

DESCRIPTION

Invention Title

METHOD FOR SYNTHESIZING 2-((6-(HYDROXYMETHYL)CHROMENE-5-YL)OXY)-1-PHENYLETHANONE DERIVATIVE

5

Technical Field

[0001] This application claims the benefit of the filing date of Korean Patent Application No. 10-2019-0092711, filed with the Korean Intellectual Property Office on July 10 30, 2019, the entire content of which is incorporated herein.

[0002] The present invention relates to a method for synthesizing 2-((6-(hydroxymethyl)chromen-5-yl)oxy)-1-phenylethanone derivatives.

15 [0003]

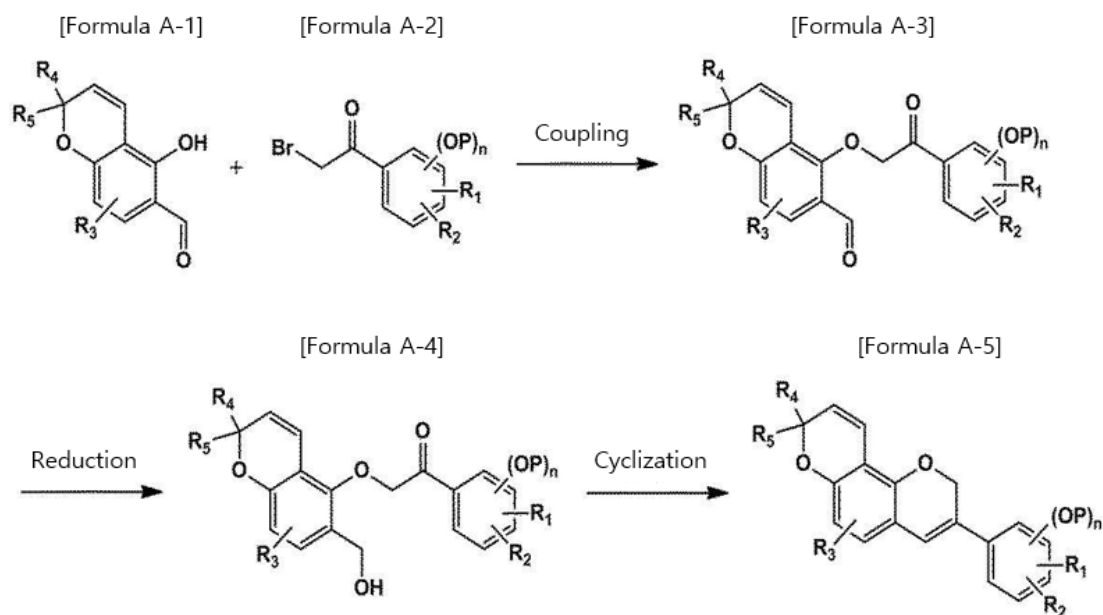
Background Art

[0004] Patent Document 1 [Korean Patent Application Publication No. 10-2015-0075030] discloses that pyranochromenylphenol derivatives are effective in 20 preventing and treating various metabolic syndromes including hyperlipidemia, fatty liver, abnormal sugar metabolism, diabetes, and obesity. Patent Document 2 [Korean Patent Application Publication No. 10-2018-0037584] discloses a method for producing 3-phenyl-2,3,4,8,9,10-

hexahydropyrano[2,3-f]chromene derivatives as key intermediates for synthesizing these pyranochromenylphenol derivatives. Specifically, as shown in Reaction Scheme A below, Patent Document 2 discloses a method of synthesizing various derivatives disclosed in Patent Document 1 by coupling a compound of Formula A-1 with a compound of Formula A-2 to obtain a compound of Formula A-3, reducing the compound of Formula A-3 to obtain a compound of Formula A-4, and cyclizing the compound of Formula A-4 to obtain a compound of Formula A-5, which is then hydrogenated. Here, in the step of producing the compound of Formula A-4 from the compound of Formula A-3, not only the reaction needs to be performed by slowly adding L-selectride® at a cryogenic temperature of -78°C, but also expensive L-selectride® needs to be used. Thus, commercial mass production of the 2-((6-(hydroxymethyl)-2H-chromen-5-yl)oxy)-1-phenylethanone derivative represented by Formula A-4 may be very laborious and difficult.

[0005] [Reaction Scheme A]

20 **[0006]**



[0007] Accordingly, there is a need for a synthesis method capable of mass-producing the 2-((6-(hydroxymethyl)-2H-chromen-5-yl)oxy)-1-phenylethanone derivative represented

5 by Formula A-4 under mild conditions.

[0008]

[0009] [Prior Art Documents]

[0010] [Patent Documents]

[0011] Korean Patent Application Publication No. 10-2015-

10 0075030

[0012] Korean Patent Application Publication No. 10-2018-

0037584

[0013]

DISCLOSURE

15 Technical Problem

[0014] The technical problem to be achieved by the present

invention is to provide a synthesis method capable of mass-producing 2-((6-(hydroxymethyl)chromen-5-yl)oxy)-1-phenylethanone derivatives under mild conditions.

[0015] However, the problems to be solved by the present invention are not limited to the above-mentioned problem, and other problems not mentioned herein will be clearly understood by those skilled in the art from the following description.

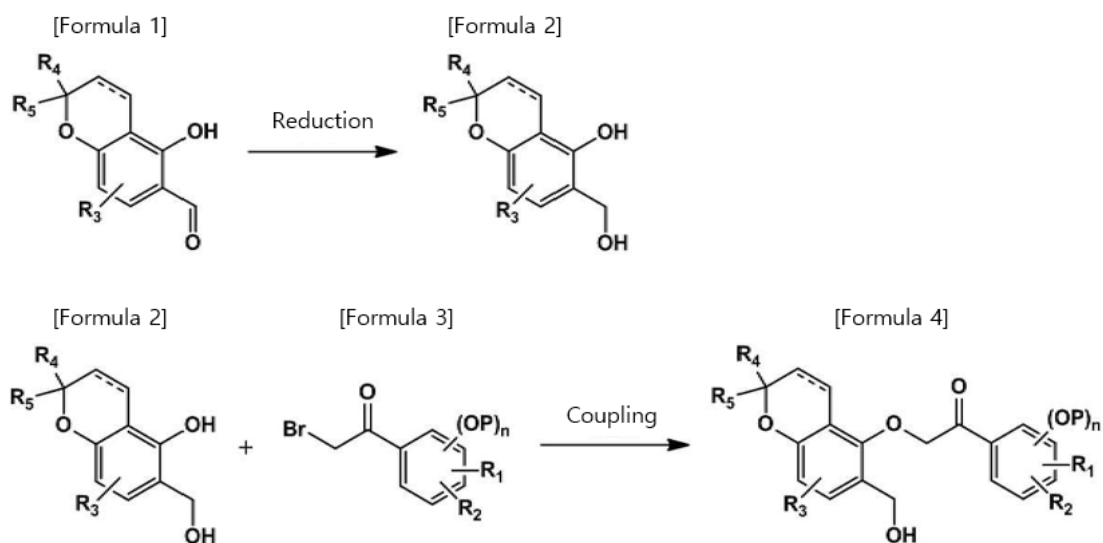
[0016]

10 **Technical Solution**

[0017] One embodiment of the present invention provides a method for synthesizing a 2-((6-(hydroxymethyl)chromen-5-yl)oxy)-1-phenylethanone derivative represented by Formula 4, the method comprising steps of: (a) reducing a compound of Formula 1 to produce a compound of Formula 2; and (b) coupling the compound of Formula 2 with a compound of Formula 3:

[0018] [Reaction Scheme 1]

[0019]



[0020] wherein

[0021] the dotted line is an optional double bond;

[0022] R_1 and R_2 are each independently any one of a hydrogen atom, a substituted or unsubstituted linear or branched $\text{C}_1\text{-C}_6$ alkyl group, a halogen atom, a substituted or unsubstituted linear or branched $\text{C}_1\text{-C}_6$ alkoxy group, a substituted or unsubstituted linear or branched $\text{C}_1\text{-C}_4$ thioalkyl group, a substituted or unsubstituted allyloxy group, a substituted or unsubstituted aryloxy group, and a phenyl group;

[0023] R_3 is any one of a hydrogen atom, a $\text{C}_1\text{-C}_3$ alkyl group, a $\text{C}_1\text{-C}_3$ alkoxy group, and a halogen atom;

[0024] R_4 and R_5 are each independently any one of a hydrogen atom and a $\text{C}_1\text{-C}_2$ alkyl group;

[0025] P is any one of a substituted or unsubstituted linear or branched $\text{C}_1\text{-C}_4$ alkyl group, a substituted or

unsubstituted benzyl group, an allyl group, a t-butyldimethylsilyl group, t-butyldiphenylsilyl group, a dimethylphenylsilyl group, a trimethylsilyl group, MeSO₂, a p-toluenesulfonyl group, and a 2,4,6-trimethylbenzenesulfonyl group;

[0026] n is an integer from 1 to 3;

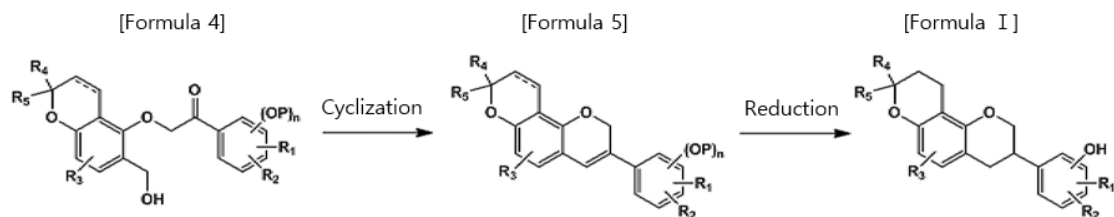
[0027] when OP is plural in number, they are the same or different; and

[0028] the substituent for the substituted alkyl group, substituted alkoxy group, substituted thioalkyl group, substituted allyloxy group, substituted aryloxy group or substituted benzyl group is any one of a benzyloxy group, a halogen atom, a linear or branched C₁-C₅ alkyl group, a linear or branched C₁-C₅ alkoxy group, a linear or branched C₁-C₃ thioalkyl group, a nitro group, and a naphthalene group.

[0029] Another embodiment of the present invention provides a method for synthesizing a 3-phenyl-2,3,4,8,9,10-hexahydropyrano[2,3-f]chromene derivative of Formula I, the method comprising steps of: (i) cyclizing the compound of Formula 4, produced according to one embodiment of the present invention, to produce a compound of Formula 5; and (ii) reducing the compound of Formula 5:

[0030] [Reaction Scheme 2]

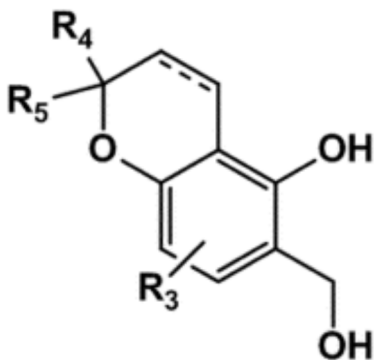
[0031]



[0032] wherein the dotted line is an optional double bond,
and R_1 to R_5 , P and n are the same as defined in Formulas 1
5 to 4 above.

[0033] Still another embodiment of the present invention
provides a 6-(hydroxymethyl)chromen-5-ol derivative
represented by the following Formula 2 or a solvate thereof:

[0034] [Formula 2]



10

[0035] wherein

[0036] R_3 is any one of a hydrogen atom, a C_1 - C_3 alkyl group,
a C_1 - C_3 alkoxy group, and a halogen atom; and

[0037] R_4 and R_5 are each independently any one of a hydrogen
15 atom and a C_1 - C_2 alkyl group.

[0038]

Advantageous Effects

[0039] The production method according to one embodiment of the present invention may commercially produce 2-((6-(hydroxymethyl)chromen-5-yl)oxy)-1-phenylethanone derivatives in a simple and easy manner.

[0040] In addition, the production method according to one embodiment of the present invention may economically produce 2-((6-(hydroxymethyl)chromen-5-yl)oxy)-1-phenylethanone derivatives.

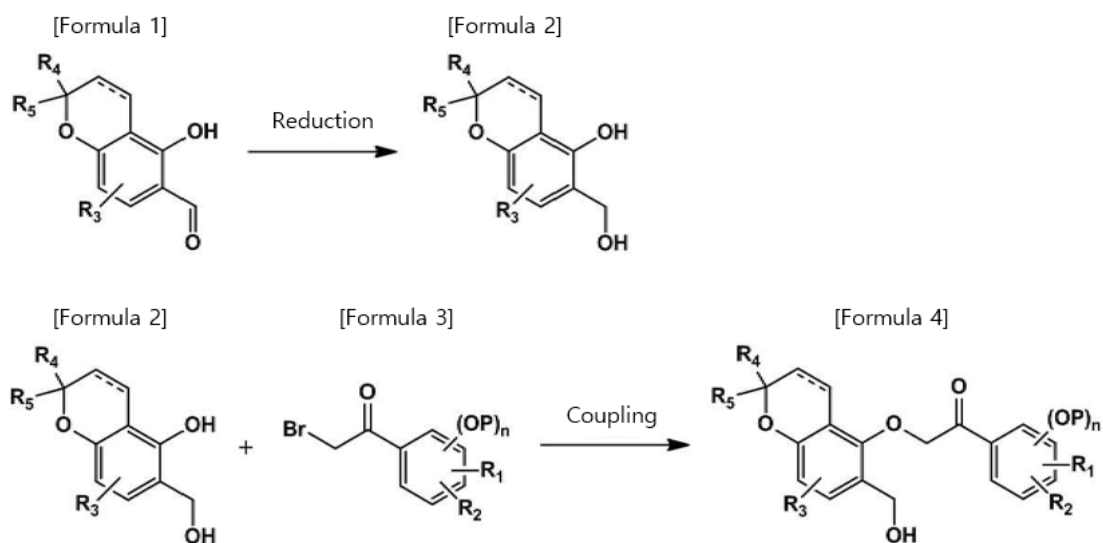
10 [0041]

Best Mode

[0042] One embodiment of the present invention provides a method for synthesizing a 2-((6-(hydroxymethyl)chromen-5-yl)oxy)-1-phenylethanone derivative represented by Formula 4, the method comprising steps of: (a) reducing a compound of Formula 1 to produce a compound of Formula 2; and (b) coupling the compound of Formula 2 with a compound of Formula 3:

[0043] [Reaction Scheme 1]

20 [0044]



[0045] wherein

[0046] the dotted line is an optional double bond;

[0047] R₁ and R₂ are each independently any one of a hydrogen atom, a substituted or unsubstituted linear or branched C₁-C₆ alkyl group, a halogen atom, a substituted or unsubstituted linear or branched C₁-C₆ alkoxy group, a substituted or unsubstituted linear or branched C₁-C₄ thioalkyl group, a substituted or unsubstituted allyloxy group, a substituted or unsubstituted aryloxy group, and a phenyl group;

[0048] R₃ is any one of a hydrogen atom, a C₁-C₃ alkyl group, a C₁-C₃ alkoxy group, and a halogen atom;

[0049] R₄ and R₅ are each independently any one of a hydrogen atom and a C₁-C₂ alkyl group;

[0050] P is any one of a substituted or unsubstituted linear or branched C₁-C₄ alkyl group, a substituted or

unsubstituted benzyl group, an allyl group, a t-butyl-
dimethylsilyl group, t-butyl-diphenylsilyl group, a
dimethylphenylsilyl group, a trimethylsilyl group, MeSO₂, a
p-toluenesulfonyl group, and a 2,4,6-
5 trimethylbenzenesulfonyl group;

[0051] n is an integer ranging from 1 to 3;

[0052] when OP is plural in number, they are the same or
different; and

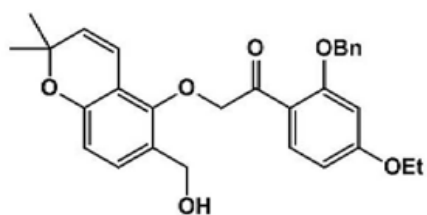
[0053] the substituent for the substituted alkyl group,
10 substituted alkoxy group, substituted thioalkyl group,
substituted allyloxy group, substituted aryloxy group or
substituted benzyl group is any one of a benzyloxy group, a
halogen atom, a linear or branched C₁-C₅ alkyl group, a
linear or branched C₁-C₅ alkoxy group, a linear or branched
15 C₁-C₃ thioalkyl group, a nitro group, and a naphthalene
group.

[0054] When the compound of Formula A-4 (the compound of
Formula 4 of the present invention) is synthesized as shown
in Reaction Scheme A of Patent Document 2 [Korean Patent
20 Application Publication No. 10-2018-0037584], not only the
reaction should be carried out at a cryogenic temperature,
but also expensive L-selectride® should be used, and hence
commercial mass production of the compound of Formula A-4
may be difficult. However, when the compound of Formula 4

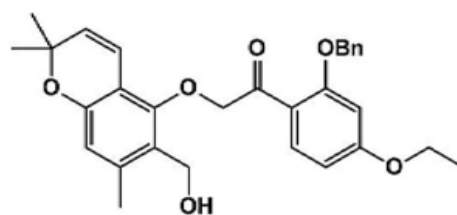
is synthesized according to one embodiment of the present invention, the synthesis is achieved by reducing the compound of Formula 1 to produce the compound of Formula 2, and then coupling the compound of Formula 2 with the
5 compound of Formula 3, and thus there is no need to carry out the reduction reaction at a cryogenic temperature and there is no need to use an expensive reducing agent. Accordingly, it is possible to commercially produce the 2-((6-(hydroxymethyl)chromen-5-yl)oxy)-1-phenylethanone
10 derivative in a simple and easy manner.

[0055] Examples of the 2-((6-(hydroxymethyl)chromen-5-yl)oxy)-1-phenylethanone derivative represented by Formula 4 include the following compounds.

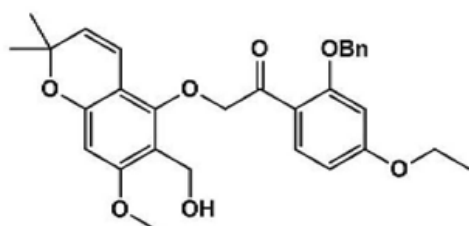
[Compound 4-1]



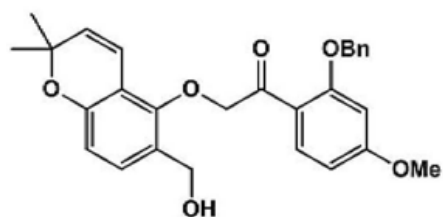
[Compound 4-2]



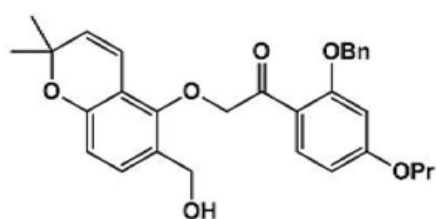
[Compound 4-3]



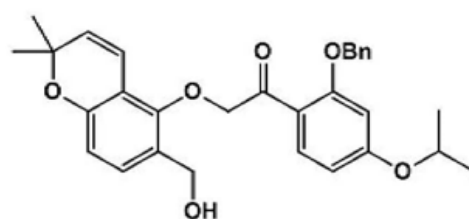
[Compound 4-4]



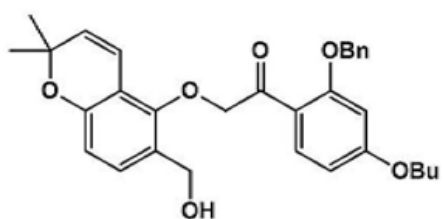
[Compound 4-5]



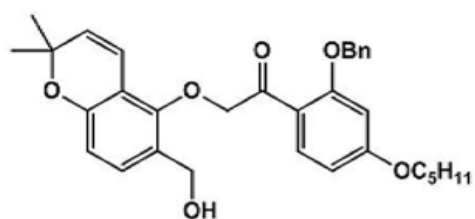
[Compound 4-6]



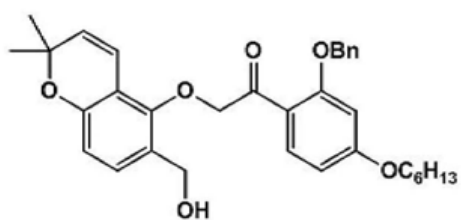
[Compound 4-7]



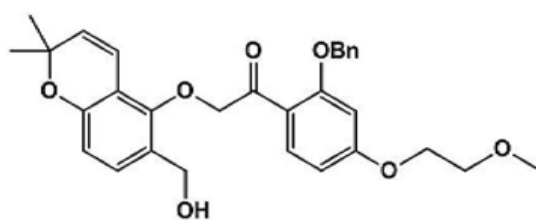
[Compound 4-8]



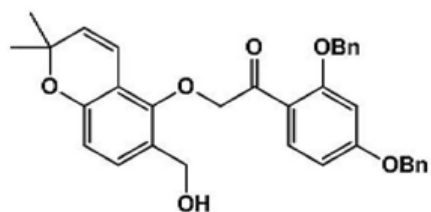
[Compound 4-9]



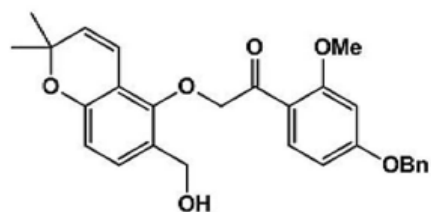
[Compound 4-10]



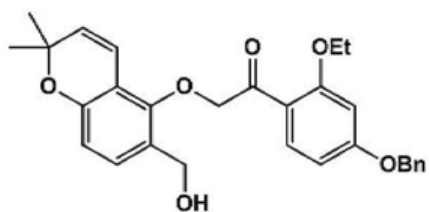
[Compound 4-11]



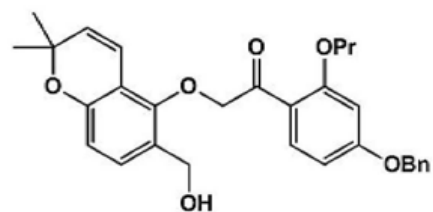
[Compound 4-12]



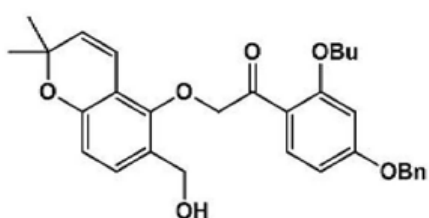
[Compound 4-13]



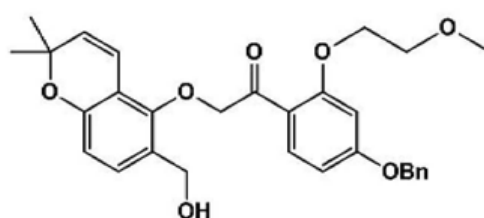
[Compound 4-14]



