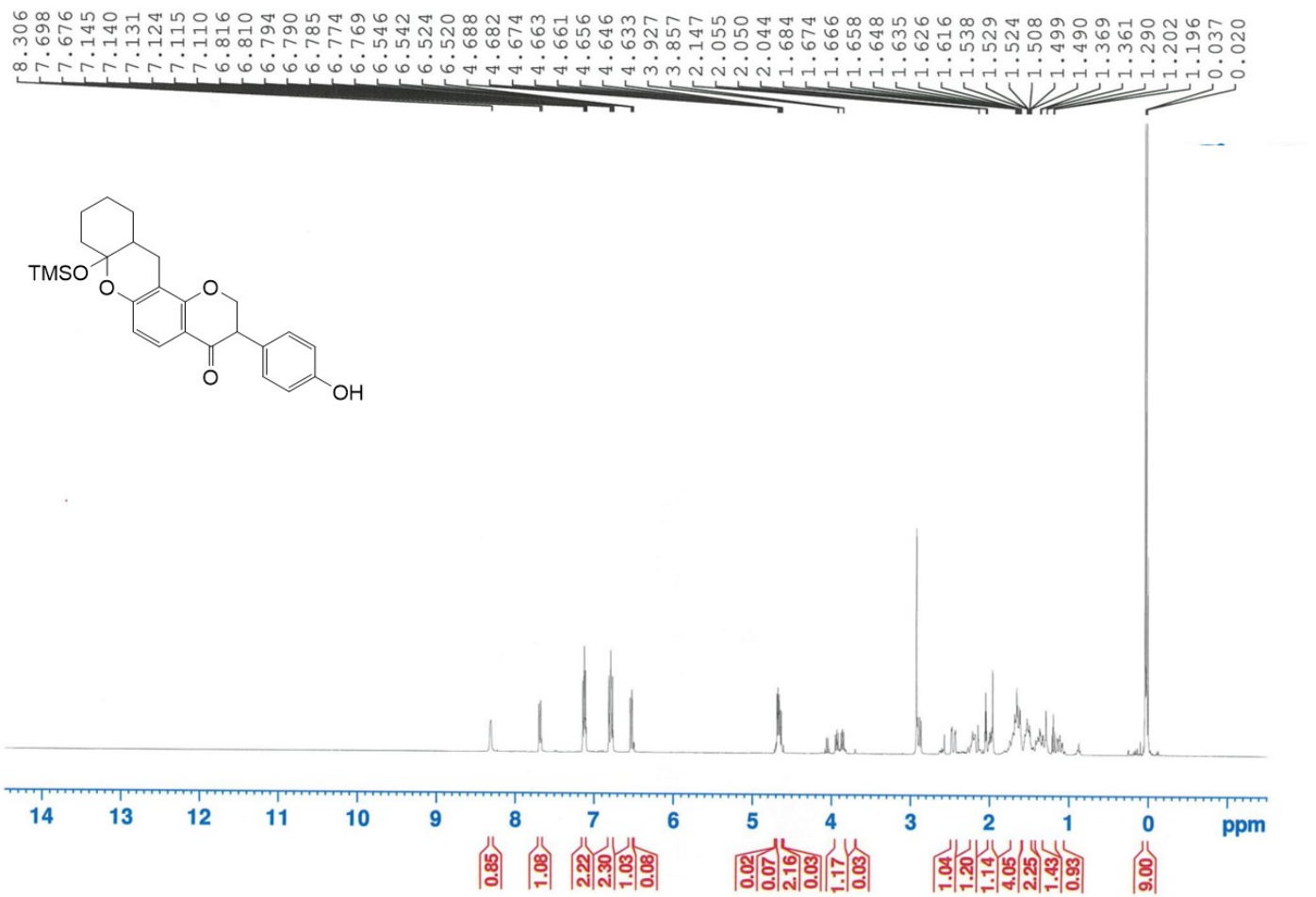

Figure S55. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 3-(4-Hydroxyphenyl)-7a-((trimethylsilyl)oxy)-2,3,7a,8,10,11,11a,12-octahydro-4*H*,9*H*-pyrano[2,3-a]xanthen-4-one (**21e**)

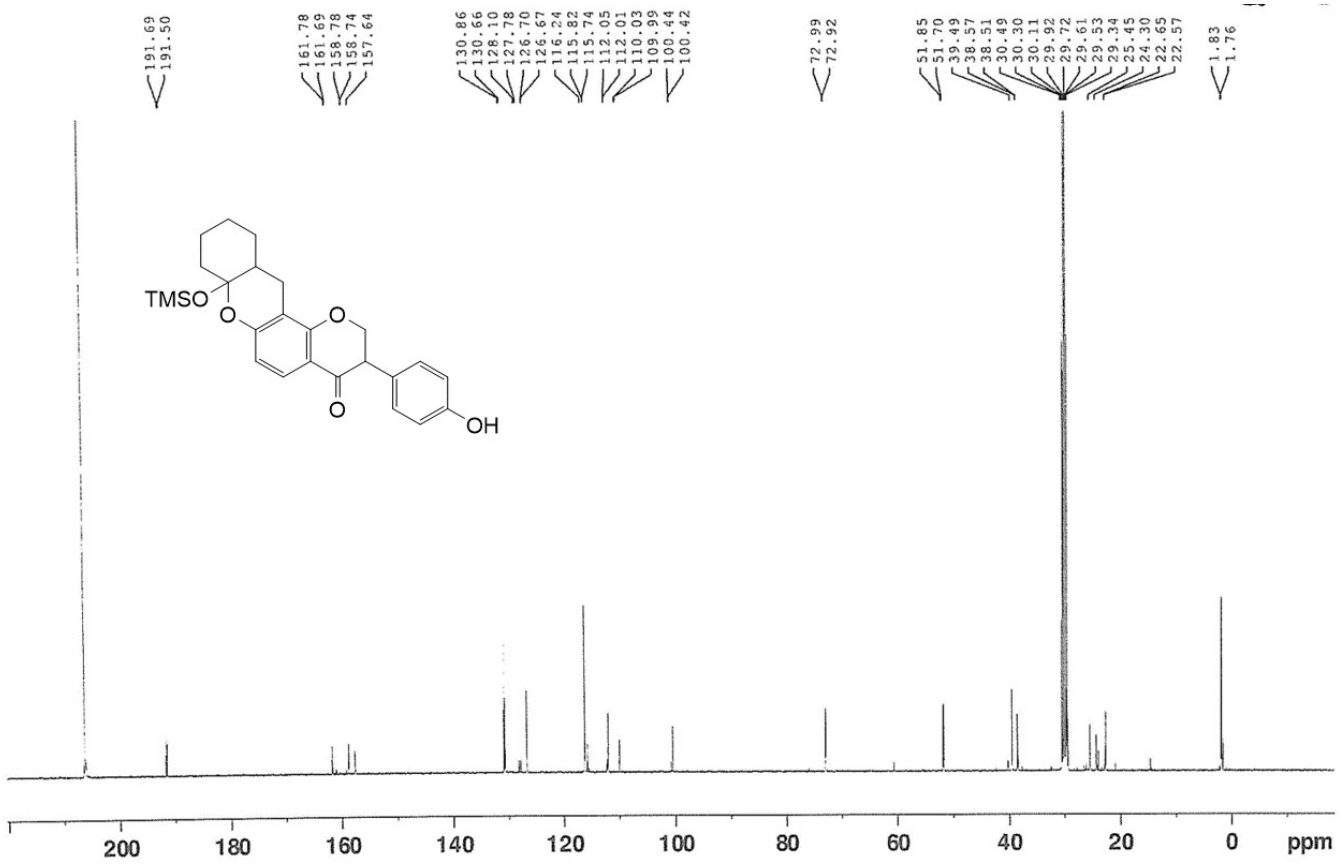

Figure S56. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 3-(4-Hydroxyphenyl)-7a-((trimethylsilyl)oxy)-2,3,7a,8,10,11,11a,12-octahydro-4*H*,9*H*-pyrano[2,3-a]xanthen-4-one (**21e**)

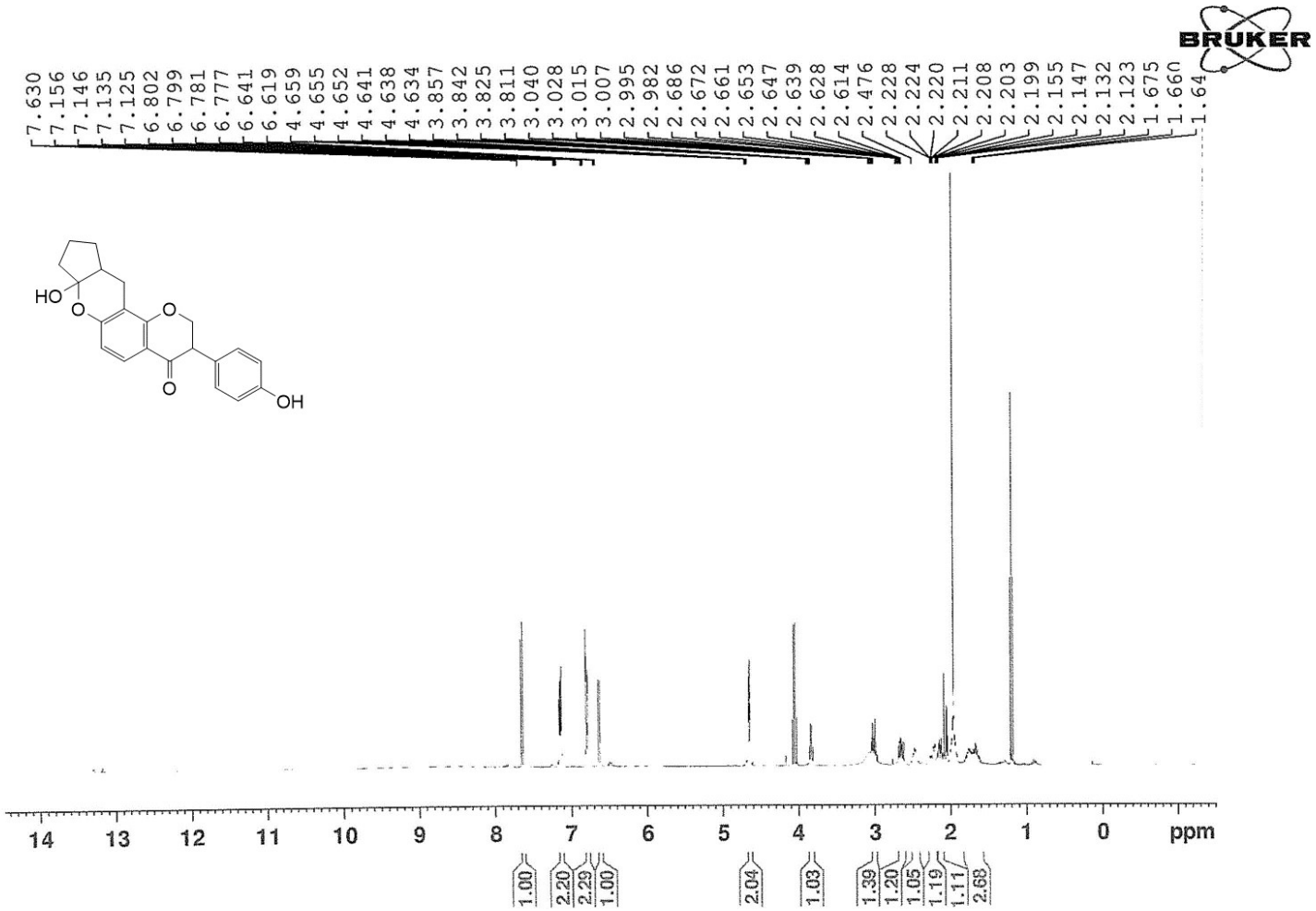

Figure S57. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 7a-hydroxy-3-(4-hydroxyphenyl)-2,3,7a,8,9,10,10a,11-octahydro-4*H*-cyclopenta[b]pyrano[2,3-f]chromen-4-one (**21f**)