[Compound 4-15]

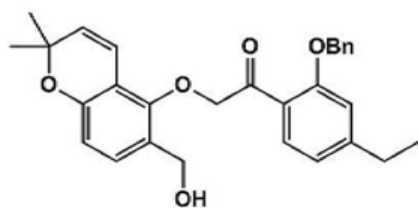


[Compound 4-16]

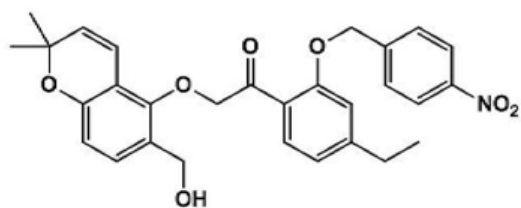


[0056]

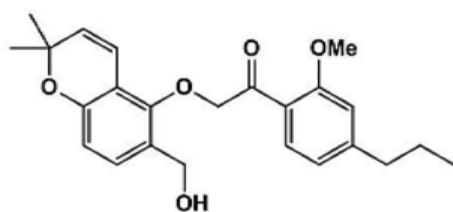
[Compound 4-17]



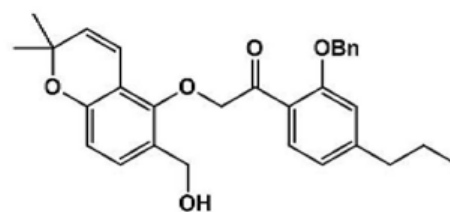
[Compound 4-18]



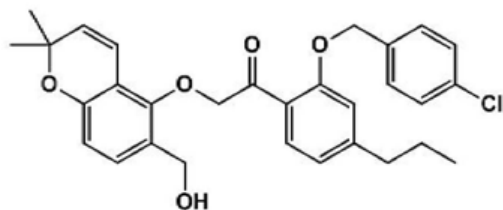
[Compound 4-19]



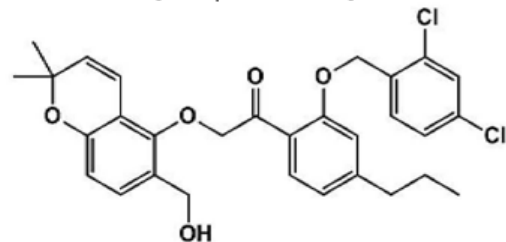
[Compound 4-20]



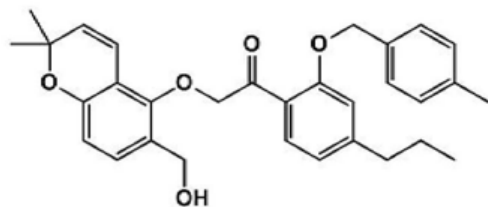
[Compound 4-21]



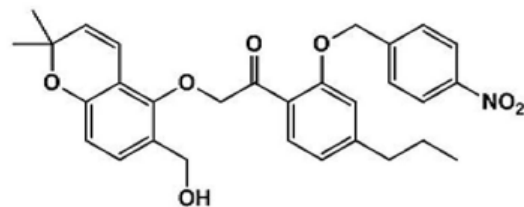
[Compound 4-22]



[Compound 4-23]

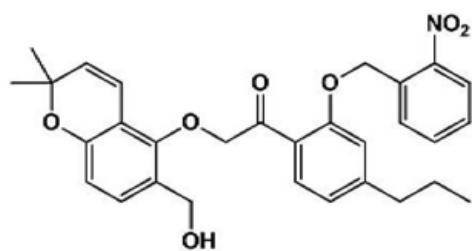


[Compound 4-24]

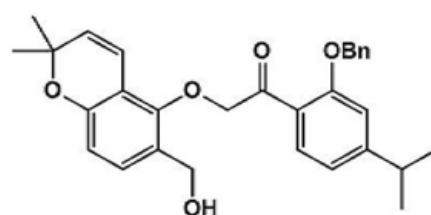


[0057]

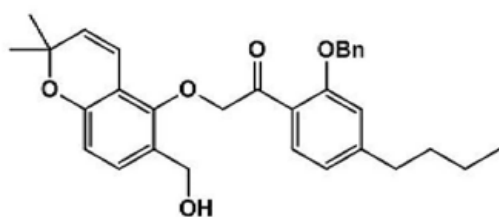
[Compound 4-25]



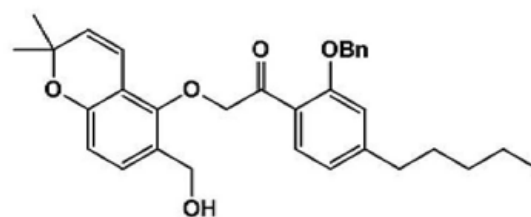
[Compound 4-26]



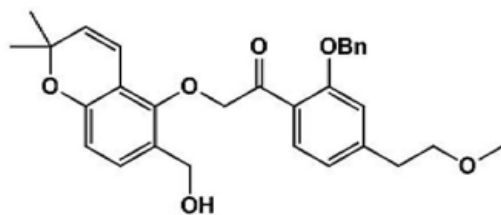
[Compound 4-27]



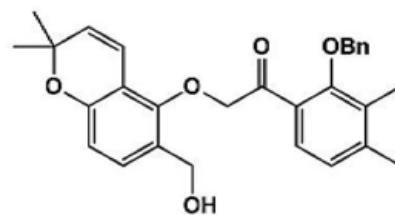
[Compound 4-28]



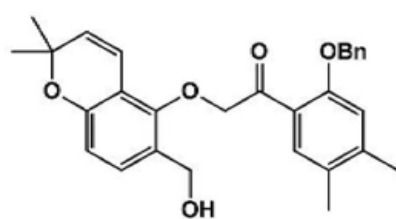
[Compound 4-29]



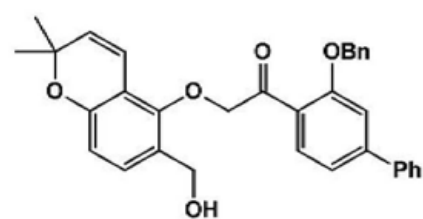
[Compound 4-30]



[Compound 4-31]

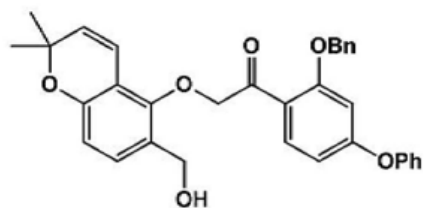


[Compound 4-32]

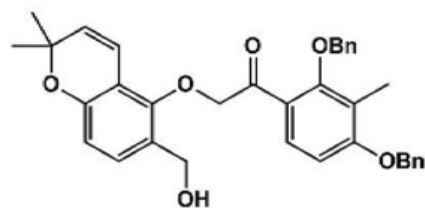


[0058]

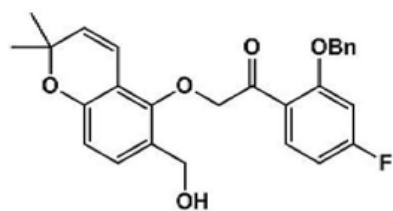
[Compound 4-33]



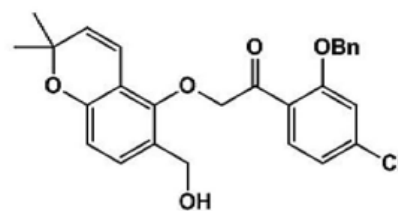
[Compound 4-34]



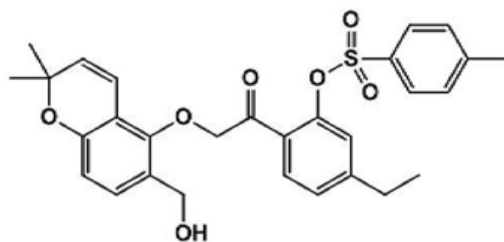
[Compound 4-35]



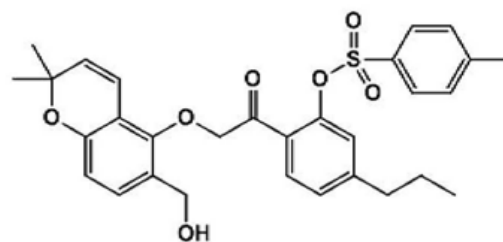
[Compound 4-36]



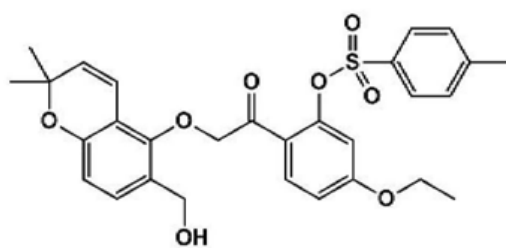
[Compound 4-37]



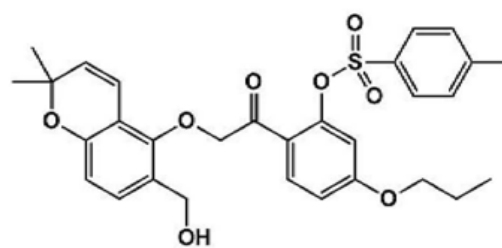
[Compound 4-38]



[Compound 4-39]

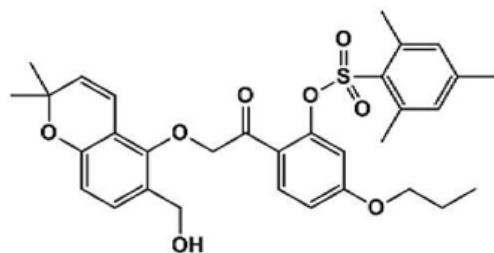


[Compound 4-40]

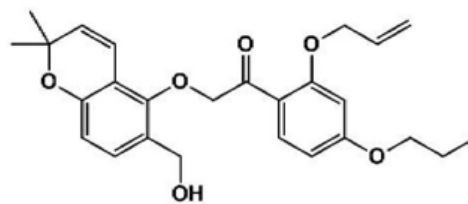


[0059]

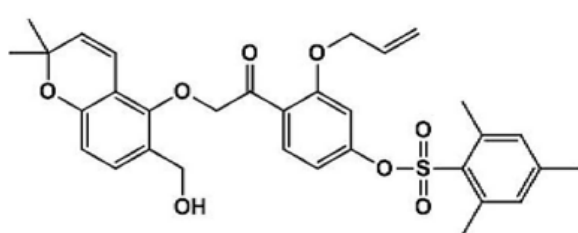
[Compound 4-41]



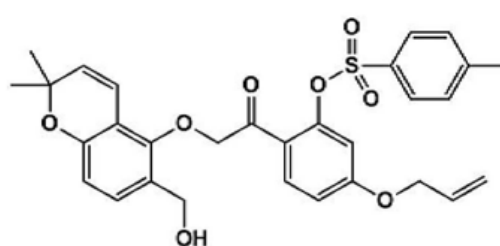
[Compound 4-42]



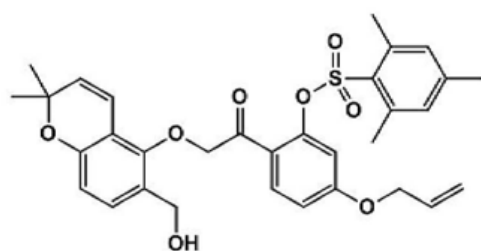
[Compound 4-43]



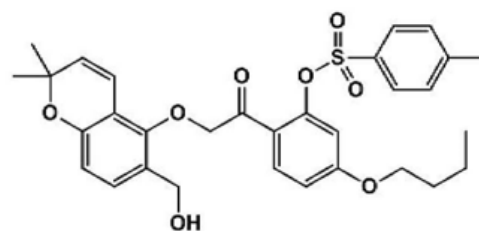
[Compound 4-44]



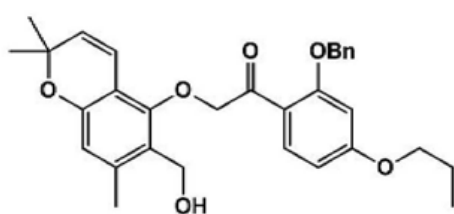
[Compound 4-45]



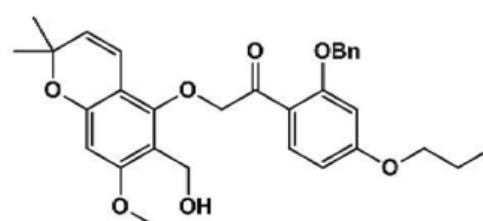
[Compound 4-46]



[Compound 4-47]

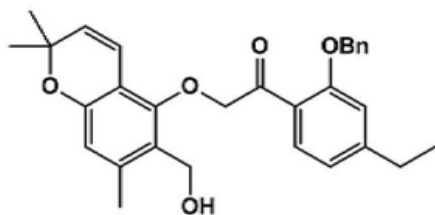


[Compound 4-48]

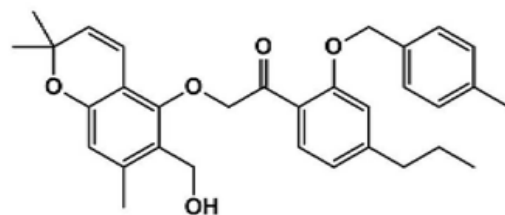


[0060]

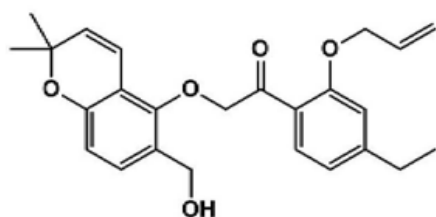
[Compound 4-49]



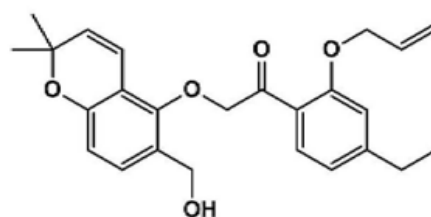
[Compound 4-50]



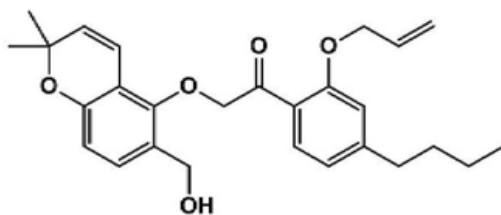
[Compound 4-51]



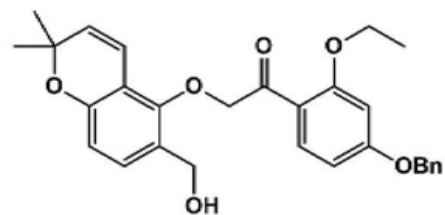
[Compound 4-52]



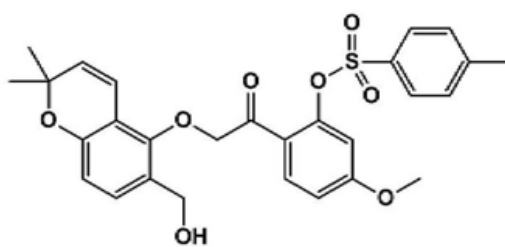
[Compound 4-53]



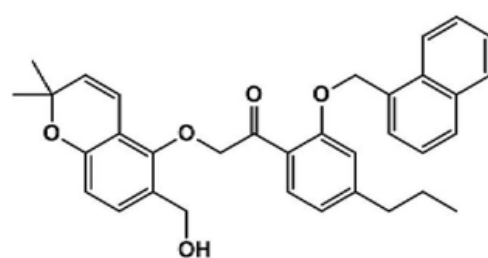
[Compound 4-54]



[Compound 4-55]

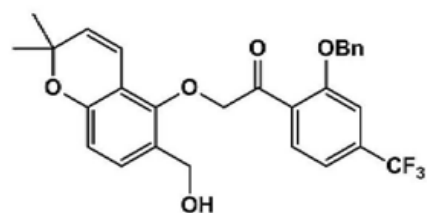


[Compound 4-56]

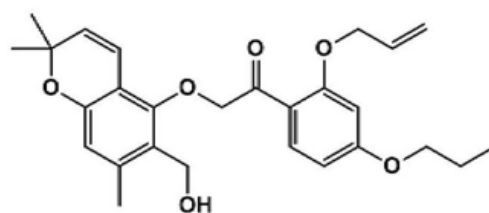


[0061]

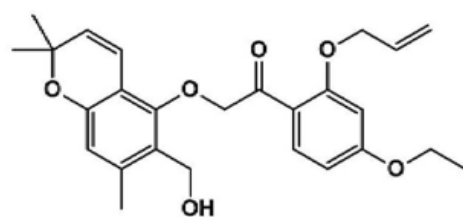
[Compound 4-57]



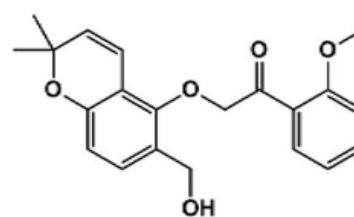
[Compound 4-58]



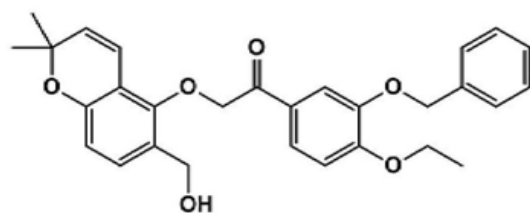
[Compound 4-59]



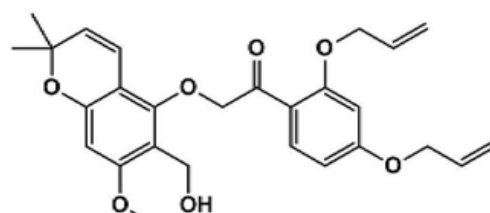
[Compound 4-60]



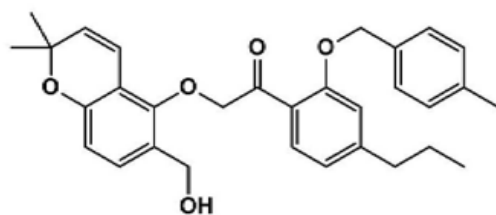
[Compound 4-61]



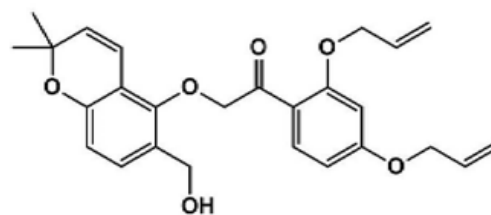
[Compound 4-62]



[Compound 4-63]

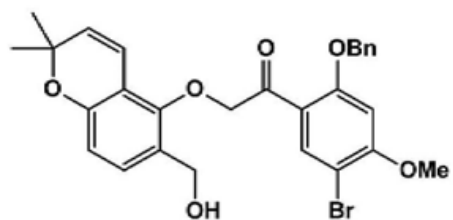


[Compound 4-64]

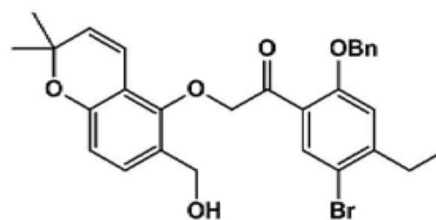


[0062]

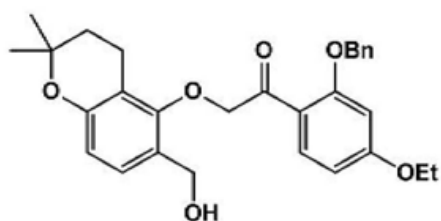
[Compound 4-65]



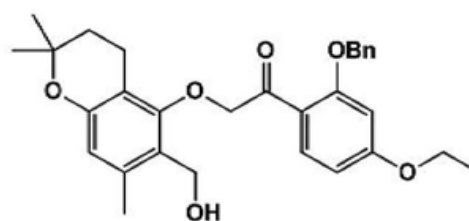
[Compound 4-66]



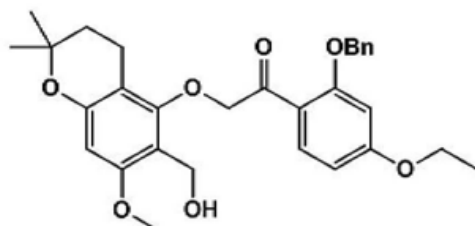
[Compound 4-67]



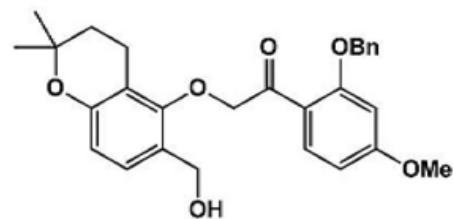
[Compound 4-68]



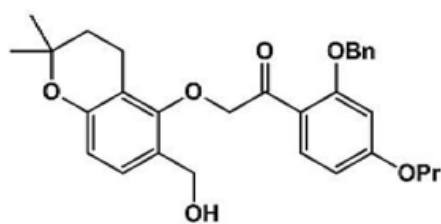
[Compound 4-69]



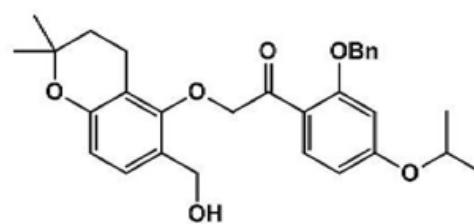
[Compound 4-70]



[Compound 4-71]

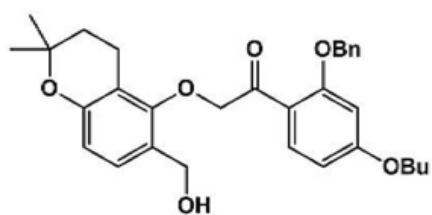


[Compound 4-72]

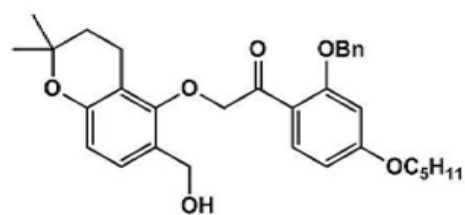


[0063]

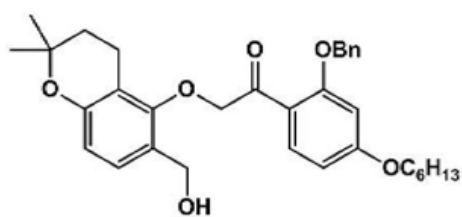
[Compound 4-73]



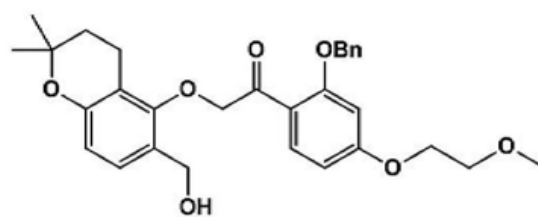
[Compound 4-74]



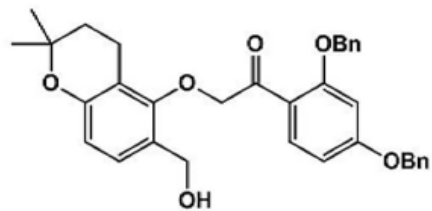
[Compound 4-75]



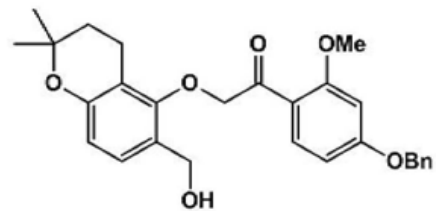
[Compound 4-76]



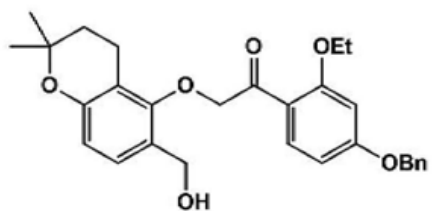
[Compound 4-77]



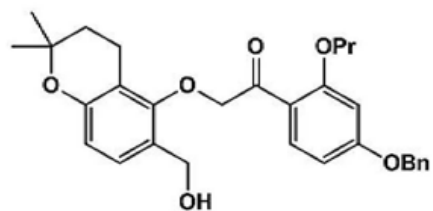
[Compound 4-78]



[Compound 4-79]

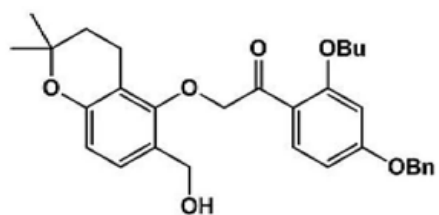


[Compound 4-80]

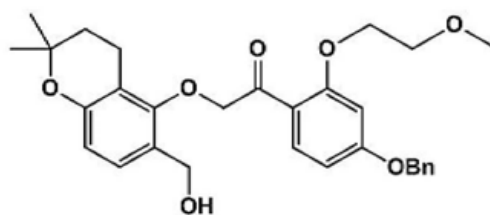


[0064]

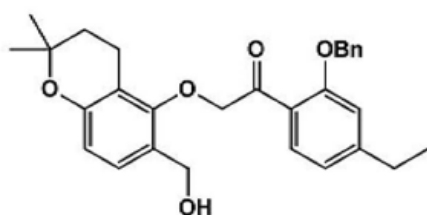
[Compound 4-81]



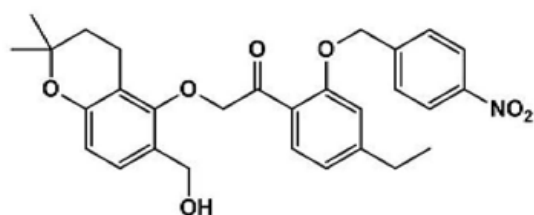
[Compound 4-82]



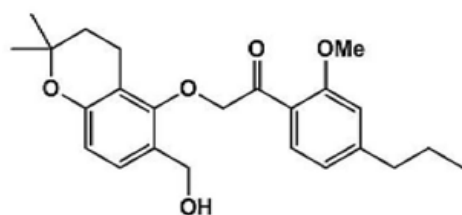
[Compound 4-83]



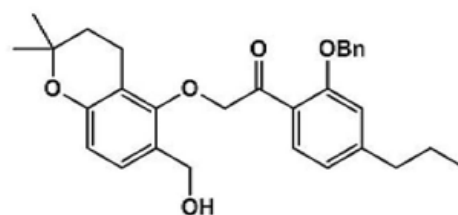
[Compound 4-84]



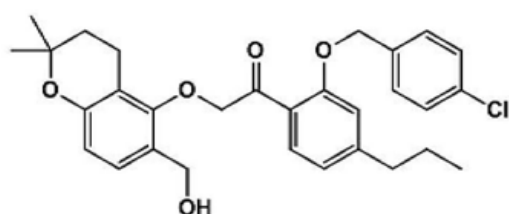
[Compound 4-85]



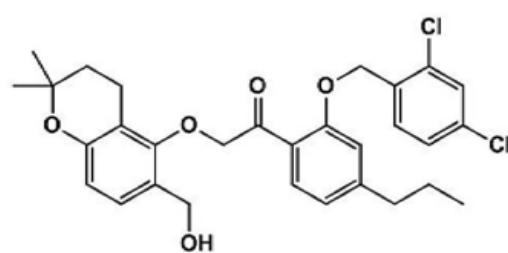
[Compound 4-86]



[Compound 4-87]

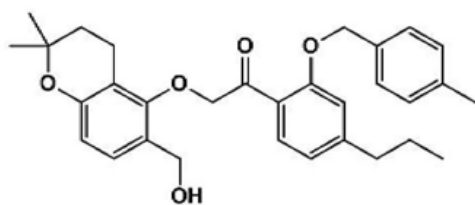


[Compound 4-88]

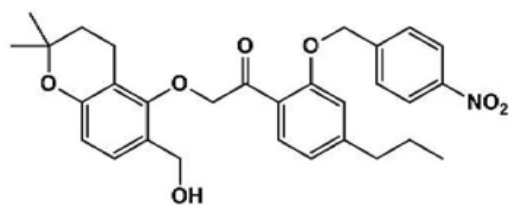


[0065]

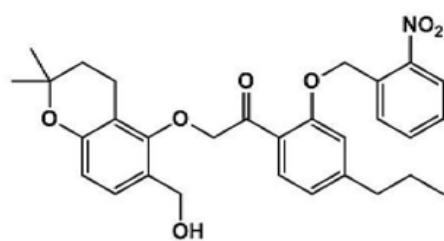
[Compound 4-89]



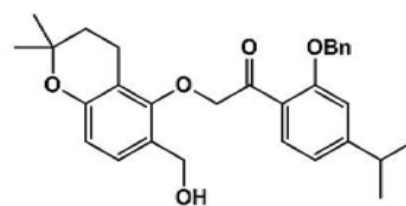
[Compound 4-90]



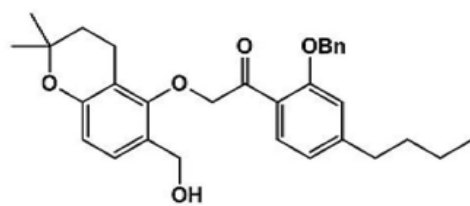
[Compound 4-91]



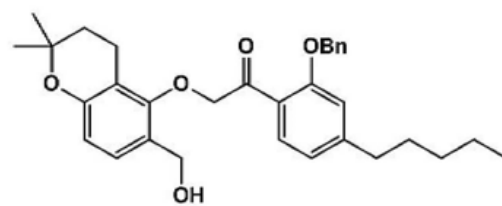
[Compound 4-92]



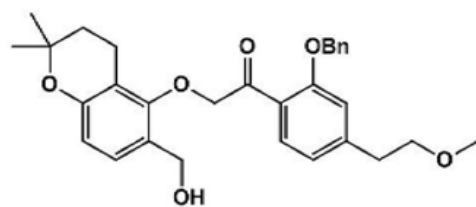
[Compound 4-93]



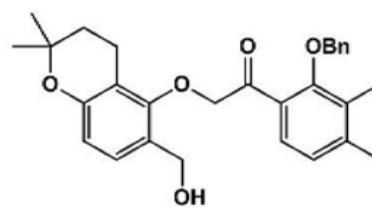
[Compound 4-94]



[Compound 4-95]

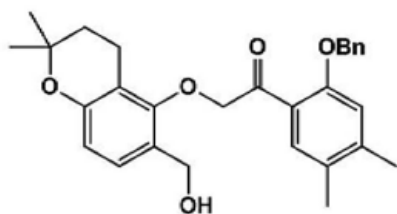


[Compound 4-96]

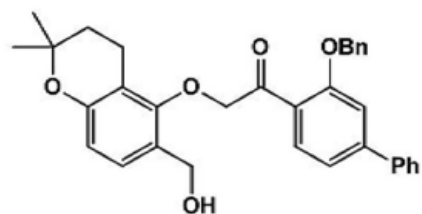


[0066]

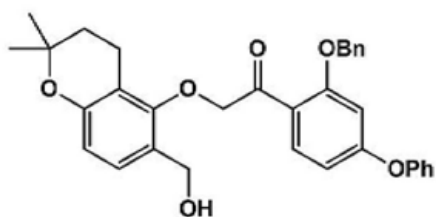
[Compound 4-97]



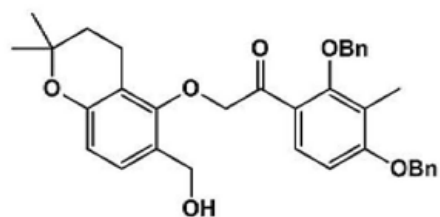
[Compound 4-98]



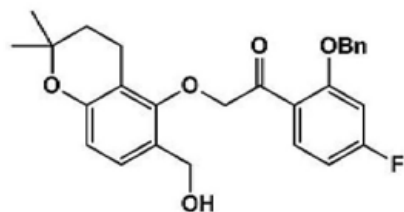
[Compound 4-99]



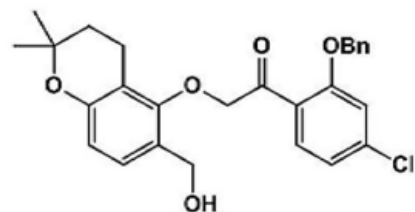
[Compound 4-100]



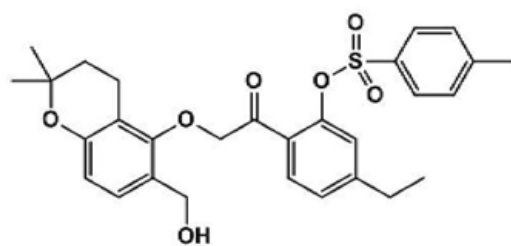
[Compound 4-101]



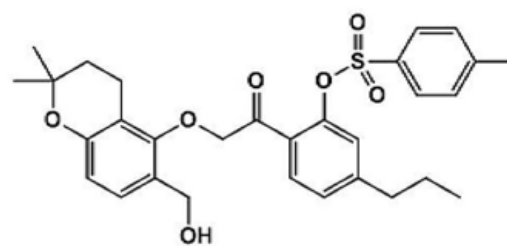
[Compound 4-102]



[Compound 4-103]

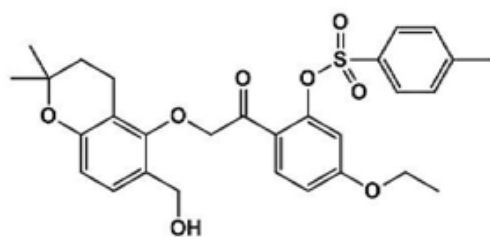


[Compound 4-104]

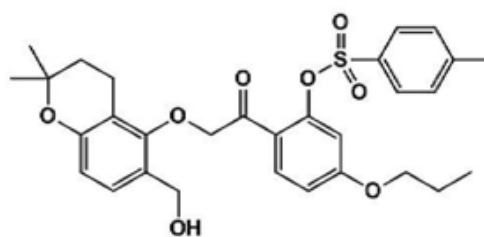


[0067]

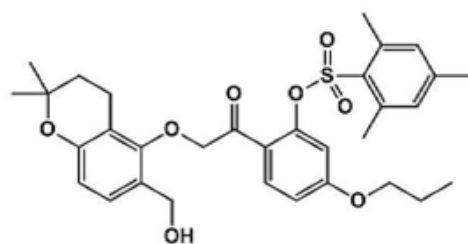
[Compound 4-105]



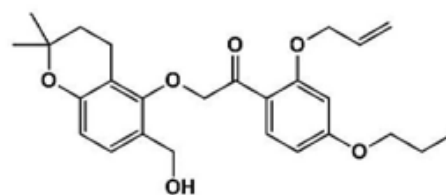
[Compound 4-106]



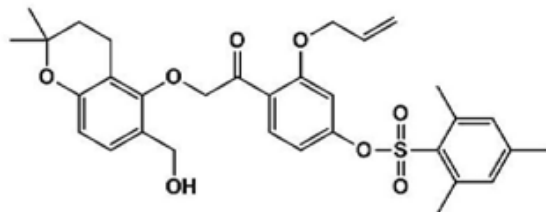
[Compound 4-107]



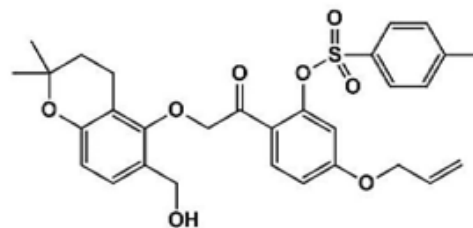
[Compound 4-108]



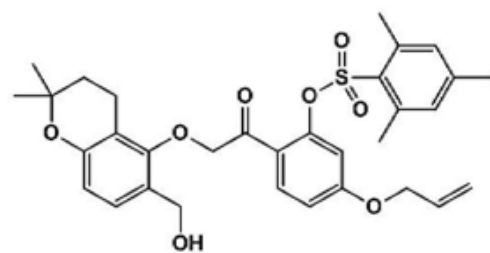
[Compound 4-109]



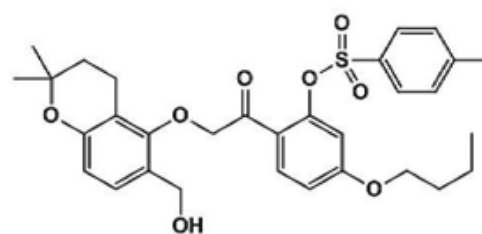
[Compound 4-110]



[Compound 4-111]

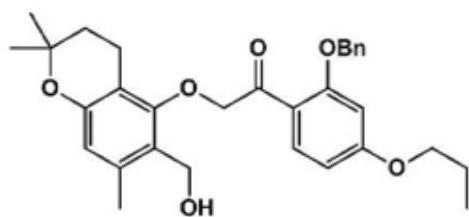


[Compound 4-112]

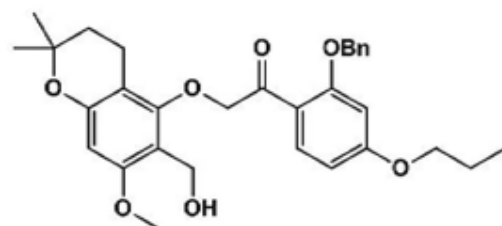


[0068]

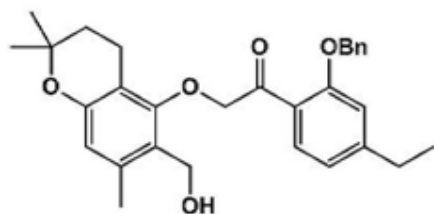
[Compound 4-113]



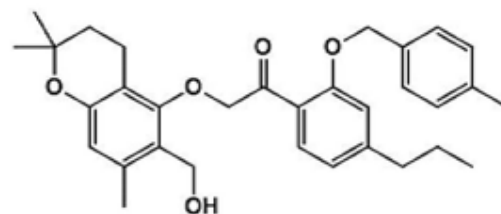
[Compound 4-114]



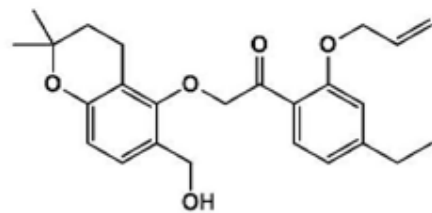
[Compound 4-115]



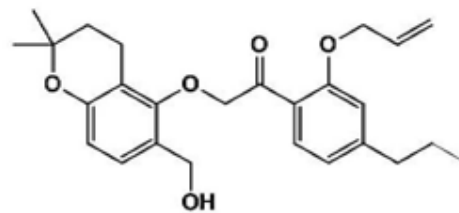
[Compound 4-116]



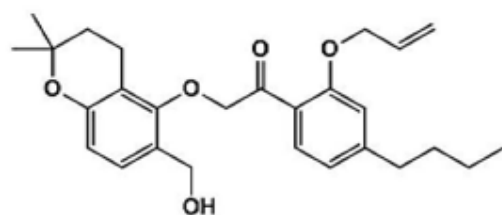
[Compound 4-117]



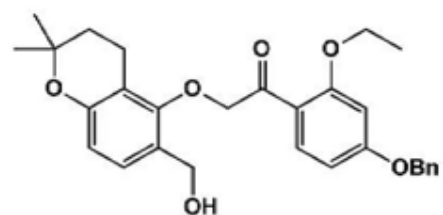
[Compound 4-118]



[Compound 4-119] [9]

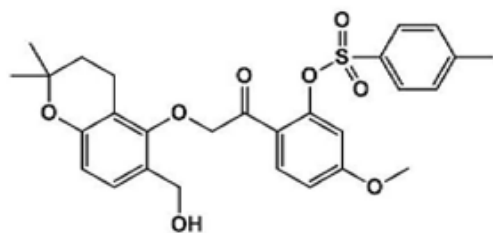


[Compound 4-120]

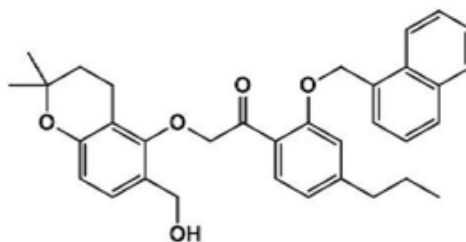


[0069]

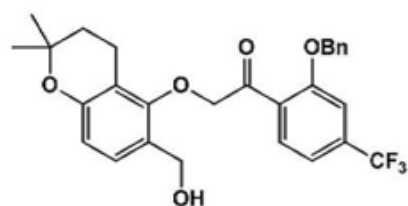
[Compound 4-121]



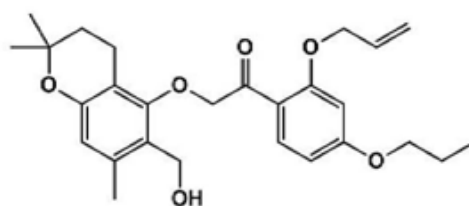
[Compound 4-122]



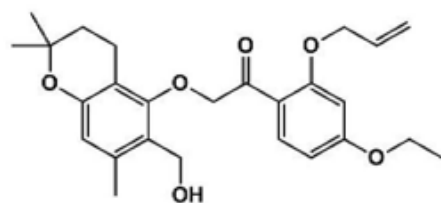
[Compound 4-123]



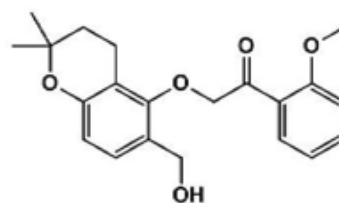
[Compound 4-124]



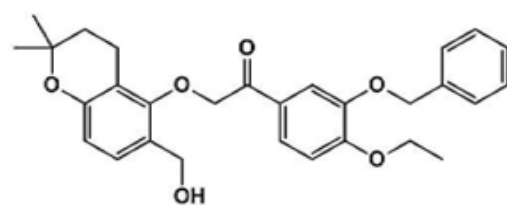
[Compound 4-125]



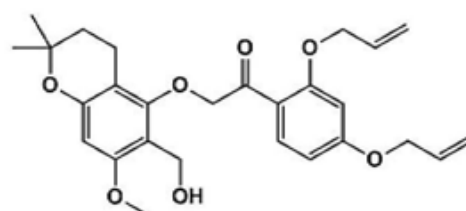
[Compound 4-126]



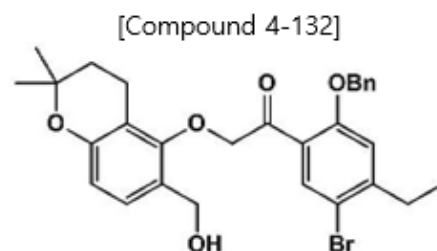
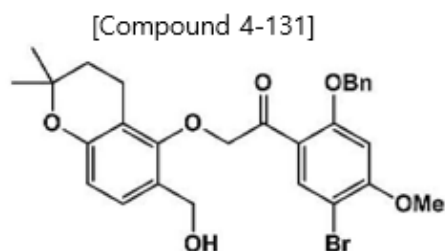
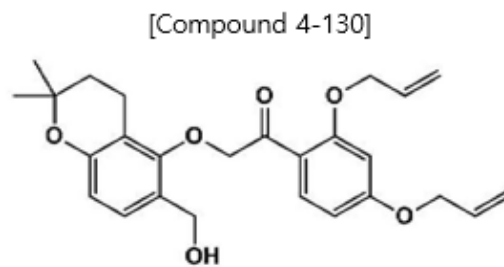
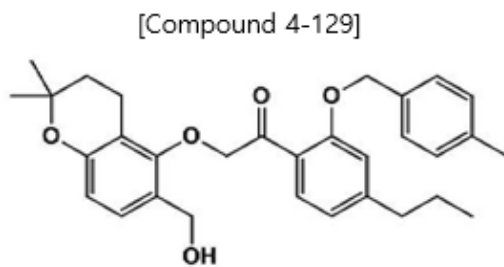
[Compound 4-127]



[Compound 4-128]



[0070]



[0071]

[0072] Hereinafter, each step of the method for synthesizing the compound of Formula 4 according to one embodiment of the present invention will be described in more detail.

- 5 [0073] Step (a) according to one embodiment of the present invention is a step of reducing the formyl group ($-COH$) of the compound of Formula 1 to produce the compound of Formula 2. The reduction may be performed at $0^{\circ}C$ to $5^{\circ}C$ using a reducing agent, for example, sodium borohydride,
- 10 lithium aluminum hydride, diisobutylaluminum hydride, or the like. Specifically, the reducing agent may be sodium borohydride or lithium aluminum hydride. As described in the "Background Art" section above, the step of reducing the compound of Formula A-3 to the compound of Formula A-4
- 15 in Patent Document 2 has a problem in that a reaction-selective reducing agent should be used at a cryogenic

temperature, because only the formyl group should be selectively reduced without reducing the carbonyl group of ketone. However, according to the synthesis method of the present invention, the compound of Formula 1 is first
5 reduced, and thus the compound of Formula 4 may be easily produced under mild conditions without using a reaction-selective reducing agent.

[0074] According to one embodiment of the present invention, step (b) may be performed under a basic condition. For
10 example, step (b) may be performed using a basic compound.

[0075] According to one embodiment of the present invention, the basic condition may be formed by adding at least one basic compound selected from among sodium hydroxide (NaOH), potassium hydroxide (KOH), sodium carbonate (Na₂CO₃),
15 lithium carbonate (Li₂CO₃), potassium carbonate (K₂CO₃), sodium hydrogen carbonate (NaHCO₃), potassium hydrogen carbonate (KHCO₃), triethylamine, and pyridine, specifically, potassium carbonate or sodium carbonate.