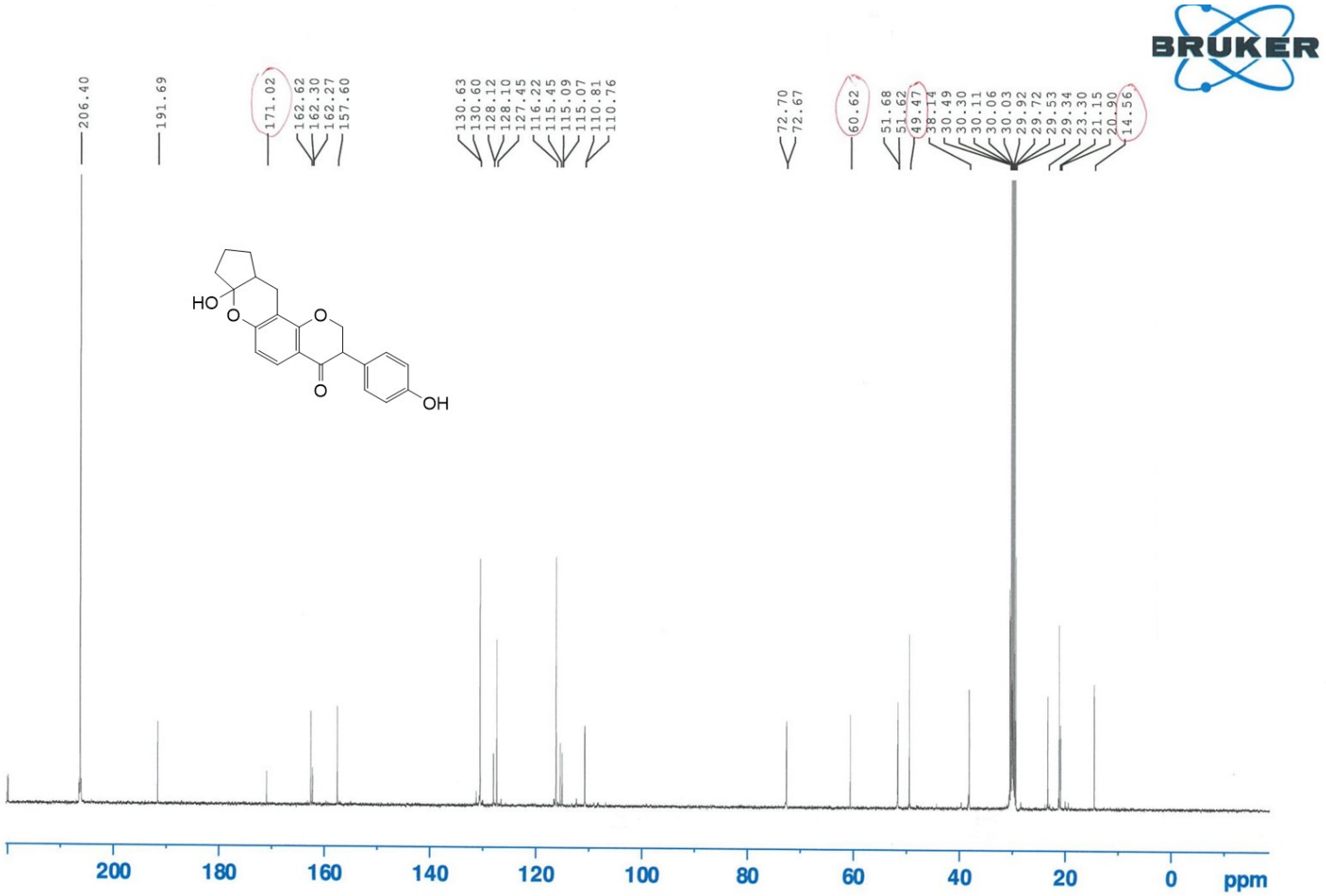

Figure S58. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 7a-hydroxy-3-(4-hydroxyphenyl)-2,3,7a,8,9,10,10a,11-octahydro-4*H*-cyclopenta[b]pyrano[2,3-f]chromen-4-one (**21f**)