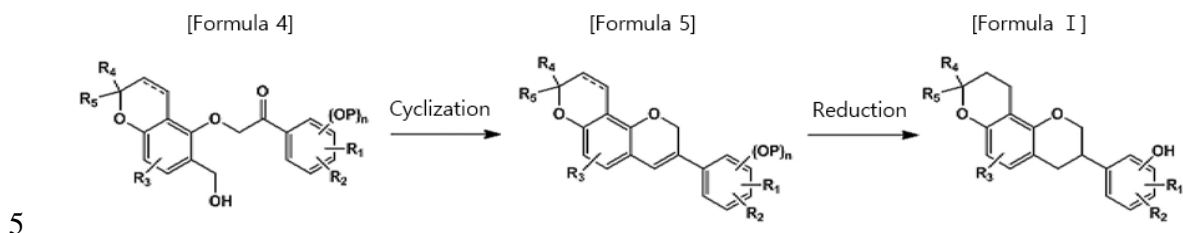
[0076]

20 **[0077]** Another embodiment of the present invention provides a method for synthesizing a 3-phenyl-2,3,4,8,9,10-hexahydropyrano[2,3-f]chromene derivative of Formula I, the method comprising steps of: (i) cyclizing the compound of Formula 4, produced according to one embodiment of the

present invention, to produce a compound of Formula 5; and
(ii) reducing the compound of Formula 5:

[0078] [Reaction Scheme 2]

[0079]



[0080] wherein the dotted line is an optional double bond,
and R_1 to R_5 , P and n are the same as defined in Formulas 1
to 4 above.

[0081] When the compound of Formula 4 is cyclized to the
10 compound of Formula 5, the cyclization may be achieved by i)
dissolving the compound of Formula 4 in acetonitrile, and
adding triphenylphosphonium bromide ($\text{Ph}_3\text{P}\cdot\text{HBr}$) thereto to
obtain an intermediate, and ii) concentrating the
intermediate of i), dissolving the concentrate, and adding
15 sodium ethoxide (NaOEt) thereto.

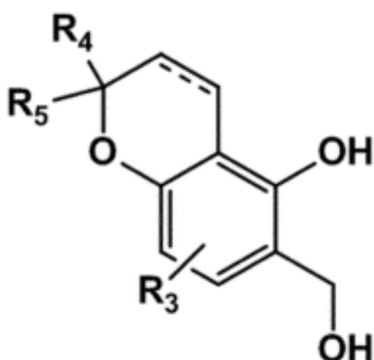
[0082] In step (ii), the compound of Formula I may be
synthesized by reducing the double bond in the compound of
Formula 5 and removing the protecting group. The removal of
the protecting group may be performed through a
20 hydrogenation reaction using palladium on carbon (Pd/C) as
a catalyst, which is the same as used in the reaction for

reducing the double bond.

[0083]

[0084] Still another embodiment of the present invention provides a 6-(hydroxymethyl)chromen-5-ol derivative
5 represented by the following Formula 2 or a solvate thereof:

[0085] [Formula 2]



[0086] wherein

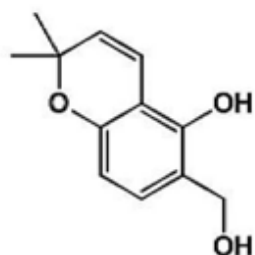
[0087] R₃ is any one of a hydrogen atom, a C₁-C₃ alkyl group,
10 a C₁-C₃ alkoxy group, and a halogen atom; and

[0088] R₄ and R₅ are each independently any one of a hydrogen atom and a C₁-C₂ alkyl group.

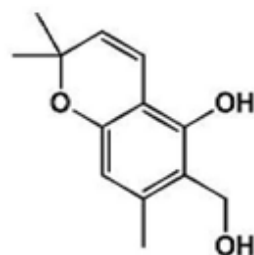
[0089]

[0090] Examples of the 6-(hydroxymethyl)chromen-5-ol
15 derivative represented by Formula 2 include the following compounds.

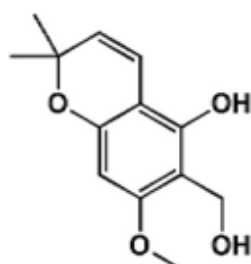
[Compound 2-1]



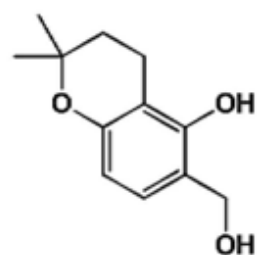
[Compound 2-2]



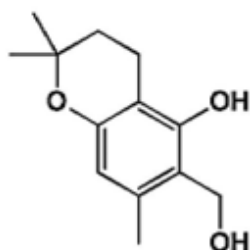
[Compound 2-3]



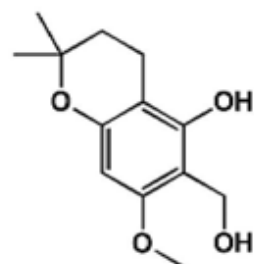
[Compound 2-4]



[Compound 2-5]



[Compound 2-6]



[0091]

[0092]

Mode for Invention

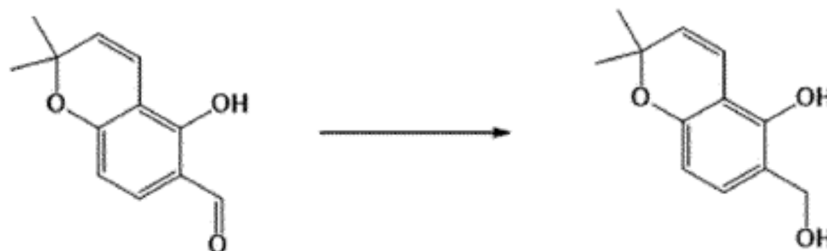
[0093] Hereinafter, the present invention will be described
5 with reference to one or more examples. However, these
examples serve to illustrate one or more embodiments, and
the scope of the present invention is not limited to these
examples.

[0094]

10 [0095] Example 1. Production of 2-(6-(hydroxymethyl)-2,2-

dimethyl-2H-chromen-5-yloxy)-1-(2-(benzyloxy)-4-ethoxyphenyl)ethanone (Compound 4-1)

[0096] 1-1. Synthesis of 6-(hydroxymethyl)-2,2-dimethyl-2H-chromen-5-ol



5 [0097]

[0098] 3 g (0.01469 mol) of 5-hydroxy-2,2-dimethyl-2H-chromene-6-carbaldehyde was added to 60 ml of methanol and cooled to a temperature of 0 to 5°C, and then 0.28 g (0.0074 mol) of sodium borohydride was added thereto in
10 four portions. The reaction solution was warmed to room temperature and then stirred for an additional 30 minutes. After completion of the reaction, the reaction solution was concentrated, then 60 ml of ethyl acetate and 15 ml of purified water were added thereto, and the resulting
15 solution was adjusted to a pH of 6 to 6.5 by slowly adding acetic acid thereto with vigorous stirring. After layer separation, the aqueous layer was removed and the organic layer was washed sequentially with 15 ml brine and 2% aqueous sodium bicarbonate solution. The organic layer was
20 anhydrous processed, filtered, concentrated, and then

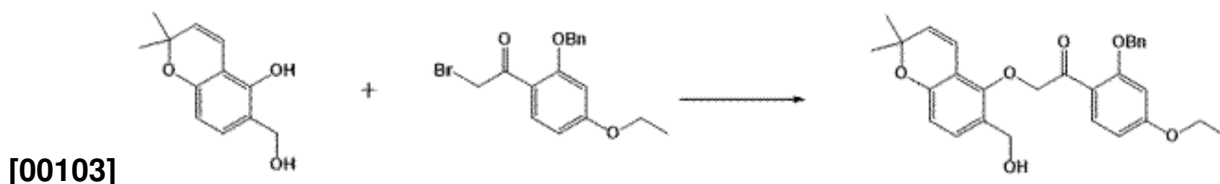
recrystallized from n-hexane to obtain 2.37 g (78.2% yield) of 6-(hydroxymethyl)-2,2-dimethyl-2H-chromen-5-ol. ¹H-NMR and ¹³C-NMR results for the obtained compound are as follows.

[0099] ¹H-NMR (CDCl₃): 7.596(s, 1H), 6.715(d, 1H, J=10Hz),
 5 6.686(d, 1H, J=10Hz), 6.287(d, 1H, 8.4H), 5.587(d, 1H, J=10Hz), 4.746(s, 2H), 2.296(br, 1H), 1.412(s, 6H).

[00100] ¹³C-NMR (CDCl₃): 153.842, 152.180, 129.192, 127.311, 116.803, 116.548, 110.336, 107.820, 75.957, 64.751, 27.730.

[00101]

10 **[00102] 1-2. Synthesis of 2-(6-(hydroxymethyl)-2,2-dimethyl-2H-chromen-5-yloxy)-1-(2-(benzyloxy)-4-ethoxyphenyl)ethanone**



[00104] 5 g (0.0242 mol) of 6-(hydroxymethyl)-2,2-dimethyl-
 15 2H-chromen-5-ol, 8.47 g (0.0242 mol) of 1-(2-(benzyloxy)-4-ethoxyphenyl)-2-bromoethanone, and 7.4 g (0.0535 mol) of potassium carbonate were added to 50 ml of acetone and stirred at room temperature overnight. After completion of the reaction, the reaction solution was filtered and the
 20 filtrate was completely concentrated. Methylene chloride was added to the concentrate which was then washed with purified water. Then, the organic layer was dried with

anhydrous processed, concentrated, and crystallized from n-hexane to obtain 10.8 g (93.9% yield) of 2-(6-(hydroxymethyl)-2,2-dimethyl-2H-chromen-5-yloxy)-1-(2-(benzyloxy)-4-ethoxyphenyl)ethanone. ¹H-NMR and ¹³C-NMR

5 results for the obtained compound are as follows.

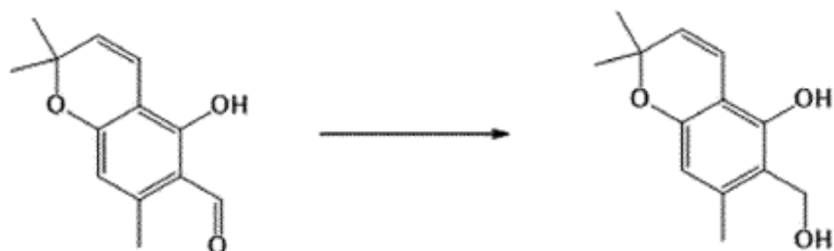
[00105] ¹H-NMR (CDCl₃): 8.063(d, 1H, J=8.8Hz), 7.35-7.32(m, 5H), 7.001(d, 1H, J=8.4Hz), 6.585(dd, 1H, J=8.8, 2.0Hz), 6.532(d, 1H, J=8.0Hz), 6.503(d, 1H, J=2.0Hz), 6.383(d, 1H, J=10Hz), 5.464(d, 1H, J=9.6Hz), 5.092(s, 2H), 5.065(s, 2H),
10 4.522(s, 2H), 4.078(q, 2H, J=13.6), 3.502(br, 1H), 1.424(t, 3H, J=6.8Hz), 1.367(s, 6H).

[00106] ¹³C-NMR (CDCl₃): 194.136, 164.785, 160.506, 154.276, 153.734, 135.384, 133.298, 130.280, 129.713, 128.772, 128.570, 127.905, 126.120, 117.735, 117.273, 114.343,
15 112.067, 106.684, 99.536, 80.734, 75.497, 70.927, 63.988, 61.479, 27.543, 14.594.

[00107]

[00108] Example 2. Production of 2-(6-(hydroxymethyl)-2,2,7-trimethyl-2H-chromen-5-yloxy)-1-(2-(benzyloxy)-4-ethoxyphenyl)ethanone (Compound 4-2)
20

[00109] 2-1. Synthesis of 6-(hydroxymethyl)-2,2,7-trimethyl-2H-chromen-5-ol



[00110]

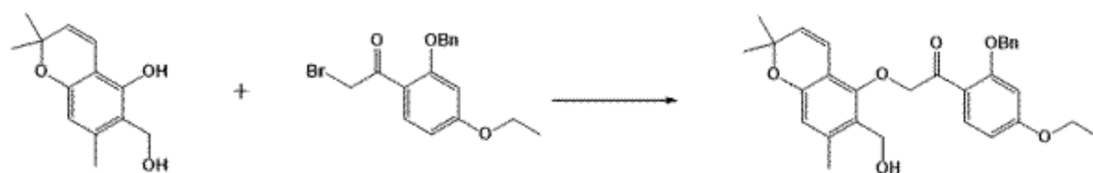
[00111] 6-(hydroxymethyl)-2,2,7-trimethyl-2H-chromen-5-ol was obtained in the same manner as in Example 1-1 above, except that 5-hydroxy-2,2,7-trimethyl-2H-chromene-6-carbaldehyde was used instead of 5-hydroxy-2,2-dimethyl-2H-chromene-6-carbaldehyde. ¹H-NMR and ¹³C-NMR results for the obtained compound are as follows.

[00112] ¹H-NMR (CDCl₃): 8.066(s, 1H), 6.648(d, 1H, J=10Hz), 6.167(s, 1H), 5.525(d, 1H, J=10Hz), 4.827(s, 2H), 2.401(br, 1H), 2.132(s, 3H), 1.399(s, 6H).

[00113] ¹³C-NMR (CDCl₃): 152.863, 152.580, 135.759, 128.156, 116.639, 114.949, 109.944, 108.437, 75.880, 60.798, 27.735, 19.462.

[00114]

15 [00115] 2-2. Synthesis of 2-(6-(hydroxymethyl)-2,2,7-trimethyl-2H-chromen-5-yloxy)-1-(2-(benzyloxy)-4-ethoxyphenyl)ethanone



[00116]

[00117] 2-(6-(hydroxymethyl)-2,2,7-trimethyl-2H-chromen-5-

yloxy)-1-(2-(benzyloxy)-4-ethoxyphenyl)ethanone was obtained in the same manner as in Example 1-2 above, except that 6-(hydroxymethyl)-2,2,7-trimethyl-2H-chromen-5-ol was used instead of 6-(hydroxymethyl)-2,2-dimethyl-2H-chromen-5-ol. ¹H-NMR and ¹³C-NMR results for the obtained compound are as follows.

[00118] ¹H-NMR (CDCl₃): 8.047(d, 1H, J=8.8Hz), 7.375-7.279(m, 5H), 6.574(dd, 1H, J=9.2, 2.4Hz), 6.495(d, 1H, J=2.4Hz), 6.479(s, 1H), 6.330(d, 1H, J=10Hz), 5.405(d, 1H, J=9.6Hz), 5.120(s, 2H), 5.078(s, 2H), 4.618(d, 2H, J=6.4Hz), 4.126~4.044(m, 2H), 3.156(br, 1H), 2.325(s, 3H), 1.417(t, 3H, J=7.2Hz), 1.359(s, 6H).

[00119] ¹³C-NMR (CDCl₃): 192.848, 164.723, 160.478, 154.581, 153.075, 139.010, 135.408, 133.229, 130.478, 129.135, 128.710, 128.665, 128.507, 127.920, 124.442, 117.383, 114.026, 111.674, 81.044, 75.421, 63.952, 56.773, 27.547, 19.331, 14.574.

[00120]

[00121] Example 3. Production of 2-(6-(hydroxymethyl)-7-methoxy-2,2-dimethyl-2H-chromen-5-yloxy)-1-(2-(benzyloxy)-4-ethoxyphenyl)ethanone (Compound 4-3)

[00122] 3-1. Synthesis of 6-(hydroxymethyl)-7-methoxy-2,2-dimethyl-2H-chromen-5-ol



[00123]

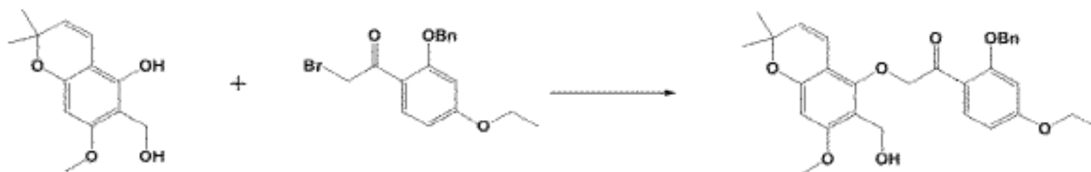
[00124] 6-(hydroxymethyl)-7-methoxy-2,2-dimethyl-2H-chromen-5-ol was obtained in the same manner as in Example 1-1 above, except that 5-hydroxy-7-methoxy-2,2-dimethyl-2H-chromene-6-carbaldehyde was used instead of 5-hydroxy-2,2-dimethyl-2H-chromene-6-carbaldehyde. ¹H-NMR and ¹³C-NMR results for the obtained compound are as follows.

[00125] ¹H-NMR (CD₃OD): 6.741(d, 1H, J=9.6Hz), 5.819(s, 1H), 5.350(d, 1H, J=9.6Hz), 4.627(s, 2H), 3.724(s, 3H), 1.369(s, 6H).

[00126] ¹³C-NMR (CD₃OD): 157.480, 154.814, 153.923, 124.960, 119.470, 107.049, 105.714, 90.203, 76.517, 58.645, 55.602, 27.885.

[00127]

15 [00128] 3-2. Synthesis of 2-(6-(hydroxymethyl)-7-methoxy-2,2-dimethyl-2H-chromen-5-yloxy)-1-(2-(benzyloxy)-4-ethoxyphenyl)ethenone



[00129]

[00130] 2-(6-(hydroxymethyl)-7-methoxy-2,2-dimethyl-2H-chromen-5-yl)oxy)-1-(2-(benzyloxy)-4-ethoxyphenyl)ethenone was obtained in the same manner as in Example 1-2 above, except that 6-(hydroxymethyl)-7-methoxy-2,2-dimethyl-2H-chromen-5-ol was used instead of 6-(hydroxymethyl)-2,2-dimethyl-2H-chromen-5-ol. ¹H-NMR and ¹³C-NMR results for the obtained compound are as follows.

[00131] ¹H-NMR (CDCl₃): 8.048(d, 1H, J=8.8Hz), 7.386-7.296(m, 5H), 6.567(dd, 1H, J=8.8, 2Hz), 6.509(s, 1H), 6.369(d, 1H, J=10Hz), 6.207(s, 1H), 5.348(d, 1H, J=10Hz), 5.120(s, 2H), 5.088(s, 2H), 4.637(d, 2H, J=6.8Hz), 4.060(q, 2H, J=14, 7.2Hz), 3.799(s, 3H), 3.032(t, 1H, J=6.4Hz), 1.411(t, 3H, J=6.8Hz), 1.366(s, 6H).

[00132] ¹³C-NMR (CDCl₃): 193.599, 164.605, 160.395, 158.879, 154.891, 154.317, 135.459, 133.157, 128.641, 128.364, 127.786, 127.088, 117.880, 117.249, 114.782, 107.335, 106.616, 99.520, 95.947, 81.138, 76.028, 70.810, 63.914, 55.636, 54.542, 27.569, 14.561.

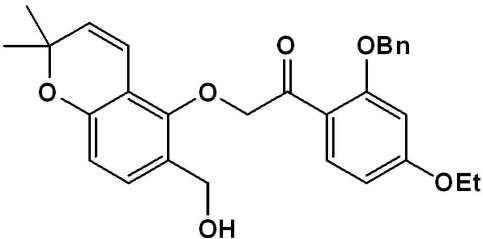
[00133]

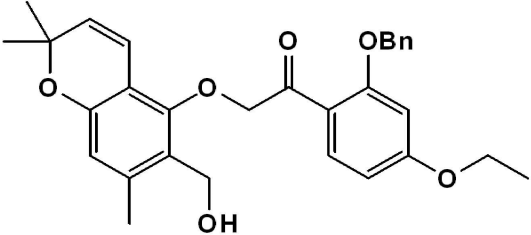
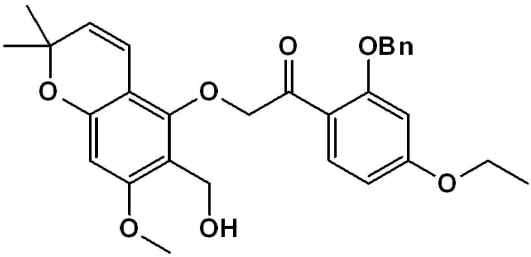
[00134] In addition, various 2-((6-(hydroxymethyl)chromen-5-yl)oxy)-1-phenylethanone derivatives shown in Table 1 below were synthesized in the same manner as in Example 1.