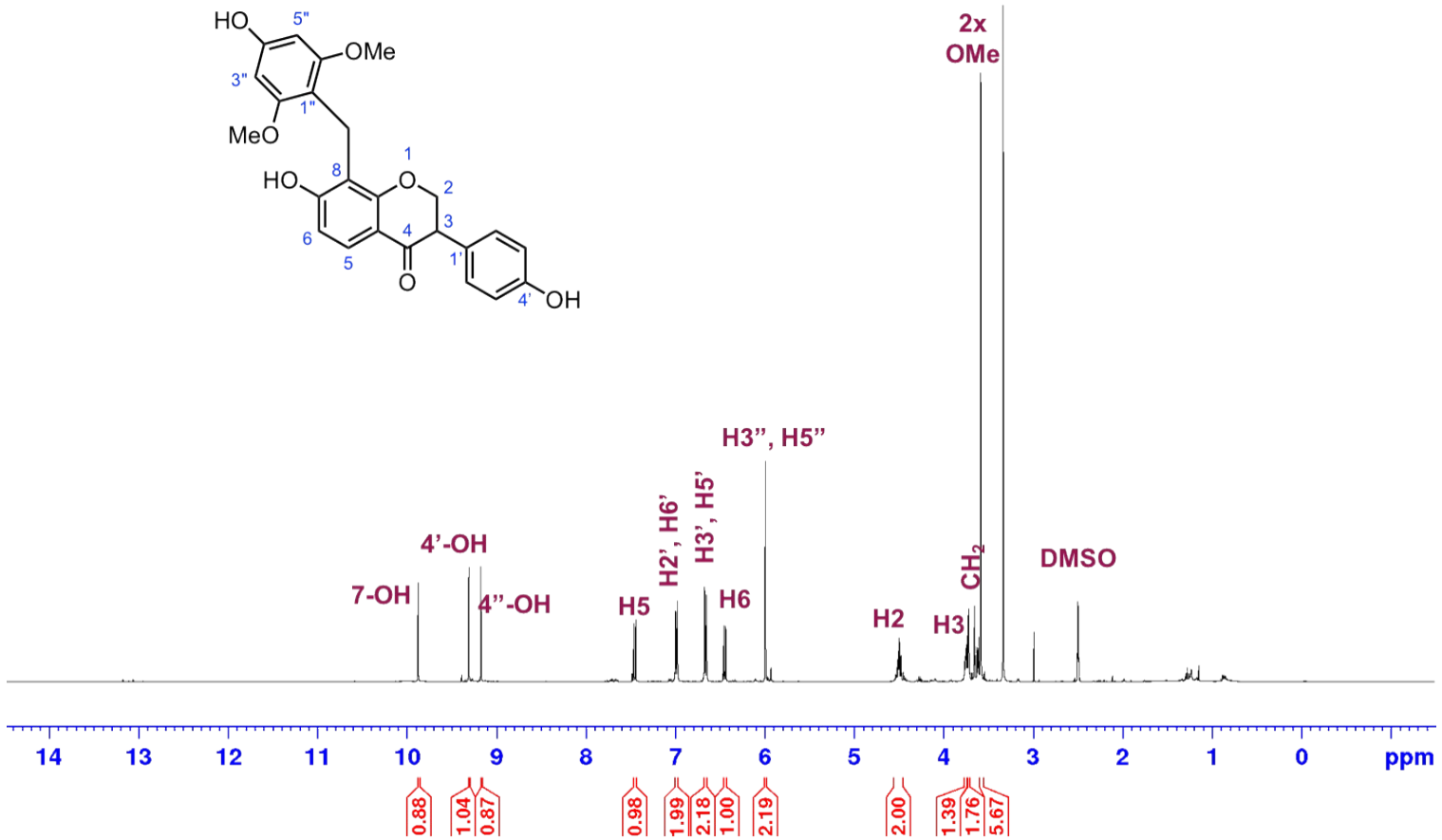

Figure S59. ^{1}H NMR (400 MHz, DMSO-d_6) spectrum of 7-Hydroxy-8-(4-hydroxy-2,6-dimethoxybenzyl)-3-(4-hydroxyphenyl)chroman-4-one (**22a**)

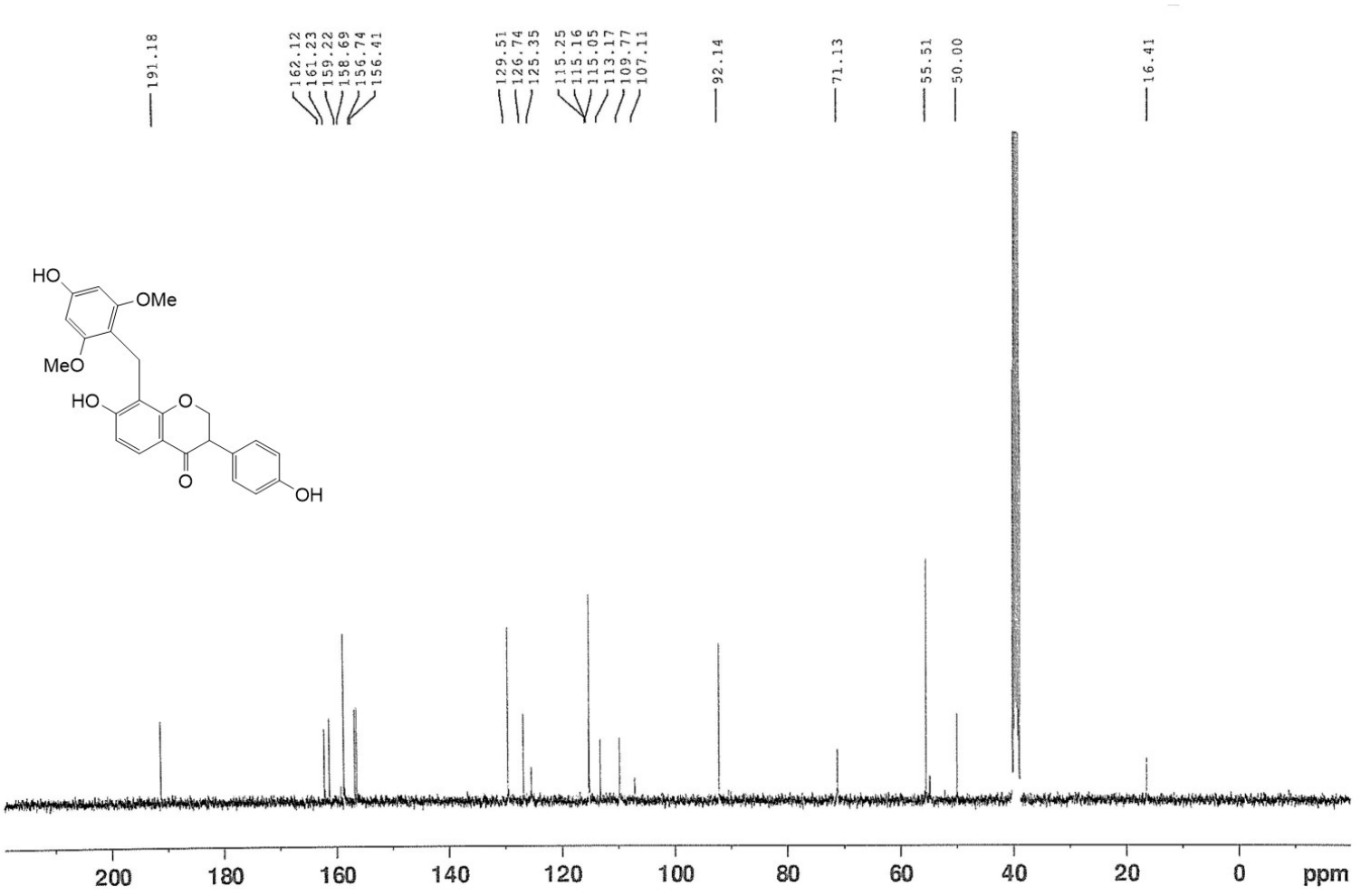

Figure S60. ^{13}C NMR (100 MHz, DMSO-d_6) spectrum of 7-Hydroxy-8-(4-hydroxy-2,6-dimethoxybenzyl)-3-(4-hydroxyphenyl)chroman-4-one (**22a**)