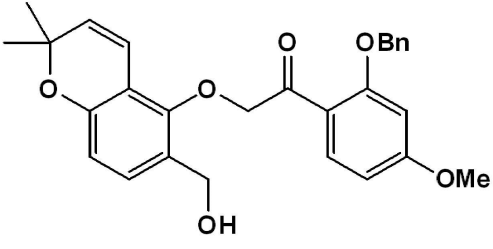
[00135]

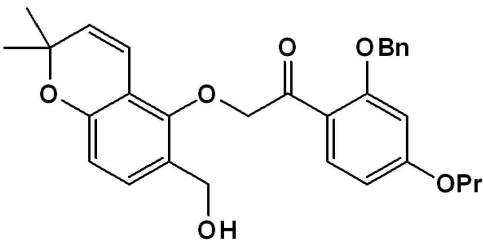
[00136] [Table 1]

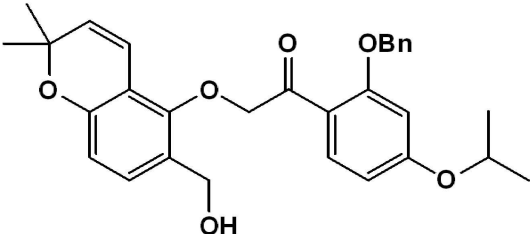
[00137]

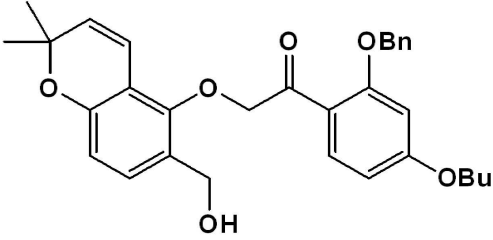
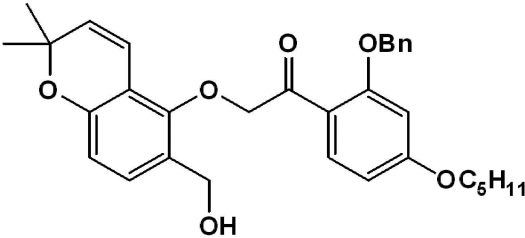
	Chemical structure	NMR
Example 1	[Compound 4-1] 	¹H-NMR (CDCl₃) : 8.063(d, 1H, J=8.8Hz), 7.35~7.32(m, 5H), 7.001(d, 1H, J=8.4Hz), 6.585(dd, 1H, J=8.8, 2.0Hz), 6.532(d, 1H, J=8.0Hz), 6.503(d, 1H, J=2.0Hz), 6.383(d, 1H, J=10Hz), 5.464(d, 1H, J=9.6Hz), 5.092(s, 2H), 5.065(s, 2H), 4.522(s, 2H), 4.078(q, 2H, J=13.6), 3.502(br, 1H), 1.424(t, 3H, J=6.8Hz), 1.367(s, 6H)
		¹³C-NMR (CDCl₃) : 194.136, 164.785, 160.506, 154.276, 153.734, 135.384, 133.298, 130.280, 129.713, 128.772, 128.570, 127.905, 126.120, 117.735, 117.273, 114.343, 112.067, 106.684, 99.536, 80.734, 75.497, 70.927, 63.988, 61.479, 27.543, 14.594
Example	[Compound 4-2]	¹H-NMR (CDCl₃) : 8.047(d, 1H, J=8.8Hz),

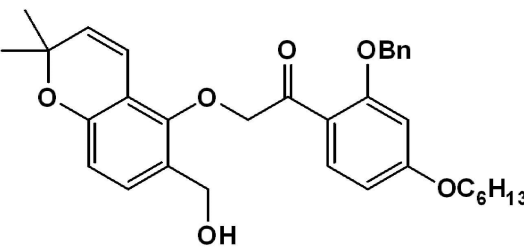
2		7.375~7.279(m, 5H), 6.574(dd, 1H, J=9.2, 2.4Hz), 6.495(d, 1H, J=2.4Hz), 6.479(s, 1H), 6.330(d, 1H, J=10Hz), 5.405(d, 1H, J=9.6Hz), 5.120(s, 2H), 5.078(s, 2H), 4.618(d, 2H, J=6.4Hz), 4.126~4.044(m, 2H), 3.156(br, 1H), 2.325(s, 3H), 1.417(t, 3H, J=7.2Hz), 1.359(s, 6H) ¹³C-NMR (CDCl₃) : 192.848, 164.723, 160.478, 154.581, 153.075, 139.010, 135.408, 133.229, 130.478, 129.135, 128.710, 128.665, 128.507, 127.920, 124.442, 117.383, 114.026, 111.674, 81.044, 75.421, 63.952, 56.773, 27.547, 19.331, 14.574
Example 3	[Compound 4-3] 	¹H-NMR (CDCl₃) : 8.048(d, 1H, J=8.8Hz), 7.386~7.296(m, 5H), 6.567(dd, 1H, J=8.8, 2Hz), 6.509(s, 1H), 6.369(d, 1H, J=10Hz), 6.207(s, 1H), 5.348(d, 1H, J=10Hz), 5.120(s, 2H), 5.088(s, 2H), 4.637(d, 2H, J=6.8Hz), 4.060(q,

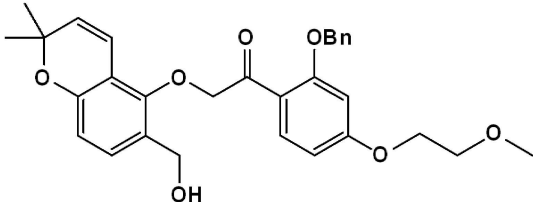
		2H, J=14, 7.2Hz), 3.799(s, 3H), 3.032(t, 1H, J=6.4Hz), 1.411(t, 3H, J=6.8Hz), 1.366(s, 6H) ¹³C-NMR (CDCl₃) : 193.599, 164.605, 160.395, 158.879, 154.891, 154.317, 135.459, 133.157, 128.641, 128.364, 127.786, 127.088, 117.880, 117.249, 114.782, 107.335, 106.616, 99.520, 95.947, 81.138, 76.028, 70.810, 63.914, 55.636, 54.542, 27.569, 14.561
Example 4	[Compound 4-4]  The chemical structure shows a benzodioxane ring system. At position 2, there is a 4-methoxybenzoyl group (-C(=O)-C₆H₄-OMe). At position 3, there is a 4-hydroxybenzyl group (-CH₂-C₆H₄-OH). The benzodioxane ring has a methyl group at position 4 and an oxygen atom at position 1.	¹H-NMR (CDCl₃) : 8.074(d, 1H, J=8.8Hz), 7.32~7.39(m, 5H), 7.010(d, 1H, J=8.0Hz), 6.599(dd, 1H, J=8.8, 2.0Hz), 6.533(d, 1H, J=8.0Hz), 6.506(d, 1H, J=2.0Hz), 6.384(d, 1H, J=10.0Hz), 5.467(d, 1H, J=10.0Hz), 5.132(s, 2H), 5.097(s, 2H), 4.523(d, 2H, J=6.4Hz), 3.844(s, 3H), 3.520(t, 1H, J=6.4Hz), 1.368(s, 6H) ¹³C-NMR (CDCl₃) : 194.139, 165.340, 160.469, 154.230, 153.719, 135.322, 133.295, 130.284,

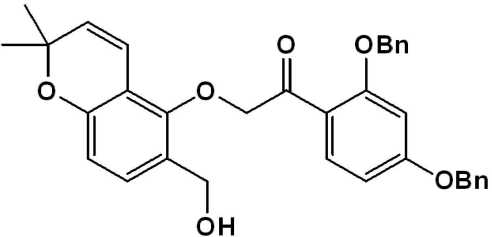
		129.700, 128.760, 128.571, 127.896, 126.099, 117.908, 117.245, 114.330, 112.064, 106.223, 99.169, 80.718, 75.488, 70.941, 61.432, 55.627, 27.528
Example 5	[Compound 4-5]  The chemical structure shows a chromane core. At position 2, there is a hydroxymethyl group (-CH₂OH). At position 3, there is an ether linkage (-OCH₂-) connecting to a benzoyl group. The benzoyl group's phenyl ring is substituted with a benzyloxy group (-OBn) at the 4-position and a propoxy group (-OPr) at the 6-position.	¹H-NMR (CDCl₃) : 8.060(d, 1H, J=8.8Hz), 7.355~7.340(m, 5H), 7.006(d, 1H, J=8Hz), 6.587(dd, 1H, J=8.8, 1.6Hz), 6.539(s, 1H), 6.514(s, 1H), 6.376(d, 1H, J=9.6Hz), 5.458(d, 1H, J=10Hz), 5.125(s, 2H), 5.091(s, 2H), 4.519(s, 2H), 3.961(t, 2H, J=6.8), 3.599(br, 1H), 1.855~1.7768(m, 2H), 1.364(s, 6H), 1.036(t, 3H, J=7.2Hz) ¹³C-NMR (CDCl₃) : 194.102, 164.977, 160.511, 154.234, 153.697, 135.367, 133.230, 130.249, 129.676, 128.736, 128.539, 127.905, 126.110, 117.653, 117.245, 114.316, 112.032, 106.766, 99.466, 80.709, 75.467, 70.922, 69.902, 61.415, 27.518, 22.342, 10.388

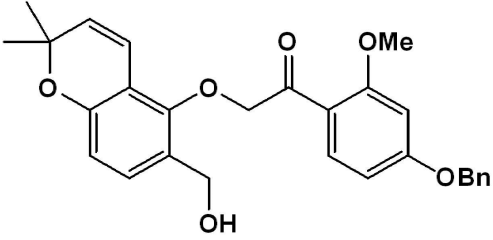
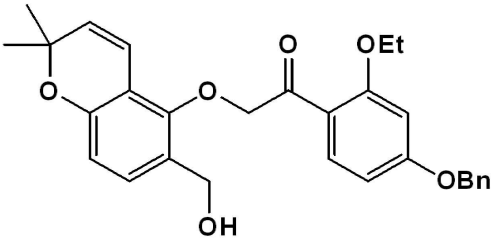
Example 6	[Compound 4-6] 	¹H-NMR (CDCl₃) : 8.057(d, 1H, J=8.8Hz), 7.378~7.324(m, 5H), 7.008(d, 1H, J=8Hz), 6.575(dd, 1H, J=8.8, 2Hz), 6.530(d, 1H, J=8Hz), 6.484(d, 1H, J=2.4Hz), 6.380(d, 1H, J=10Hz), 5.461(d, 1H, J=9.6Hz), 5.128(s, 2H), 5.096(s, 2H), 4.645~4.585(m, 1H), 4.522(d, 2H, J=4Hz), 3.555(br, 1H), 1.366(s, 6H), 1.350(s, 3H), 1.335(s, 3H) ¹³C-NMR (CDCl₃) : 194.066, 163.881, 160.601, 154.263, 153.714, 135.417, 133.222, 130.254, 129.692, 128.751, 128.532, 127.869, 126.117, 117.443, 117.263, 114.327, 112.039, 107.420, 100.503, 80.709, 75.476, 70.903, 70.408, 61.439, 27.526, 21.860
Example 7	[Compound 4-7]	¹H-NMR (CDCl₃) : 8.061(d, 1H, J=8.8Hz), 7.356~7.342(m, 5H), 7.006(d, 1H, J=8.4Hz), 6.571(dd, 1H, J=8.8, 1.6Hz), 6.558(d, 1H, J=14.4Hz), 6.513(d, 1H, J=4.4Hz), 6.375(d, 1H,

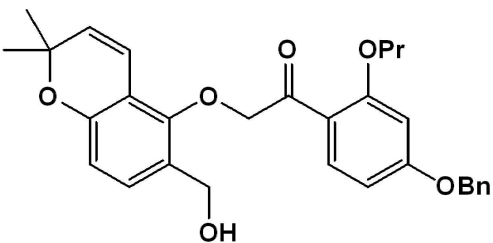
		$J=10\text{Hz}$), 5.458(d, 1H, $J=10\text{Hz}$), 5.125(s, 2H), 5.092(s, 2H), 4.519(d, 2H, $J=6.4\text{Hz}$), 4.004(t, 2H, $J=11.2\text{Hz}$), 3.537(t, 1H, $J=6.4\text{Hz}$), 1.803~1.749(m, 2H), 1.532~1.409(m, 2H), 1.365(s, 6H), 0.977(t, 3H, $J=7.2\text{Hz}$) $^{13}\text{C-NMR}$ (CDCl_3) : 194.120, 164.999, 160.515, 154.259, 153.713, 135.375, 133.257, 130.258, 129.697, 128.751, 128.558, 127.923, 126.113, 117.645, 114.325, 112.044, 106.759, 99.471, 80.722, 75.478, 70.928, 68.142, 61.453, 31.020, 27.528, 19.109, 13.759
Example 8	[Compound 4-8] 	$^1\text{H-NMR}$ (CDCl_3) : 8.059(d, 1H, $J=8.8\text{Hz}$), 7.355~7.324(m, 5H), 7.006(d, 1H, $J=8\text{Hz}$), 6.589(dd, 1H, $J=8, 2\text{Hz}$), 6.529(d, 1H, $J=8\text{Hz}$), 6.505(d, 1H, $J=2\text{Hz}$), 6.375(d, 1H, $J=10\text{Hz}$), 5.458(d, 1H, $J=10\text{Hz}$), 5.125(s, 2H), 5.091(s, 2H), 4.519(s, 2H), 3.995(t, 2H, $J=6.4\text{Hz}$), 3.544(br, 1H), 1.805~1.752(m, 2H),

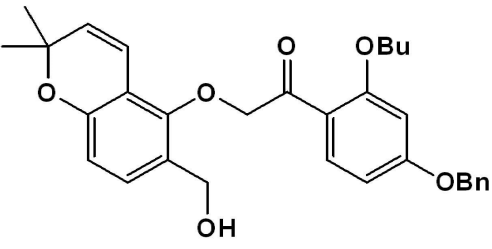
		1.455~1.388(m, 4H), 1.365(s, 6H), 0.935(t, 3H, J=6.8Hz)
		¹³ C-NMR (CDCl ₃) : 194.117, 164.992, 160.515, 154.262, 153.715, 135.379, 133.258, 130.260, 129.697, 128.752, 128.557, 127.923, 126.117, 117.651, 117.651, 114.329, 112.047, 106.760, 99.474, 80.725, 75.479, 70.931, 68.448, 61.453, 28.694, 28.109, 27.532, 22.363, 13.961
Example 9	[Compound 4-9] 	¹ H-NMR (CDCl ₃) : 8.061(d, 1H, J=8.8Hz), 7.382~7.325(m, 5H), 7.007(d, 1H, J=8Hz), 6.588(dd, 1H, J=8.8, 2.4Hz), 6.530(d, 1H, J=8.4Hz), 6.506(d, 1H, J=2Hz), 6.377(d, 1H, J=10Hz), 5.459(d, 1H, J=9.6Hz), 5.126(s, 2H), 5.093(s, 2H), 4.519(d, 2H, J=6.8Hz), 3.996(t, 2H, J=6.4Hz), 3.527(t, 1H, J=6.8Hz), 1.798~1.744(m, 2H), 1.465~1.316(m, 6H), 1.366(s, 6H), 0.910(t, 3H, J=5.6Hz)
		¹³ C-NMR (CDCl ₃) : 194.114, 164.998, 160.517,

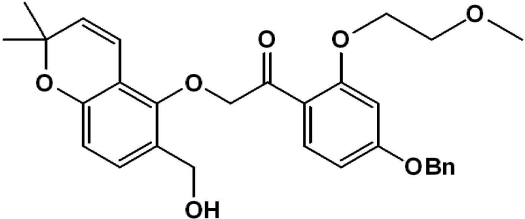
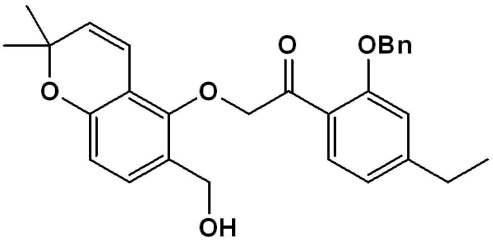
		154.252, 153.714, 135.382, 133.249, 130.257, 129.695, 128.747, 128.551, 127.917, 126.115, 117.656, 117.258, 114.327, 112.046, 106.773, 99.479, 80.720, 75.478, 70.934, 68.463, 61.438, 31.460, 28.959, 27.530, 25.569, 22.527, 13.983
Example 10	[Compound 4-10] 	¹H-NMR (CDCl₃) : 8.063(d, 1H, J=8.8Hz), 7.364~7.319(m, 5H), 7.005(d, 1H, J=8.4Hz), 6.607(dd, 1H, J=8.8, 2Hz), 6.577(d, 1H, J=2Hz), 6.529(d, 1H, J=8.4Hz), 6.379(d, 1H, J=10Hz), 5.463(d, 1H, J=10Hz), 5.125(s, 2H), 5.081(s, 2H), 4.516(s, 2H), 4.162(d, 2H, J=5.2, 3.2Hz), 3.748(d, 2H, J=5.2, 3.2Hz), 3.445(br, 1H), 3.435(s, 3H), 1.364(s, 6H) ¹³C-NMR (CDCl₃) : 194.140, 164.523, 160.419, 154.227, 153.735, 135.332, 133.278, 130.305, 129.702, 128.762, 128.569, 127.883, 126.104, 118.112, 117.241, 114.353, 112.089, 106.535, 99.968, 80.731, 75.504, 70.966, 70.662, 67.612,

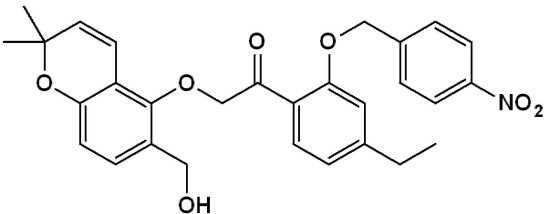
		61.447, 59.236, 27.546
Example 11	[Compound 4-11] 	¹H-NMR (CDCl₃) : 8.074(d, 1H, J=8.8Hz), 7.411~7.340(m, 10H), 7.011(d, 1H, J=8Hz), 6.682(dd, 1H, J=8.8, 2Hz), 6.592(d, 1H, J=2Hz), 6.536(d, 1H, J=8Hz), 6.384(d, 1H, J=10Hz), 5.468(d, 1H, J=10Hz), 5.130(s, 2H), 5.106(s, 2H), 5.073(s, 2H), 4.522(d, 2H, J=5.2Hz), 3.444(br, 1H), 1.370(s, 6H) ¹³C-NMR (CDCl₃) : 194.140, 164.450, 160.458, 154.252, 153.753, 135.848, 135.315, 133.317, 130.312, 129.727, 128.782, 128.738, 128.594, 128.373, 127.903, 127.519, 126.110, 118.138, 117.261, 114.358, 112.102, 107.104, 100.031, 80.742, 75.512, 70.981, 70.381, 61.477, 27.556
Example 12	[Compound 4-12]	¹H-NMR (CDCl₃) : 8.051(d, 1H, J=8.8Hz), 7.439~7.350(m, 5H), 7.055(d, 1H, J=8.4Hz), 6.664(dd, 1H, J=8.8, 2.4Hz), 6.614(d, 1H, J=10Hz), 6.572(d, 1H, J=10Hz), 6.515(d, 1H,

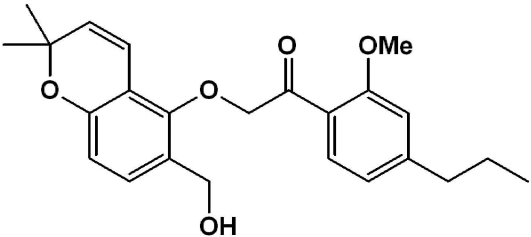
		$J=2\text{Hz}$), 5.655(d, 1H, $J=9.6\text{Hz}$), 5.161(s, 2H), 5.120(s, 2H), 4.168(d, 2H, $J=2.8\text{Hz}$), 3.830(s, 3H), 3.610(br, 1H), 1.426(s, 6H) $^{13}\text{C-NMR}$ (CDCl_3) : 194.073, 164.558, 161.291, 154.335, 153.806, 135.859, 133.217, 130.426, 129.721, 128.712, 128.578, 127.523, 126.169, 117.842, 117.449, 114.622, 112.180, 106.662, 98.960, 80.4778, 75.628, 70.351, 61.520, 55.518, 27.555
Example 13	[Compound 4-13] 	$^1\text{H-NMR}$ (CDCl_3) : 8.055(d, 1H, $J=8.8\text{Hz}$), 7.425~7.345(m, 5H), 7.037(d, 1H, $J=8.4\text{Hz}$), 6.646(dd, 1H, $J=8.8, 2\text{Hz}$), 6.610(d, 1H, $J=10\text{Hz}$), 6.556(d, 1H, $J=8\text{Hz}$), 6.479(d, 1H, $J=2\text{Hz}$), 5.655(d, 1H, $J=10\text{Hz}$), 5.229(s, 2H), 5.105(s, 2H), 4.643(s, 2H), 4.127(br, 1H), 4.058(q, 2H, $J=14\text{Hz}$), 1.434(t, 3H, $J=5.6\text{Hz}$), 1.417(s, 6H) $^{13}\text{C-NMR}$ (CDCl_3) : 194.514, 164.547, 160.795,

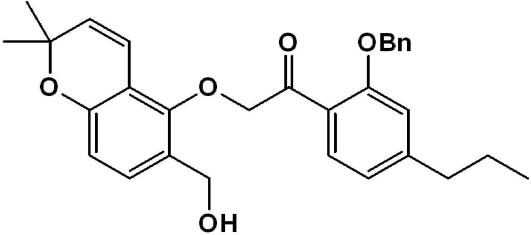
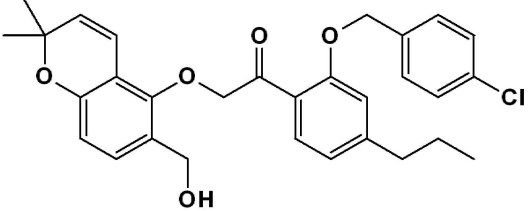
		154.849, 153.833, 135.869, 133.204, 130.221, 129.790, 128.700, 128.328, 127.499, 126.189, 117.822, 114.303, 111.932, 106.680, 99.441, 80.741, 75.368, 70.308, 64.232, 61.752, 27.379, 14.710
Example 14	[Compound 4-14] 	¹H-NMR (CDCl₃) : 8.063(d, 1H, J=8.8Hz), 7.412~7.362(m, 5H), 7.039(d, 1H, J=8.4Hz), 6.648(dd, 1H, J=8.8, 2Hz), 6.593(d, 1H, J=10Hz), 6.558(d, 1H, J=8.4Hz), 6.493(d, 1H, J=2.4Hz), 5.646(d, 1H, J=9.6Hz), 5.219(s, 2H), 5.109(s, 2H), 4.631(s, 2H), 4.2(br, 1H), 3.955(t, 2H, J=6.8Hz), 1.832~1.814(m, 2H), 1.426(s, 6H), 1.012(t, 3H, 7.6Hz) ¹³C-NMR (CDCl₃) : 194.386, 164.551, 160.892, 154.701, 153.796, 135.888, 133.258, 130.245, 129.784, 128.699, 128.546, 127.503, 126.244, 117.782, 117.662, 114.387, 112.016, 106.630, 99.476, 80.696, 75.409, 70.322, 61.716, 27.424,

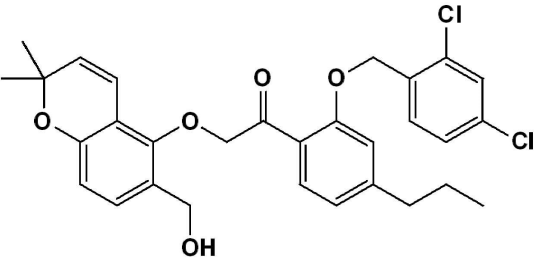
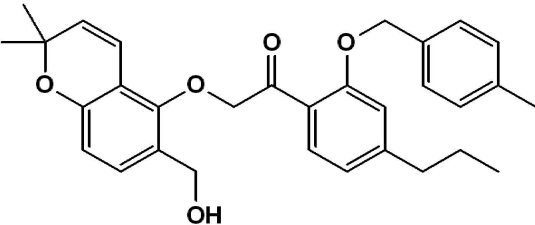
		22.400, 10.871
Example 15	[Compound 4-15] 	¹H-NMR (CDCl₃) : 8.063(d, 1H, J=8.8Hz), 7.433~7.336(m, 5H), 7.043(d, 1H, J=8Hz), 6.648(dd, 1H, J=8.8, 2.4Hz), 6.602(d, 1H, J=10Hz), 6.559(d, 1H, J=8Hz), 6.497(d, 1H, J=2.4Hz), 5.648(d, 1H, J=9.6Hz), 5.208(s, 2H), 5.110(s, 2H), 4.629(d, 2H, J=3.6Hz), 3.990(m, 3H), 1.815~1.744(m, 2H), 1.486~1.396(m, 8H), 0.928(t, 3H, 7.2Hz)
		¹³C-NMR (CDCl₃) : 194.341, 164.543, 160.890, 154.634, 153.788, 135.888, 133.253, 130.303, 129.791, 128.699, 128.327, 127.509, 126.250, 117.781, 117.605, 114.379, 112.049, 106.595, 99.491, 80.697, 75.443, 70.318, 68.405, 61.678, 30.997, 27.495, 19.337, 13.709
Example 16	[Compound 4-16]	¹H-NMR (CDCl₃) : 8.069(d, 1H, J=8.8Hz), 7.426~7.347(m, 5H), 7.062(d, 1H, J=8Hz), 6.688~6.652(m, 2H), 6.558(d, 1H, J=8.4Hz),

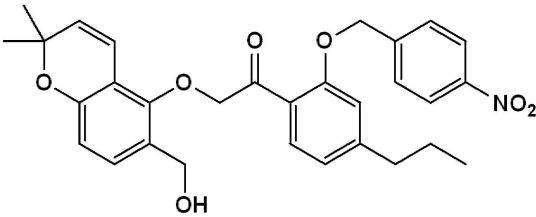
		6.487(d, 1H, J=2.4Hz), 5.641(d, 1H, J=10Hz), 5.244(s, 2H), 5.110(s, 2H), 4.614(d, 2H, J=6.4Hz), 4.122(t, 2H, J=4.8Hz), 3.693~3.620(m, 3H), 3.228(s, 3H), 1.420(s, 6H) ¹³C-NMR (CDCl₃) : 194.068, 164.393, 160.4485, 154.308, 153.700, 135.851, 133.172, 130.359, 129.823, 128.703, 128.336, 127.495, 126.260, 118.109, 117.483, 114.640, 112.187, 107.077, 99.757, 80.789, 75.629, 70.370, 70.335, 67.570, 61.340, 58.674, 27.617
Example 17	[Compound 4-17] 	¹H-NMR (CDCl₃) : 7.971(d, 1H, J=8Hz), 7.433~7.339(m, 5H), 7.011(d, 1H, J=8.4Hz), 6.924(d, 1H, J=8Hz), 6.865(s, 1H), 6.538(d, 1H, J=8.4Hz), 6.389(d, 1H, J=10Hz), 5.475(d, 1H, J=10Hz), 5.138(d, 2H, J=8Hz), 4.515(s, 2H), 3.310(br, 1H), 2.707~2.619(m, 2H), 1.369(s, 6H), 1.245(t, 3H, J=7.6Hz) ¹³C-NMR (CDCl₃) : 195.369, 158.868, 153.761,

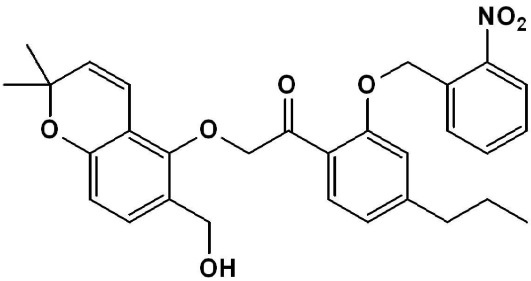
		152.515, 135.625, 131.324, 130.363, 129.697, 128.738, 128.509, 127.499, 126.083, 122.421, 121.132, 117.210, 114.408, 112.166, 112.135, 80.841, 75.540, 70.913, 61.402, 29.204, 27.859, 15.014
Example 18	[Compound 4-18] 	$^1\text{H-NMR}$ (CDCl_3) : 8.168(d, 2H, $J=8.8\text{Hz}$), 7.950(d, 1H, $J=8\text{Hz}$), 7.545(d, 2H, $J=8.8\text{Hz}$), 7.020(d, 1H, $J=8.0\text{Hz}$), 6.959(dd, 1H, $J=8$, 1.2Hz), 6.795(s, 1H), 6.552(d, 1H, $J=8\text{Hz}$), 6.428(d, 1H, $J=9.6\text{Hz}$), 5.509(d, 1H, $J=10\text{Hz}$), 5.233(s, 2H), 5.131(s, 2H), 4.532(d, 2H, $J=6.4\text{Hz}$), 3.134(t, 1H, $J=6.4\text{Hz}$), 2.671(q, 2H, $J=15.2\text{Hz}$), 1.344(s, 6H), 1.232(t, 3H, $J=7.6\text{Hz}$) $^{13}\text{C-NMR}$ (CDCl_3) : 194.892, 158.011, 153.937, 152.558, 147.782, 142.812, 131.4406, 130.706, 129.797, 128.125, 127.519, 125.970, 123.970, 123.883, 122.518, 121.668, 116.946, 114.550, 113.201, 112.537, 112.045, 80.751, 75.627,

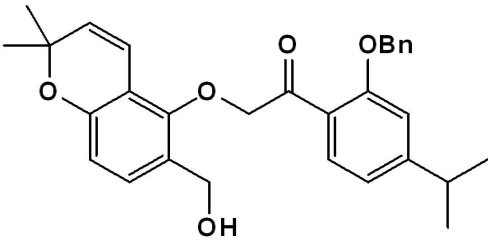
		69.546, 61.309, 29.170, 27.497, 15.017
Example 19	[Compound 4-19] 	$^1\text{H-NMR}$ (CDCl_3) : 7.948(d, 1H, J=8Hz), 7.065(d, 1H, J=8Hz), 6.992(d, 1H, J=8Hz), 6.758(s, 1H), 6.618(d, 1H, J=10Hz), 6.580(d, 1H, J=8Hz), 5.660(d, 1H, J=10Hz), 5.194(s, 2H), 4.630(d, 2H, J=6Hz), 3.875(s, 3H), 3.431(t, 1H, J=6.4Hz), 2.624(t, 2H, J=7.6Hz), 1.692~1.617(m, 2H), 1.431(s, 6H), 0.955(t, 3H, J=7.2Hz) $^{13}\text{C-NMR}$ (CDCl_3) : 195.352, 159.530, 154.279, 153.804, 151.120, 131.081, 130.458, 129.702, 126.156, 121.981, 121.410, 117.421, 114.635, 112.208, 111.466, 80.598, 75.635, 61.525, 55.410, 38.210, 27.544, 24.110, 13.755
Example 20	[Compound 4-20]	$^1\text{H-NMR}$ (CDCl_3) : 7.967(d, 1H, J=8Hz), 7.430~7.320(m, 5H), 7.010(d, 1H, J=8Hz), 6.998(d, 1H, J=8Hz), 6.845(s, 1H), 6.538(d, 1H, J=8Hz), 6.387(d, 1H, J=10Hz), 5.473(d, 1H,

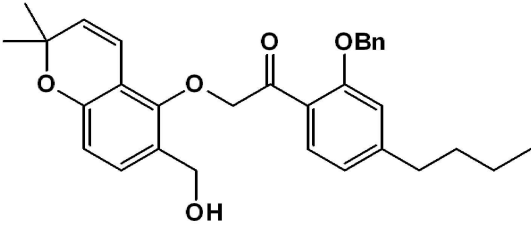
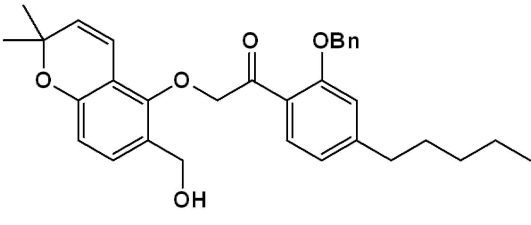
		$^1\text{H-NMR}$ (CDCl_3) : 5.163(s, 2H), 5.153(s, 2H), 4.514(s, 2H), 3.389(s, 1H), 2.611(t, 2H, $J=7.6\text{Hz}$), 1.674~1.600(m, 2H), 1.368(s, 6H), 0.934(t, 3H, $J=7.2\text{Hz}$)
	[Compound 4-21] 	$^1\text{H-NMR}$ (CDCl_3) : 7.967(d, 1H, $J=8\text{Hz}$), 7.306(s, 4H), 7.025(d, 1H, $J=8\text{Hz}$), 6.919(dd, 1H, $J=8, 1.2\text{Hz}$), 6.811(s, 1H), 6.558(d, 1H, $J=8.4\text{Hz}$), 6.370(d, 1H, $J=10\text{Hz}$), 5.493(d, 1H, $J=10\text{Hz}$), 5.112(s, 2H), 5.082(s, 2H), 4.524(s, 2H), 3.296(br, 1H), 2.616(t, 2H, $J=7.6\text{Hz}$), 1.697~1.604(m, 4H), 1.377(s, 6H), 0.940(t, 3H, $J=7.6\text{Hz}$)

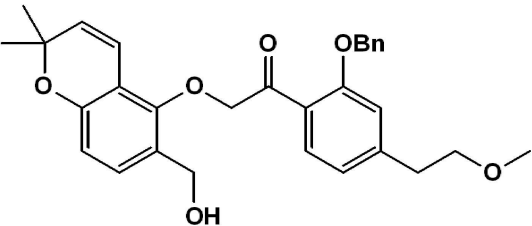
		-
Example 22	[Compound 4-22] 	¹H-NMR (CDCl₃) : 7.961(d, 1H, J=8Hz), 7.401(d, 1H, J=2Hz), 7.366(d, 1H, J=8Hz), 7.227(d, 1H, 2.4Hz), 7.206(d, 1H, J=2Hz), 7.026(d, 1H, 8.4Hz), 6.933(dd, 1H, J=8, 0.8Hz), 6.804(s, 1H), 6.556(d, 1H, J=8.4Hz), 6.398(d, 1H, J=9.6Hz), 5.504(d, 1H, J=10Hz), 5.172(s, 2H), 5.123(s, 2H), 4.540(s, 2H), 3.3(br, 1H), 2.623(t, 2H, J=7.6Hz), 1.684~1.610(m, 4H), 1.382(s, 6H), 0.944(t, 3H, J=7.2Hz)
Example 23	[Compound 4-23] 	¹H-NMR (CDCl₃) : 7.961(d, 1H, J=8Hz), 7.245(d, 2H, J=8.8Hz), 7.113(d, 2H, J=8Hz), 7.007(d, 1H, 8.4Hz), 6.889(dd, 1H, J=8, 1.2Hz), 6.842(d, 1H, J=1.2Hz), 6.539(dd, 1H, J=8.4, 0.4Hz), 6.392(dd, 1H, J=10, 0.8Hz), 5.466(d, 1H, J=9.6Hz), 5.124(s, 2H), 5.067(s, 2H), 4.504(s, 2H), 3.3(br, 1H), 2.611(t, 2H, J=7.6Hz),

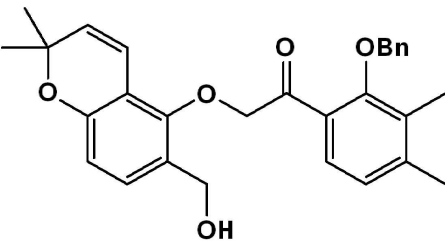
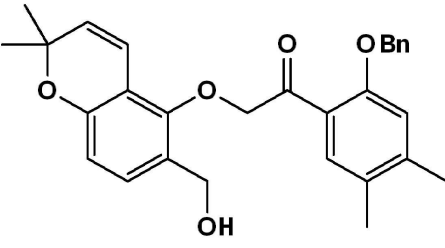
		2.347(s, 2H), 1.679~1.622(m, 2H), 1.369(s, 6H), 0.938(t, 3H, J=7.2Hz)
		¹³ C-NMR (CDCl ₃) : 195.3316, 158.874, 154.093, 153.705, 151.006, 138.261, 132.530, 131.130, 130.271, 129.607, 129.336, 128.062, 126.084, 122.313, 121.608, 117.247, 114.379, 112.676, 112.071, 80.901, 75.477, 70.780, 61.354, 38.248, 27.491, 24.037, 21.170, 13.703
Example 24	[Compound 4-24] 	¹ H-NMR (CDCl ₃) : 8.154(d, 2H, J=8.4Hz), 7.936(d, 1H, J=8Hz), 7.538(d, 2H, J=8.8Hz), 7.112(d, 1H, 8Hz), 6.930(d, 1H, J=8Hz), 6.773(s, 1H), 6.543(d, 1H, J=8Hz), 6.423(d, 1H, J=10Hz), 5.499(d, 1H, J=6Hz), 5.225(s, 2H), 5.129(s, 2H), 4.504(s, 2H), 3.240(br, 1H), 2.600(t, 2H, J=7.6Hz), 1.655~1.588(m, 2H), 1.337(s, 6H), 0.917(t, 3H, J=7.2Hz)
		¹³ C-NMR (CDCl ₃) : 194.877, 157.904, 153.873, 153.719, 151.043, 147.723, 142.811, 131.228,

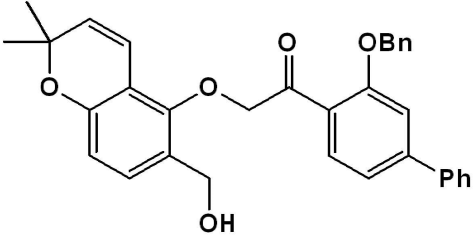
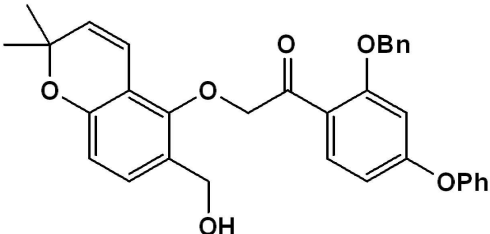
		130.668, 129.761, 128.101, 125.952, 123.847, 122.482, 112.220, 121.974, 116.910, 114.515, 112.614, 112.494, 80.738, 75.536, 69.504, 61.207, 38.178, 27.461, 24.006, 13.641
Example 25	[Compound 4-25] 	¹H-NMR (CDCl₃) : 8.130(dd, 1H, J=8, 1.2Hz), 7.907(d, 1H, J=8Hz), 7.712(d, 1H, J=7.6Hz), 7.594(td, 1H, 7.6, 1.2Hz), 7.497(dd, 1H, J=8.4, 1.6Hz), 7.040(d, 1H, J=8Hz), 6.927(dd, 1H, J=8, 1.2Hz), 6.747(s, 1H), 6.555(d, 1H, J=8.4Hz), 6.485(d, 1H, J=9.6Hz), 5.561(s, 2H), 5.535(d, 1H, J=10Hz), 5.183(s, 2H), 4.576(d, 2H, J=5.6Hz), 3.205(br, 1H), 2.573(t, 2H, J=4Hz), 1.636~1.579(m, 2H), 1.359(s, 6H), 0.906(t, 3H, J=7.6Hz)
		¹³C-NMR (CDCl₃) : 195.109, 157.878, 153.977, 153.791, 151.084, 147.120, 134.110, 132.256, 131.117, 130.597, 129.793, 129.029, 128.971, 126.048, 125.171, 122.525, 122.189, 117.065,

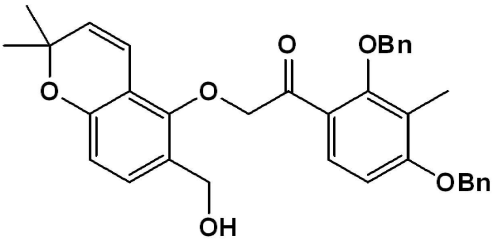
		114.542, 112.975, 112.387, 80.358, 75.657, 67.659, 38.190, 27.557, 24.064, 13.653
Example 26	[Compound 4-26] 	¹H-NMR (CDCl₃) : 7.980(d, 1H, J=8.4Hz), 7.388~7.322(m, 5H), 7.012(d, 1H, J=8.4Hz), 6.950(dd, 1H, J=8, 1.2Hz), 6.889(s, 1H), 6.540(d, 1H, J=8Hz), 6.393(d, 1H, J=9.6Hz), 5.478(d, 1H, J=10Hz), 5.155(s, 2H), 5.138(s, 2H), 4.519(d, 2H, J=4.8Hz), 3.381(br, 1H), 2.928(m, 1H), 1.400(s, 6H), 1.261~1.215(m, 6H) ¹³C-NMR (CDCl₃) : 195.327, 257.109, 154.077, 153.683, 131.276, 130.306, 129.642, 128.679, 128.457, 127.922, 126.031, 122.391, 119.581, 117.161, 114.329, 112.088, 80.805, 75.483, 61.319, 34.480, 27.502
Example 27	[Compound 4-27]	¹H-NMR (CDCl₃) : 7.961(d, 1H, J=8Hz), 7.359~7.279(m, 5H), 7.011(d, 1H, J=8Hz), 6.901(d, 1H, J=8Hz), 6.842(s, 1H), 6.539(d, 1H, J=8Hz), 6.395(d, 1H, J=9.6Hz), 5.476(d, 1H,

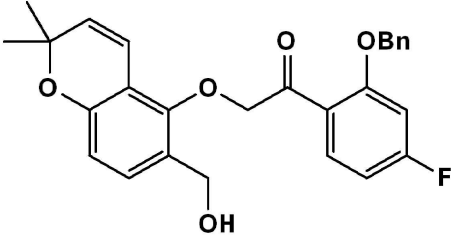
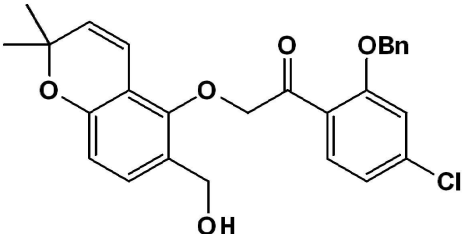
		^1H-NMR (CDCl_3) : 9.6 Hz), 5.150(s, 2H), 5.126(s, 2H), 4.516(d, 2H, $J=4.8\text{Hz}$), 3.302(br, 1H), 2.634(t, 2H, $J=7.6\text{Hz}$), 1.587(m, 2H), 1.417~1.331(m, 2H), 1.370(s, 6H), 0.923(t, 3H, $J=7.2\text{Hz}$) ^{13}C-NMR (CDCl_3) : 195.358, 158.764, 154.118, 153.717, 151.297, 135.582, 131.196, 130.340, 129.680, 128.711, 128.348, 127.909, 126.058, 122.263, 121.664, 117.189, 114.372, 112.629, 112.127, 80.842, 75.518, 70.840, 61.386, 35.941, 33.033, 27.534, 22.420, 13.857
Example 28	[Compound 4-28] 	^1H-NMR (CDCl_3) : 7.968(d, 1H, $J=8\text{Hz}$), 7.369~7.208(m, 5H), 7.011(d, 1H, $J=8.4\text{Hz}$), 6.905(d, 1H, $J=8\text{Hz}$), 6.840(s, 1H), 6.539(d, 1H, $J=8\text{Hz}$), 6.356(d, 1H, $J=10\text{Hz}$), 5.474(d, 1H, $J=9.6\text{Hz}$), 5.153(s, 2H), 5.127(s, 2H), 4.516(d, 2H, $J=6.4\text{Hz}$), 3.298(t, 1H, $J=6.8\text{Hz}$), 2.625(t, 2H, $J=7.6\text{Hz}$), 1.626~1.592(m, 2H), 1.417~1.216(m, 10H), 0.887(t, 3H, $J=6.4\text{Hz}$)

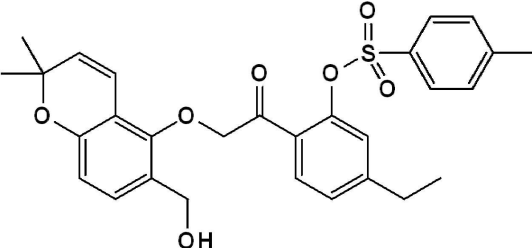
		-
Example 29	[Compound 4-29] 	¹H-NMR (CDCl₃) : 7.972(d, 1H, J=7.6Hz), 7.405~7.322(m, 5H), 7.012(d, 1H, J=8Hz), 6.941(d, 1H, J=8.4Hz), 6.925(s, 1H), 6.540(d, 1H, J=8.4Hz), 6.387(d, 1H, J=10Hz), 5.479(d, 1H, J=10Hz), 5.169(s, 2H), 5.146(s, 2H), 4.511(d, 2H, J=5.6Hz), 3.608(t, 2H, J=6.4Hz), 3.332(s, 3H), 3.272(br, 1H), 2.899(t, 2H, J=6.4Hz), 1.416(s, 6H) ¹³C-NMR (CDCl₃) : 195.380, 158.685, 154.084, 153.726, 147.462, 135.527, 131.269, 130.372, 129.687, 128.723, 128.506, 127.928, 126.041, 122.783, 121.901, 117.169, 114.367, 113.245, 112.154, 80.841, 75.527, 70.873, 61.375, 58.741, 36.433, 27.537
Example 30	[Compound 4-30]	¹H-NMR (CDCl₃) : 7.526(d, 1H, J=8Hz), 7.496~7.291(m, 5H), 7.270(d, 1H, J=8Hz), 7.016(d, 1H, J=8.4Hz), 6.546(d, 1H, 8Hz),

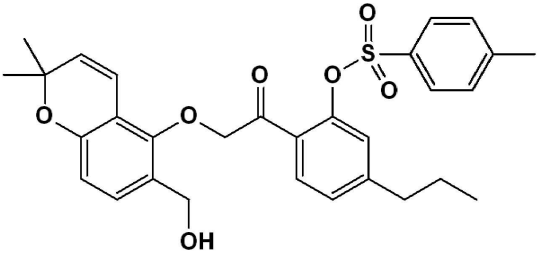
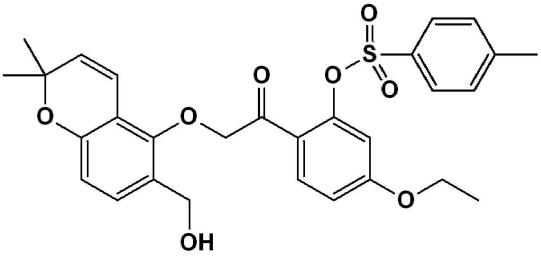
		6.432(d, 1H, J=8Hz), 5.498(d, 1H, J=10Hz), 5.135(s, 2H), 4.820(s, 2H), 4.539(s, 2H), 3.201(br, 1H), 2.332(s, 3H), 2.236(s, 3H), 1.361(s, 6H)
		-
Example 31	[Compound 4-31] 	¹ H-NMR (CDCl ₃) : 7.804(s, 1H), 7.346~7.334(m, 5H), 7.010(d, 1H, J=8.4Hz), 6.826(s, 1H), 6.536(d, 1H, J=8Hz), 6.398(d, 1H, J=10Hz), 5.472(d, 1H, J=10Hz), 5.147(s, 2H), 5.096(s, 2H), 4.517(d, 2H, J=3.6Hz), 3.327(br, 1H), 2.293(s, 3H), 2.233(s, 3H), 1.367(s, 6H)
		¹³ C-NMR (CDCl ₃) : 195.485, 156.948, 154.1449, 153.705, 144.902, 135.781, 131.672, 130.322, 129.657, 128.695, 128.409, 127.827, 126.078, 121.959, 117.197, 114.379, 114.009, 112.105, 80.880, 75.510, 70.948, 61.410, 27.529, 20.534, 18.974
Example	[Compound 4-32]	¹ H-NMR (CDCl ₃) : 8.119(d, 1H, J=8Hz),