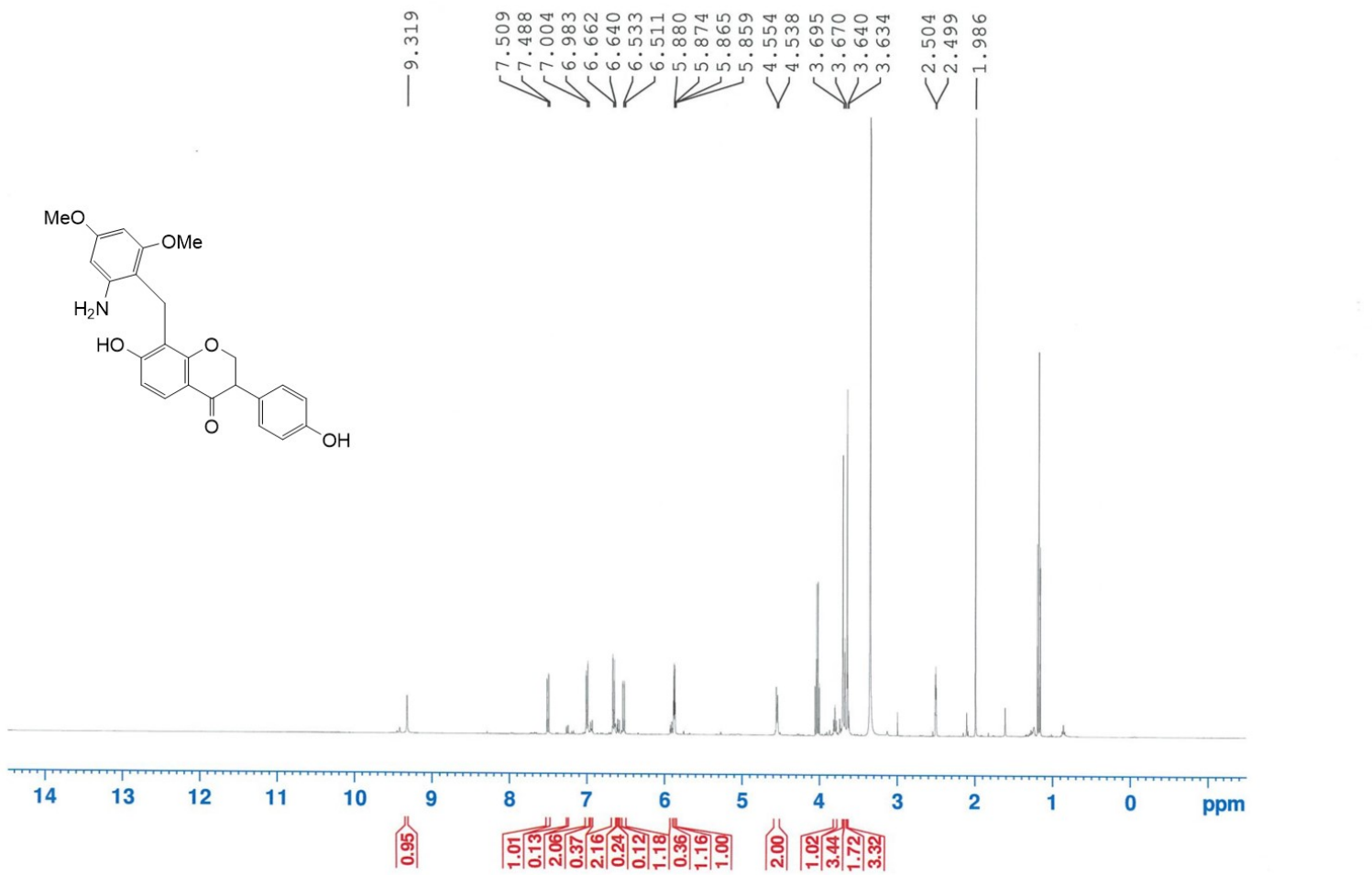

Figure S61. ^{1}H NMR (400 MHz, DMSO-d_6) spectrum of 8-(2-Amino-4,6-dimethoxybenzyl)-7-hydroxy-3-(4-hydroxyphenyl)chroman-4-one (**22b**)