32		7.536~7.205(m, 12H), 7.031(d, 1H, J=8.4Hz), 6.560(d, 1H, J=8Hz), 6.423(d, 1H, J=9.6Hz), 5.504(d, 1H, J=9.6Hz), 5.213(s, 4H), 4.541(d, 2H, J=5.6Hz), 3.240(t, 1H, J=6.4Hz), 1.385(s, 6H)
		¹³C-NMR (CDCl₃) : 195.363, 158.944, 154.081, 153.770, 148.050, 139.675, 135.426, 131.754, 130.445, 129.738, 128.969, 128.799, 128.615, 128.550, 127.963, 127.229, 126.046, 120.287, 117.167, 114.418, 112.231, 111.393, 80.924, 75.570, 71.064, 61.410, 27.570
Example 33	[Compound 4-33] 	¹H-NMR (CDCl₃) : 8.037(d, 1H, J=8.4Hz), 7.419~7.009(m, 11H), 6.603~6.535(m, 3H), 6.411(d, 1H, J=10Hz), 5.491(d, 1H, J=9.6Hz), 5.157(s, 2H), 5.035(s, 2H), 4.532(d, 2H, J=6.8Hz), 3.400(t, 1H, J=6.4Hz), 1.378(s, 6H) ¹³C-NMR (CDCl₃) : 194.214, 163.765, 160.375, 154.848, 154.168, 153.739, 135.098, 133.150,

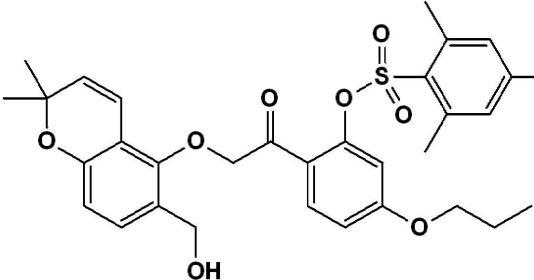
		130.344, 130.076, 129.724, 128.761, 128.577, 127.904, 126.0660, 124.910, 120.330, 119.189, 119.135, 144.344, 112.135, 110.042, 101.837, 80.752, 75.510, 70.976, 61.407, 27.536
Example 34	[Compound 4-34] 	¹H-NMR (CDCl₃) : 7.722(d, 1H, J=8.8Hz), 7.486~7.320(m, 10H), 7.013(d, 1H, J=8.4Hz), 6.828(d, 1H, J=8.8Hz), 6.544(d, 1H, J=8.4Hz), 6.418(d, 1H, J=10Hz), 5.481(d, 1H, J=10Hz), 5.162(s, 2H), 5.142(s, 2H), 4.850(s, 2H), 3.406(t, 1H, J=6.4Hz), 2.257(s, 3H), 1.363(s, 6H) ¹³C-NMR (CDCl₃) : 196.210, 161.985, 157.971, 154.160, 153.769, 136.275, 135.967, 130.506, 129.731, 129.099, 128.678, 128.646, 128.461, 128.137, 127.892, 127.126, 126.068, 123.289, 120.738, 117.149, 114.469, 112.222, 107.937, 79.434, 75.569, 61.487, 27.538, 9.705
Example 35	[Compound 4-35]	¹H-NMR (CDCl₃) : 8.101(dd, 1H, J=8.8, 6.8Hz), 7.420~7.347(m, 5H), 7.036(d, 1H, J=8Hz),

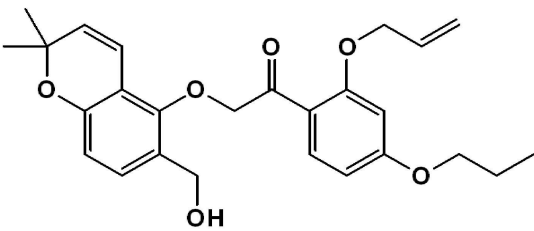
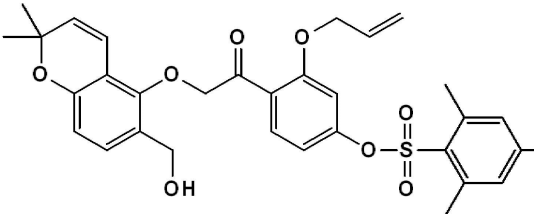
		6.827~6.749(m, 2H), 6.567(d, 1H, J=8Hz), 6.415(d, 2H, J=10Hz), 5.512(d, 1H, J=10Hz), 5.154(s, 2H), 5.123(s, 2H), 4.533(s, 2H), 3.2(br, 1H), 1.393(s, 6H) ¹³C-NMR (CDCl₃) : 194, 168.163, 165.619, 160.334, 160.229, 153.975, 153.772, 134.734, 133.584, 133.472, 130.501, 129.760, 128.858, 128.790, 127.915, 125.969, 121.147, 121.119, 117.070, 114.388, 112.291, 108.852, 108.637, 100.820, 100.560, 80.765, 75.579, 71.388, 27.562
Example 36	[Compound 4-36] 	¹H-NMR (CDCl₃) : 7.984(d, 1H, J=8Hz), 7.371~7.320(m, 5H), 7.085~6.988(m, 3H), 6.549(d, 1H, J=8Hz), 6.380(d, 1H, J=10Hz), 5.491(d, 1H, J=9.6Hz), 5.119(s, 2H), 5.111(s, 2H), 4.501(s, 2H), 3.002(br, 1H), 1.371(s, 6H) ¹³C-NMR (CDCl₃) : 194, 159, 154.051, 153.893, 140.950, 134.766, 132.341, 130.545, 129.762,

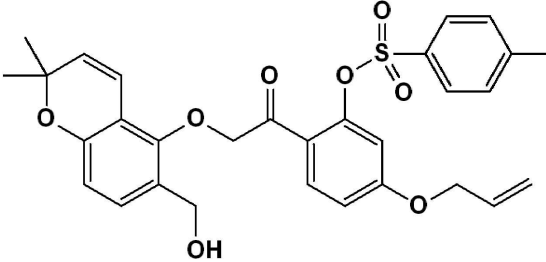
		128.855, 128.804, 127.919, 127.397, 125.938, 117.021, 114.402, 113.359, 112.341, 80.803, 75.600, 71.419, 61.322, 27.645
Example 37	[Compound 4-37] 	¹H-NMR (CDCl₃) : 7.707(d, 1H, J=8Hz), 7.649~7.628(m, 2H), 7.314~7.187(m, 3H), 7.078(d, 1H, J=8Hz), 7.013(s, 1H), 6.601(d, 1H, J=8.4Hz), 6.544(d, 1H, J=10Hz), 5.668(d, 1H, J=10Hz), 5.065(s, 2H), 4.587(s, 2H), 3(br, 1H), 2.676~2.619(m, 2H), 2.433(s, 3H), 1.429(s, 6H), 1.179(t, 3H, J=6.4Hz) ¹³C-NMR (CDCl₃) : 194.769, 153.894, 153.594, 151.474, 147.506, 146.216, 131.482, 130.893, 130.512, 130.008, 129.892, 129.787, 128.425, 127.586, 127.036, 125.931, 122.448, 116.989, 114.608, 112.670, 79.074, 75.811, 28.594, 27.597, 21.739, 14.723
Example 38	[Compound 4-38]	¹H-NMR (CDCl₃) : 7.698(d, 1H, J=8Hz), 7.630(d, 2H, J=6.4Hz), 7.248(d, 2H, J=8Hz),

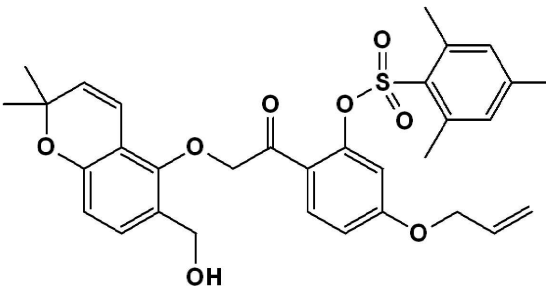
		7.176(dd, 1H, J=8, 1.6Hz), 7.078(d, 1H, J=8.4Hz), 6.997(d, 1H, J=1.2Hz), 6.601(d, 1H, J=8.4Hz), 6.548(d, 1H, J=9.6Hz), 5.670(d, 1H, J=10Hz), 5.067(s, 2H), 4.589(d, 2H, J=6.4Hz), 2.949(t, 1H, J=6.4Hz), 2.581(t, 2H, J=7.6Hz), 2.431(s, 3H), 1.605~1.549(m, 2H), 1.430(s, 6H), 0.899(t, 3H, J=7.2Hz) -
Example 39	[Compound 4-39] 	¹H-NMR (CDCl₃) : 7.814(d, 1H, J=8.8Hz), 7.659(dd, 2H, J=6.8, 1.6Hz), 7.239(d, 2H, J=8Hz), 7.069(d, 1H, J=8Hz), 6.858(dd, 1H, J=8.8, 1.6Hz), 6.786(s, 1H), 6.598(d, 1H, J=8Hz), 6.544(dd, 1H, J=9.6, 0.4Hz), 5.667(d, 1H, J=10Hz), 5.013(s, 2H), 4.561(d, 2H, J=5.6Hz), 4.032(q, 2H, J=14, 7.2Hz), 3.05(br, 1H), 2.423(s, 3H), 1.431(s, 6H), 1.400(t, 3H, J=4.8Hz) ¹³C-NMR (CDCl₃) : 193.271, 163.431, 153.875,

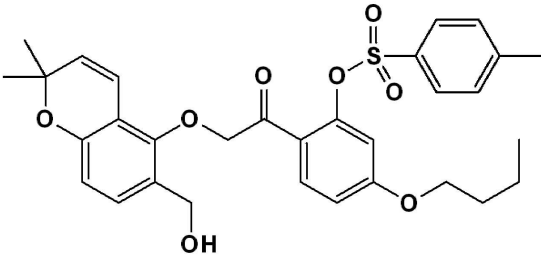
		153.718, 149.422, 146.293, 132.214, 131.584, 130.851, 130.063, 129.825, 128.329, 125.979, 121.846, 117.039, 114.607, 113.663, 112.501, 108.537, 79.121, 75.860, 64.363, 61.228, 27.604, 21.743, 14.429
Example 40	[Compound 4-40]	$^1\text{H-NMR}$ (CDCl_3) : 7.814(d, 1H, $J=8.8\text{Hz}$), 7.662(dd, 2H, $J=6.8, 1.6\text{Hz}$), 7.241(d, 2H, $J=8\text{Hz}$), 7.070(d, 1H, $J=8.4\text{Hz}$), 6.864(dd, 1H, $J=8.8, 1.6\text{Hz}$), 6.769(d, 1H, $J=2.4\text{Hz}$), 6.598(dd, 1H, $J=8, 0.4\text{Hz}$), 6.533(dd, 1H, $J=10, 0.4\text{Hz}$), 5.668(d, 1H, $J=10\text{Hz}$), 5.017(s, 2H), 4.563(d, 2H, $J=4.4\text{Hz}$), 3.905(t, 2H, $J=6.8\text{Hz}$), 3.079(br, 1H), 2.423(s, 3H), 1.829~1.777(m, 2H), 1.431(s, 6H), 1.027(t, 3H, $J=3.6\text{Hz}$)
		$^{13}\text{C-NMR}$ (CDCl_3) : 193.262, 163.614, 153.859, 149.399, 146.284, 132.196, 131.800, 131.555, 130.840, 129.943, 129.814, 128.349, 125.969, 121.798, 117.035, 114.596, 113.707, 112.484,

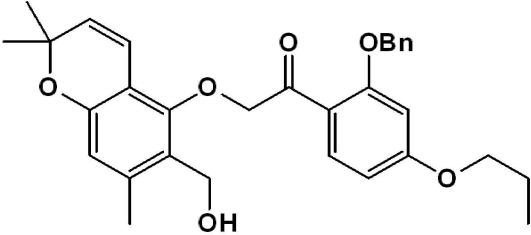
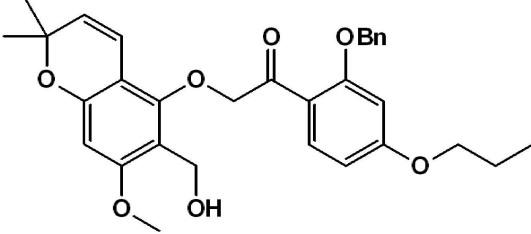
		108.528, 79.114, 75.790, 70.229, 27.719, 22.198, 21.734, 10.329
Example 41	[Compound 4-41] 	¹H-NMR (CDCl₃) : 7.942(d, 1H, J=9.2Hz), 7.043(d, 1H, J=8Hz), 6.975(s, 2H), 6.852(dd, 1H, J=8.8, 2.4Hz), 6.575(d, 1H, J=7.6Hz), 6.544(s, 1H), 6.258(d, 1H, J=2.4Hz), 5.648(d, 1H, J=10Hz), 5.074(s, 2H), 4.562(s, 2H), 3.731(t, 2H, J=6.4Hz), 3.1(br, 1H), 2.517(s, 6H), 2.321(s, 3H), 1.750~1.698(m, 2H), 1.422(s, 6H), 0.970(t, 3H, J=7.6Hz) ¹³C-NMR (CDCl₃) : 193.390, 163.533, 153.843, 153.775, 149.753, 144.601, 140.337, 132.494, 131.984, 130.764, 130.708, 129.709, 125.983, 122.210, 117.178, 114.649, 113.666, 112.400, 107.455, 79.339, 75.760, 70.058, 61.285, 27.558, 22.682, 22.116, 21.142, 10.241
Example 42	[Compound 4-42]	¹H-NMR (CDCl₃) : 8.051(d, 1H, J=8.8Hz), 7.042(d, 1H, J=8.4Hz), 6.618~6.548(m, 3H),

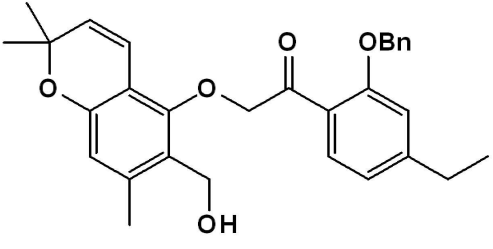
		6.415(d, 1H, J=2Hz), 6.045~6.029(m, 1H), 5.652(d, 1H, J=9.6Hz), 5.392(dd, 1H, J=17.2, 1.2Hz), 5.296(dd, 1H, J=11.2, 0.8Hz), 5.220(s, 2H), 4.634(d, 2H, J=6.8Hz), 4.584(d, 2H, J=5.6Hz), 4.009~3.953(m, 3H), 1.849~1.797(m, 2H), 1.431(s, 6H), 1.044(t, 3H, J=7.6Hz) ¹³C-NMR (CDCl₃) : 194.362, 165.011, 160.388, 154.687, 153.791, 133.236, 132.016, 130.230, 129.753, 126.206, 119.138, 117.748, 117.546, 114.381, 111.969, 106.68, 99.310, 880.667, 75.423, 69.890, 69.627, 61.722, 27.448, 22.366, 10.406
Example 43	[Compound 4-43] 	¹H-NMR (CDCl₃) : 7.045(d, 1H, J=8.4Hz), 6.996(s, 2H), 6.728(d, 1H, J=2Hz), 6.578(s, 1H), 6.555(d, 1H, J=2Hz), 6.521(dd, 1H, J=8.8, 2Hz), 5.989~5.920(m, 1H), 5.649(d, 1H, J=10Hz), 5.377~5.305(m, 2H), 5.194(s, 2H), 4.610(s, 2H), 4.511(d, 2H, J=5.6Hz), 2.571(s, 6H), 2.334(s,

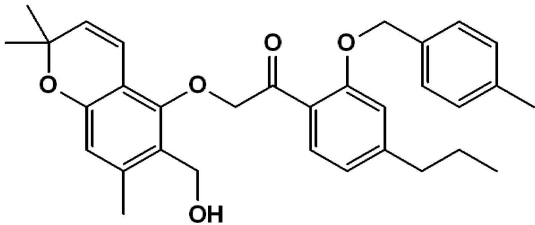
		3H), 1.425(s, 6H)
		¹³ C-NMR (CDCl ₃) : 194.5, 159.172, 154.216, 153.891, 144.344, 140.427, 132.524, 131.977, 131.589, 131.305, 130.549, 129.832, 125.997, 123.1110, 119.710, 117.408, 114.5507, 114.441, 112.325, 110.490, 107.381, 80.673, 75.564, 70.050, 61.556, 27.514, 22.745, 21.106
Example 44	[Compound 4-44] 	¹ H-NMR (CDCl ₃) : 7.820(d, 1H, J=8.8Hz), 7.660(d, 1H, J=8.4Hz), 7.266~7.233(m, 2H), 7.071(d, 1H, J=8Hz), 6.888(dd, 1H, J=8.8, 2.4Hz), 6.806(d, 1H, J=2.4Hz), 6.600(dd, 1H, J=8.4, 0.4Hz), 6.532(dd, 1H, J=9.6, 0.4Hz), 6.028~5.959(m, 1H), 5.669(d, 1H, J=10Hz), 5.422~5.318(m, 2H), 5.220(s, 2H), 4.567~4.526(m, 4H), 3.05(br, 1H), 2.425(s, 3H), 1.431(s, 6H)
		¹³ C-NMR (CDCl ₃) : 193.285, 162.930, 153.859, 153.679, 149.347, 146.328, 132.220, 131.702,

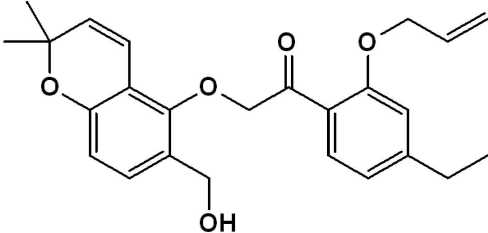
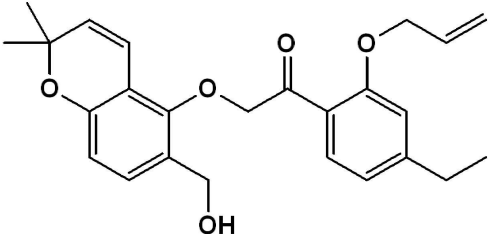
		131.497, 130.862, 130.069, 129.827, 128.336, 125.948, 122.144, 118.717, 117.011, 114.595, 113.897, 112.504, 108.808, 79.126, 75.796, 69.325, 61.209, 27.586, 21.749
Example 45	[Compound 4-45] 	¹H-NMR (CDCl₃) : 7.942(d, 1H, J=8.8Hz), 7.044(d, 1H, J=8Hz), 6.978(s, 2H), 6.876(dd, 1H, J=8.8, 2Hz), 6.586~6.545(m, 2H), 6.293(d, 1H, J=2.4Hz), 5.938~5.869(m, 1H), 5.647(d, 1H, J=10Hz), 5.327~5.263(m, 2H), 5.156(s, 2H), 4.563(d, 2H, J=2.4Hz), 4.376(d, 2H, J=5.6Hz), 3.092(br, 1H), 2.529(s, 6H), 2.334(s, 3H), 1.421(s, 6H) ¹³C-NMR (CDCl₃) : 193.422, 162.870, 153.852, 153.741, 149.669, 144.634, 140.332, 132.506, 131.890, 131.706, 130.732, 129.724, 125.976, 122.650, 118.556, 117.161, 114.656, 113.799, 112.430, 107.894, 79.336, 75.767, 69.176, 61.267, 29.330, 22.669, 21.150

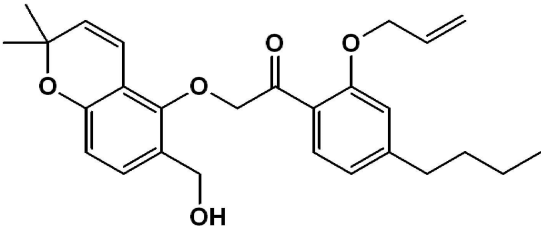
Example 46	[Compound 4-46] 	¹H-NMR (CDCl₃) : 7.814(d, 1H, J=8.8Hz), 7.665(dd, 1H, J=8.4, 2Hz), 7.266(s, 1H), 7.240(d, 1H, J=8Hz), 7.068(d, 1H, J=8.4Hz), 6.858(dd, 1H, J=8.8, 2.4Hz), 6.758(d, 1H, J=2Hz), 6.596(dd, 1H, J=8.4, 0.4Hz), 6.533(d, 1H, J=10Hz), 5.665(d, 1H, J=10Hz), 5.016(s, 2H), 4.561(s, 2H), 3.942(t, 2H, J=6.8Hz), 3.095(br, 1H), 2.421(s, 3H), 1.792~1.722(m, 2H), 1.499~1.392(m, 8H), 0.975(t, 3H, J=7.2Hz) ¹³C-NMR (CDCl₃) : 193.251, 163.619, 153.863, 153.709, 149.408, 146.273, 132.191, 131.595, 130.836, 130.042, 129.810, 128.355, 125.981, 121.812, 117.040, 113.709, 112.487, 108.519, 79.115, 75.788, 68.483, 61.206, 30.829, 27.594, 21.729, 19.098, 13.711
Example 47	[Compound 4-47]	¹H-NMR (CDCl₃) : 8.047(d, 1H, J=8.8Hz), 7.3884~7.324(m, 5H), 6.581(dd, 1H, J=8.8,

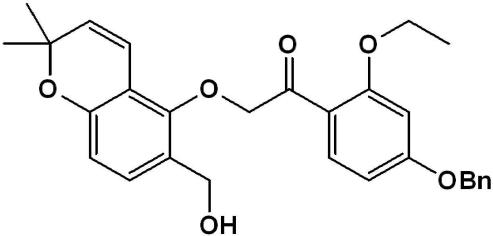
		2H), 6.507(s, 1H), 6.502(s, 1H), 6.422(d, 1H, J=8Hz), 5.401(d, 1H, J=10Hz), 5.116(s, 2H), 5.090(s, 2H), 4.615(s, 2H), 3.959(t, 2H, J=6.8Hz), 3.2(br, 1H), 2.325(s, 3H), 1.836~1.784(m, 2H), 1.355(s, 6H), 1.036(t, 3H, J=7.6Hz) ¹³C-NMR (CDCl₃) : 194.185, 164.941, 160.501, 154.568, 153.073, 139.013, 135.410, 133.214, 129.135, 128.709, 128.515, 127.952, 124.437, 117.703, 117.378, 114.027, 111.673, 106.724, 99.451, 81.045, 75.422, 70.892, 69.899, 56.764, 27.548, 22.352, 19.333, 10.396
Example 48	[Compound 4-48] 	¹H-NMR (CDCl₃) : 8.048(d, 1H, J=8.8Hz), 7.388~7.297(m, 5H), 6.574(dd, 1H, J=8.8, 2.4Hz), 6.490(d, 1H, J=2Hz), 6.363(d, 1H, J=9.6Hz), 6.206(s, 1H), 5.345(d, 1H, J=9.6Hz), 5.118(s, 2H), 5.090(s, 2H), 4.636(d, 2H, J=5.2Hz), 3.948(t, 2H, J=6.4Hz), 3.782(s, 3H),