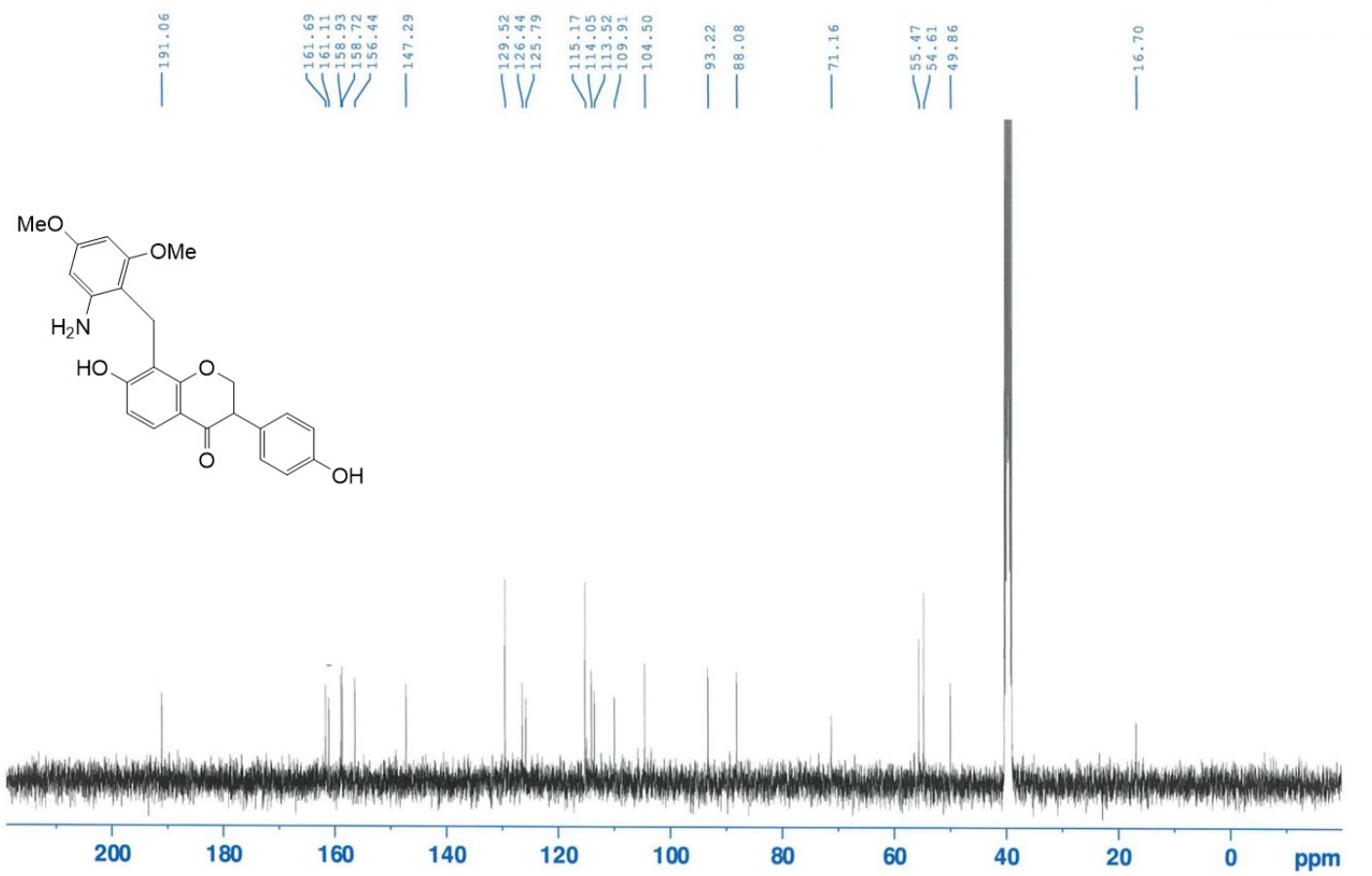

Figure S62. ^{13}C NMR (100 MHz, DMSO-d_6) spectrum of 8-(2-Amino-4,6-dimethoxybenzyl)-7-hydroxy-3-(4-hydroxyphenyl)chroman-4-one (**22b**)

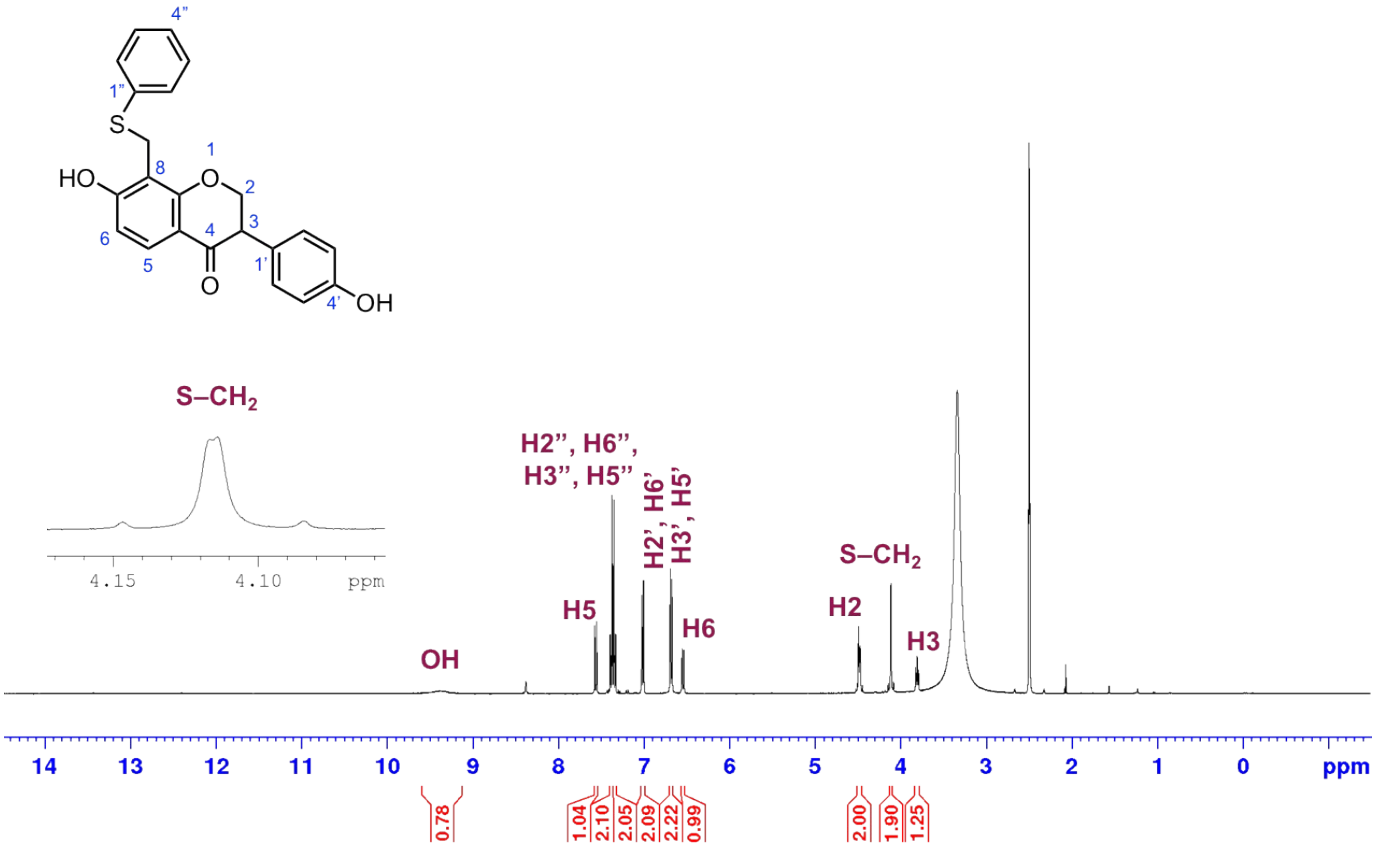

Figure S63. ^{1}H NMR (400 MHz, acetone-d_6) spectrum of 7-Hydroxy-3-(4-hydroxyphenyl)-8-((phenylthio)methyl)chroman-4-one (**22c**)

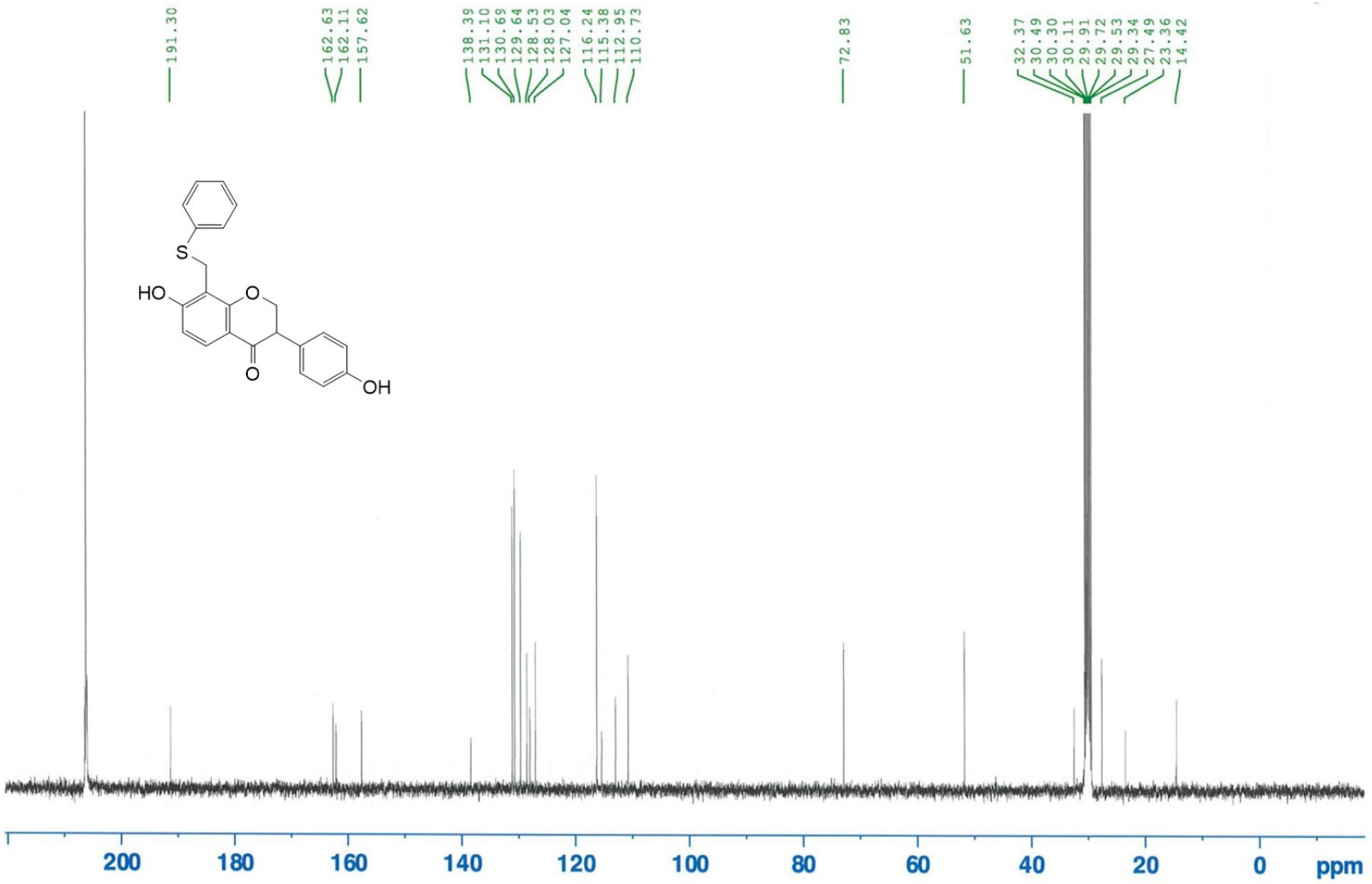

Figure S64. ^{13}C NMR (100 MHz, acetone-d_6) spectrum of 7-Hydroxy-3-(4-hydroxyphenyl)-8-((phenylthio)methyl)chroman-4-one (**22c**)

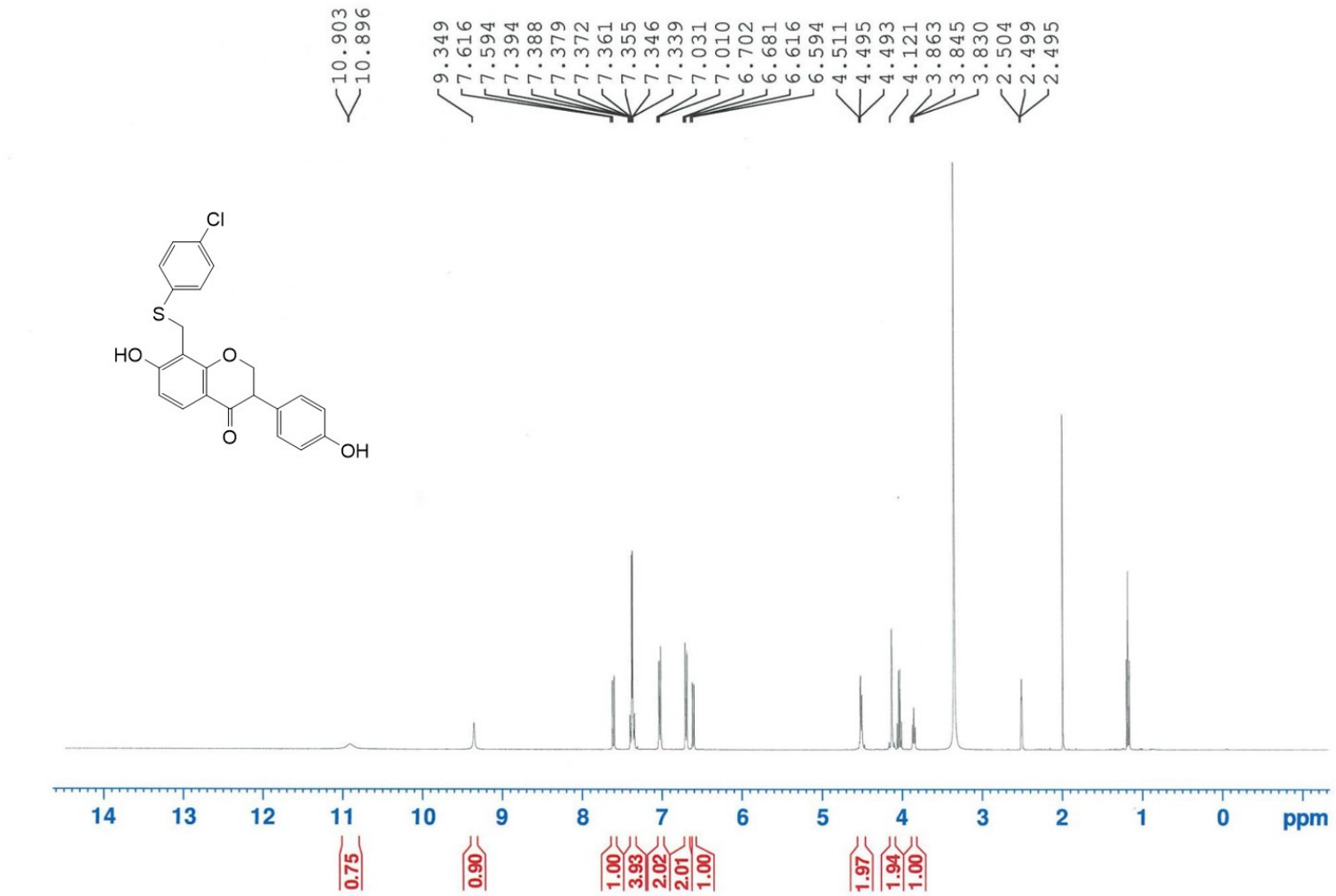

Figure S65. ^{1}H NMR (400 MHz, DMSO-d_6) spectrum of 8-(((4-Chlorophenyl)thio)methyl)-7-hydroxy-3-(4-hydroxyphenyl)chroman-4-one (**22d**)

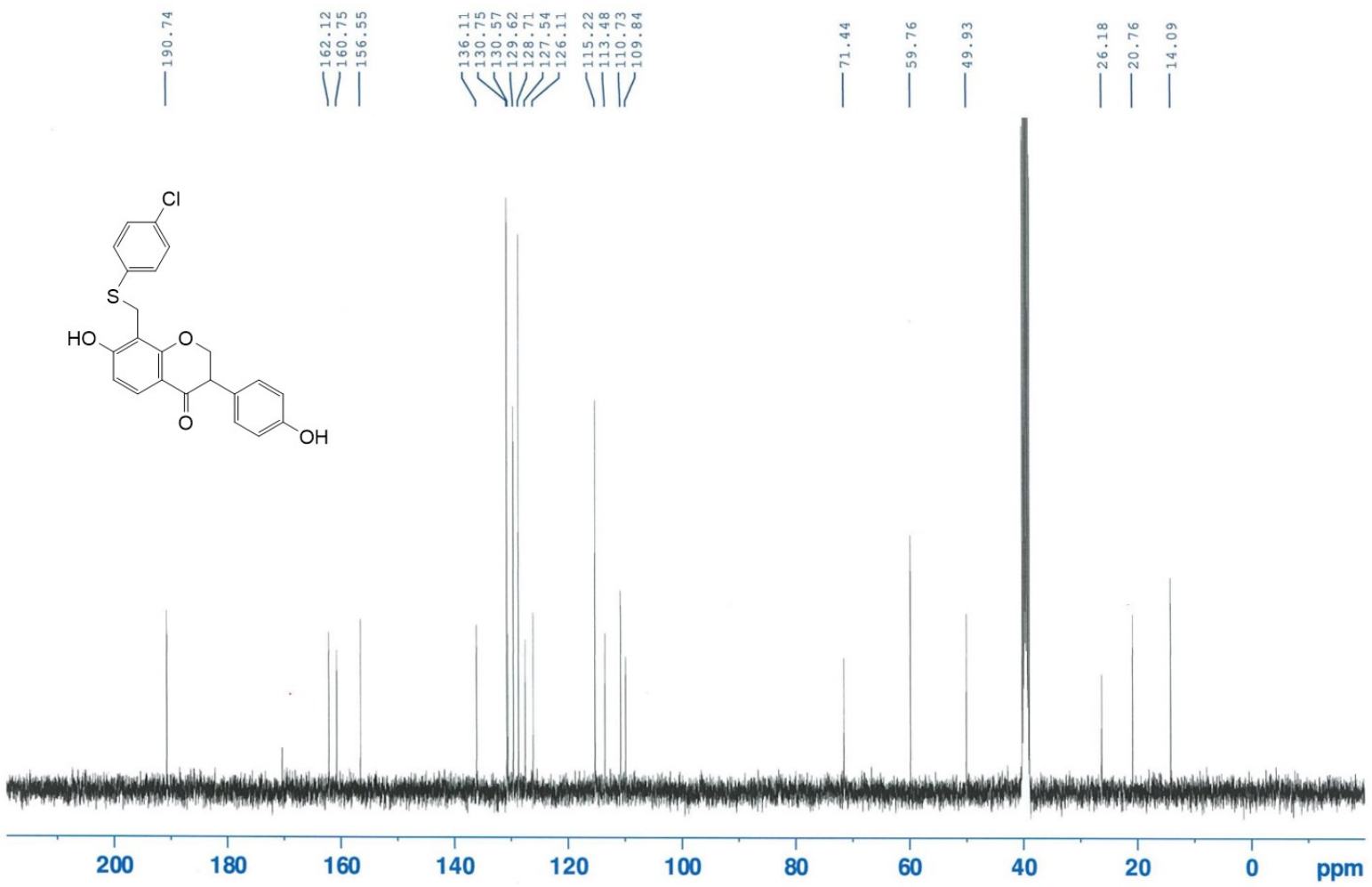

Figure S66. ^{13}C NMR (100 MHz, DMSO-d_6) spectrum of 8-(((4-Chlorophenyl)thio)methyl)-7-hydroxy-3-(4-hydroxyphenyl)chroman-4-one (**22d**)