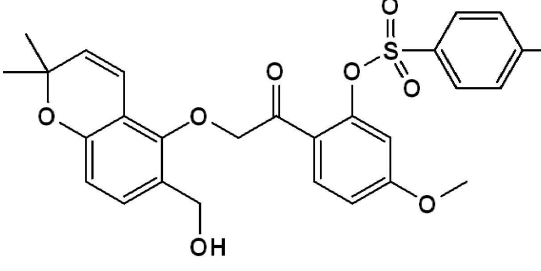
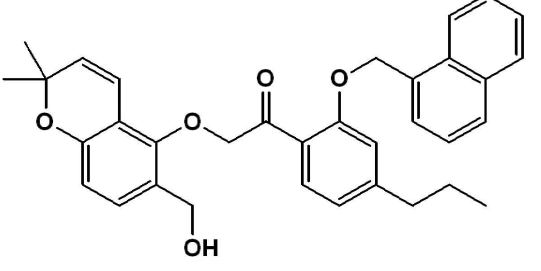
		3.054(br, 1H), 1.811~1.758(m, 2H), 1.365(s, 6H), 1.030(t, 3H, J=7.6Hz) ¹³C-NMR (CDCl₃) : 193.584, 164.806, 160.403, 158.863, 154.891, 154.301, 135.452, 133.104, 128.805, 128.345, 127.798, 127.061, 117.821, 117.232, 114.778, 107.315, 106.702, 81.117, 75.999, 70.82, 69.844, 55.614, 54.511, 27.550, 22.321, 14.122
Example 49	[Compound 4-49] 	¹H-NMR (CDCl₃) : 7.952(d, 1H, J=8Hz), 7.380~7.314(m, 5H), 6.901(d, 1H, J=8Hz), 6.855(s, 1H), 6.434(s, 1H), 6.334(d, 1H, J=9.6Hz), 5.410(d, 1H, J=10Hz), 5.138(s, 2H), 5.117(s, 2H), 4.605(d, 2H, J=3.2Hz), 3.050(br, 1H), 2.656(q, 2H, J=15.2, 7.6Hz), 2.318(s, 3H), 1.353(s, 6H), 1.234(t, 3H, J=7.6Hz) ¹³C-NMR (CDCl₃) : 195.367, 158.811, 154.415, 153.049, 152.438, 139.003, 135.578, 131.209, 129.179, 128.630, 128.397, 127.907, 124.342,

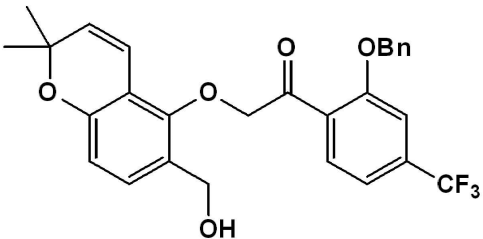
		122.280, 121.000, 120.907, 117.261, 114.061, 112.049, 111.687, 81.134, 75.415, 70.779, 56.687, 29.130, 27.516, 19.278, 14.979
Example 50	[Compound 4-50] 	¹ H-NMR (CDCl ₃) : 7.948(d, 1H, J=8Hz), 7.245(d, 2H, J=3.2Hz), 7.113(d, 2H, 7.6Hz), 6.877(d, 1H, J=8.4Hz), 6.835(s, 1H), 6.437(s, 1H), 6.340(d, 1H, J=10Hz), 5.406(d, 1H, J=9.6Hz), 5.119(s, 2H), 5.064(s, 2H), 4.606(s, 2H), 3.0(br, 1H), 2.603(t, 2H, J=7.6Hz), 2.347(s, 3H), 2.324(s, 3H), 1.673~1.586(m, 2H), 1.338(s, 6H), 0.933(t, 3H, J=7.2Hz)
		¹³ C-NMR (CDCl ₃) : 195.369, 158.846, 154.454, 153.083, 150.926, 138.996, 138.227, 132.552, 131.100, 129.287, 129.145, 128.073, 127.683, 124.369, 122.347, 121.558, 117.353, 114.054, 112.648, 81.231, 75.425, 70.715, 56.739, 38.2321, 27.525, 24.023, 21.149, 19.307, 13.696
Example	[Compound 4-51]	¹ H-NMR (CDCl ₃) : 7.956(d, 1H, J=8Hz),

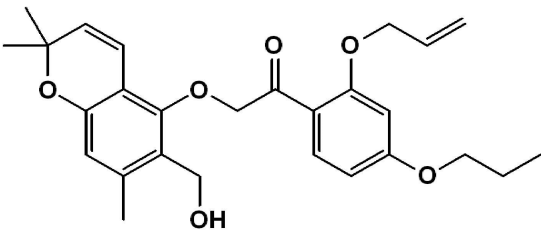
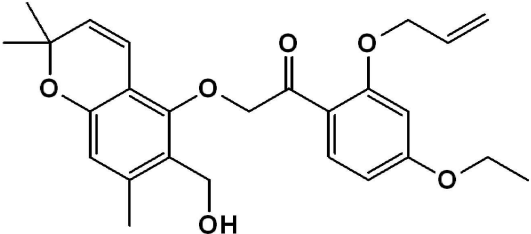
51		$^1\text{H-NMR}$ (CDCl_3) : 7.048(d, 1H, $J=8.4\text{Hz}$), 6.907(dd, 1H, $J=8.8$, 0.8Hz), 6.765(s, 1H), 6.615~6.554(m, 2H), 6.073~6.004(m, 1H), 5.650(d, 1H, $J=10\text{Hz}$), 5.389(dd, 1H, $J=17.2$, 1.2Hz), 5.291(dd, 1H, $J=2.4$, 1.2Hz), 5.244(s, 2H), 4.629~4.615(m, 4H), 3.8(br, 1H), 2.662(t, 2H, $J=7.6\text{Hz}$), 1.426(s, 6H), 1.245(t, 3H, $J=7.6\text{Hz}$) $^{13}\text{C-NMR}$ (CDCl_3) : 195.629, 158.718, 154.543, 153.826, 152.559, 132.231, 131.297, 130.317, 129.774, 126.151, 122.200, 121.036, 118.989, 117.658, 114.410, 112.076, 111.980, 80.768, 75.469, 69.552, 61.660, 29.197, 27.470, 15.023
Example 52	[Compound 4-52] 	$^1\text{H-NMR}$ (CDCl_3) : 7.948(d, 1H, $J=8\text{Hz}$), 7.047(d, 1H, $J=8.4\text{Hz}$), 6.884(dd, 1H, $J=8$, 1.2Hz), 6.745(s, 1H), 6.601(d, 1H, $J=10\text{Hz}$), 6.562(d, 1H, $J=8.4\text{Hz}$), 6.069~6.000(m, 1H), 5.650(d, 1H, $J=9.6\text{Hz}$), 5.408~5.217(m, 2H), 5.244(s, 2H), 4.641~4.606(m, 4H), 3.800(br,

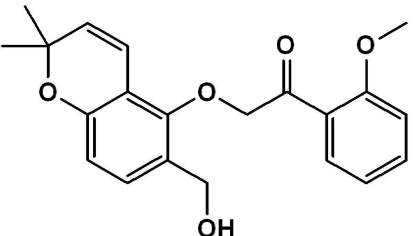
		1H), 2.605(t, 2H, J=7.6Hz), 1.677~1.602(m, 2H), 1.429(s, 6H), 0.943(t, 3H, J=5.6Hz) ¹³C-NMR (CDCl₃) : 195.608, 158.610, 154.521, 153.801, 151.042, 132.214, 131.152, 130.305, 129.747, 126.158, 122.208, 121.623, 118.961, 117.643, 114.406, 112.557, 112.062, 80.760, 75.455, 69.533, 61.637, 38.252, 27.459, 24.051, 13.713
Example 53	[Compound 4-53] 	¹H-NMR (CDCl₃) : 7.947(d, 1H, J=8Hz), 7.048(d, 1H, J=8Hz), 6.888(d, 1H, J=8Hz), 6.744(s, 1H), 6.613~6.553(m, 2H), 6.045~6.002(m, 1H), 6.649(d, 1H, J=10Hz), 5.387(dd, 1H, J=17.2, 1.2Hz), 5.288(d, 1H, J=10.4Hz), 5.242(s, 2H), 4.634~4.607(m, 4H), 2.646~2.608(m, 3H), 1.637~1.561(m, 2H), 1.430(s, 6H), 1.399~1.257(m, 2H), 0.929(t, 3H, J=7.2Hz) ¹³C-NMR (CDCl₃) : 195.613, 158.641, 154.545,

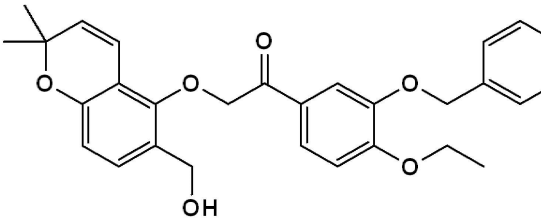
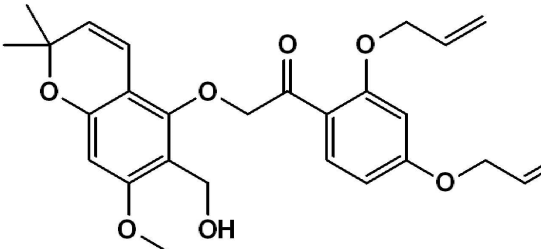
		153.837, 151.300, 132.246, 131.194, 130.316, 129.780, 126.166, 122.222, 121.610, 118.970, 117.665, 114.427, 112.520, 112.091, 80.770, 75.476, 69.558, 61.660, 35.965, 33.050, 27.485, 22.293, 13.853
Example 54	[Compound 4-54] 	¹H-NMR (CDCl₃) : 8.050(dd, 1H, J=8.8, 1.2Hz), 7.427~7.338(m, 5H), 7.042(dd, 1H, J=8, 0.8Hz), 6.650~6.549(m, 3H), 6.474(s, 1H), 5.665(d, 1H, J=8.4Hz), 5.219(s, 2H), 5.108(s, 2H), 4.653~4.607(m, 3H), 4.241(br, 1H), 1.427(s, 6H), 1.357(s, 3H), 1.342(s, 3H) ¹³C-NMR (CDCl₃) : 194.745, 164.444, 159.670, 154.967, 153.851, 135.907, 133.374, 130.156, 129.853, 128.717, 128.330, 127.485, 126.201, 118.540, 117.989, 114.223, 111.883, 106.602, 100.247, 80.878, 75.310, 70.847, 70.327, 61.766, 27.321, 21.994
Example	[Compound 4-55]	¹H-NMR (CDCl₃) : 7.824(d, 1H, J=8.8Hz),

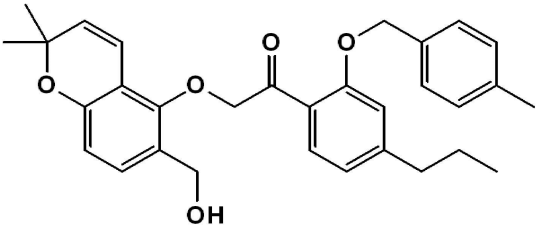
55		¹H-NMR (CDCl₃) : 7.663(d, 1H, J=8.4Hz), 7.272(s, 1H), 7.243(d, 1H, J=8Hz), 7.069(d, 1H, J=8Hz), 6.868(dd, 1H, J=8.8, 2.4Hz), 6.751(d, 1H, J=2.4Hz), 6.593(d, 1H, J=8.4Hz), 6.536(d, 1H, J=9.6Hz), 5.664(d, 1H, J=10Hz), 5.026(s, 2H), 4.562(s, 2H), 3.798(s, 3H), 3.15(br, 1H), 2.418(s, 3H), 1.427(s, 6H) ¹³C-NMR (CDCl₃) : 194, 163.926, 153.806, 153.609, 149.353, 146.301, 132.214, 131.516, 130.816, 130.029, 129.774, 128.309, 125.937, 122.075, 116.978, 114.564, 113.116, 112.464, 108.177, 79.077, 75.759, 61.093, 55.809, 27.550, 21.698
Example 56	[Compound 4-56] 	¹H-NMR (CDCl₃) : 8.009(d, 1H, J=8Hz), 7.946(d, 1H, J=8Hz), 7.874(d, 1H, J=7.6Hz), 7.508~7.424(m, 4H), 7.016(s, 1H), 6.951(dd, 1H, J=8.4, 0.8Hz), 6.870(d, 1H, J=8Hz), 6.438(d, 1H, J=8.4Hz), 5.903(d, 1H, J=9.6Hz),

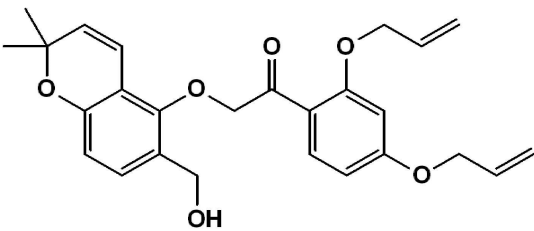
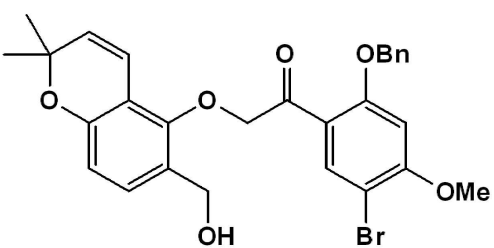
		5.528(s, 2H), 5.155(d, 1H, J=10Hz), 4.883(s, 2H), 4.258(d, 2H, J=4.8Hz), 3.049(br, 1H), 2.672(t, 2H, J=7.6Hz), 1.733~1.676(m, 2H), 1.279(s, 6H), 0.983(t, 3H, J=7.2Hz) -
Example 57	[Compound 4-57] 	¹H-NMR (CDCl₃) : 7.691(d, 1H, J=7.6Hz), 7.416~7.358(m, 5H), 7.267(d, 1H, J=9.2Hz), 7.156(s, 1H), 6.983(d, 1H, J=8.4Hz), 6.526(d, 1H, J=8Hz), 6.383(d, 1H, J=9.6Hz), 5.524(d, 1H, J=6.4Hz), 5.485(d, 1H, J=10Hz), 5.116(q, 2H, J=16, 11.2Hz), 4.619(d, 1H, J=11.6Hz), 4.464(d, 1H, J=11.6Hz), 4.233(dd, 1H, J=10., 2.4Hz), 3.859(q, 1H, J=10, 8.4Hz), 1.374(s, 3H), 1.356(s, 3H) -
Example 58	[Compound 4-58]	¹H-NMR (CDCl₃) : 8.028(d, 1H, J=8.8Hz), 6.584~6.557(m, 2H), 6.538~6.408(m, 2H), 6.071~6.002(m, 1H), 5.580(d, 1H, J=10Hz),

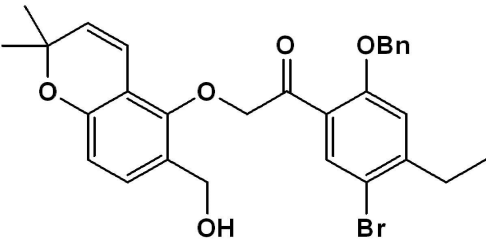
		5.388(dd, 1H, J=17.2, 1.2Hz), 5.295(dd, 1H, J=10.8, 1.2Hz), 5.207(s, 2H), 4.723(d, 2H, J=3.6Hz), 4.583(d, 2H, J=5.6Hz), 3.963(t, 2H, J=6.8Hz), 3.669(br, 1H), 2.348(s, 3H), 1.844~1.792(m, 2H), 1.412(s, 6H), 1.040(t, 3H, J=7.6Hz) ¹³C-NMR (CDCl₃) : 194.441, 164.916, 160.332, 154.940, 153.077, 138.949, 133.145, 132.049, 129.089, 124.555, 119.021, 117.799, 117.648, 113.959, 111.768, 106.661, 99.312, 80.855, 75.354, 69.856, 69.581, 56.850, 27.465, 22.346, 19.329, 10.378
Example 59	[Compound 4-59] 	¹H-NMR (CDCl₃) : 8.033(d, 1H, J=8Hz), 6.581~6.537(m, 2H), 6.458(s, 1H), 6.405(d, 1H, J=2Hz), 6.068~5.999(m, 1H), 5.583(d, 1H, J=10Hz), 5.389(dd, 1H, J=18.8, 1.2Hz), 5.296(dd, 1H, J=10.4, 1.2Hz), 5.208(s, 2H), 4.724(s, 2H), 4.579(d, 2H, J=5.6Hz), 4.079(q,

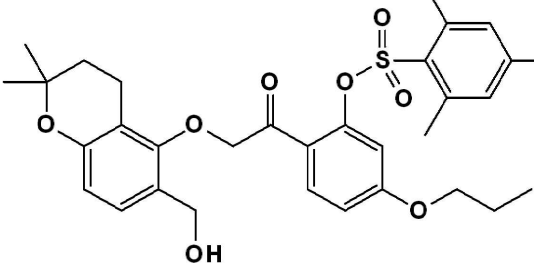
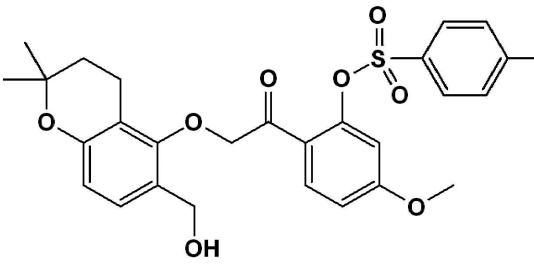
		2H, J=14, 7.2Hz), 3.683(br, 1H), 2.350(s, 3H), 1.447~1.413(m, 9H) ¹³C-NMR (CDCl₃) : 194.467, 164.720, 160.332, 154.965, 153.107, 138.981, 133.213, 132.068, 129.121, 124.580, 119.055, 117.816, 117.761, 113.998, 111.799, 106.589, 99.403, 80.876, 75.388, 69.597, 63.949, 56.901, 27.497, 19.426, 14.592
Example 60	[Compound 4-60] 	¹H-NMR (CDCl₃) : 7.997(dd, 1H, J=7.6, 1.6Hz), 7.529(t, 1H, J=8Hz), 7.088~7.004(m, 2H), 9.970(d, 1H, J=8.4Hz), 6.614(d, 1H, J=10Hz), 6.582(d, 1H, J=8.4Hz), 6.659(d, 1H, J=10Hz), 5.206(s, 2H), 4.606(s, 2H), 3.880(s, 3H), 3.306(br, 1H), 1.249(s, 6H) -
Example 61	[Compound 4-61]	¹H-NMR (CDCl₃) : 7.576(s, 1H), 7.504~7.324(m, 5H), 7.297(d, 1H, J=6.8Hz), 7.065(d, 1H, J=8Hz), 6.876(d, 1H, J=8.4Hz),

		6.596(s, 1H), 6.574(s, 1H), 5.658(d, 1H, J=10Hz), 5.210(s, 2H), 5.174(s, 2H), 4.607(d, 2H, J=6Hz), 4.161(q, 2H, J=14, 6.8Hz), 3.165(t, 1H J=6Hz), 1.486(t, 3H, J=6.8Hz), 1.425(s, 6H) ¹³C-NMR (CDCl₃) : 193.041, 154.272, 153.906, 153.863, 148.440, 136.577, 130.902, 129.974, 128.511, 127.951, 127.345, 127.013, 125.968, 122.799, 116.971, 114.608, 113.354, 112.637, 111.670, 76.409, 75.779, 71.131, 64.582, 61.237, 27.637, 14.590
Example 62	[Compound 4-62] 	¹H-NMR (CDCl₃) : 8.038(d, 1H, J=8Hz), 6.588(dd, 1H, J=8.8, 2.4Hz), 6.551(dd, 1H, J=9.6, 0.4Hz), 6.443(d, 1H, J=2Hz), 6.231(s, 1H), 6.068~5.988(m, 2H), 5.489(d, 1H, J=10Hz), 5.442~5.269(m, 4H), 5.193(s, 2H), 4.734(s, 2H), 4.593~4.572(m, 4H), 3.805(s, 3H), 3.3(br, 1H), 1.421(s, 6H) ¹³C-NMR (CDCl₃) : 193.834, 164.157, 160.240,

		158.901, 155.163, 154.371, 133.163, 132.272, 132.061, 127.111, 118.970, 118.374, 118.132, 117.611, 114.862, 107.431, 106.790, 99.730, 95.984, 80.951, 76.020, 69.617, 69.048, 55.676, 54.620, 27.525
Example 63	[Compound 4-63] 	¹H-NMR (CDCl₃) : 7.964(d, 1H, J=7.6Hz), 7.249(d, 1H, J=9.6Hz), 7.118(d, 2H, J=8Hz), 7.010(d, 1H, J=8Hz), 6.895(d, 1H, J=8Hz), 6.842(s, 1H), 6.541(d, 1H, J=8Hz), 6.391(d, 1H, J=10Hz), 5.468(d, 1H, J=9.6Hz), 5.125(s, 2H), 5.070(s, 2H), 4.505(d, 2H, J=6.4Hz), 3.243(t, 1H, J=6.4Hz), 2.614(t, 2H, J=7.6Hz), 2.351(s, 3H), 1.681~1.603(m, 2H), 1.371(s, 6H), 0.941(t, 3H, J=7.6Hz)
		-
Example 64	[Compound 4-64]	¹H-NMR (CDCl₃) : 8.048(d, 1H, J=8Hz), 7.042(d, 1H, J=8.4Hz), 6.614~6.548(m, 3H), 6.449(d, 1H, J=2Hz), 6.067~5.995(m, 2H),

		5.651(d, 1H, J=10Hz), 5.444~5.285(m, 4H), 5.216(s, 2H), 4.631(d, 2H, J=6.4Hz), 4.596~4.571(m, 4H), 3.964(t, 1H, J=6.8Hz), 1.430(s, 6H) ¹³C-NMR (CDCl₃) : 194.330, 164.317, 160.321, 154.619, 153.784, 133.201, 132.202, 131.945, 130.248, 129.739, 126.183, 119.170, 118.384, 117.872, 117.699, 114.379, 111.991, 106.869, 99.644, 80.651, 75.428, 69.640, 69.049, 61.670, 27.446
Example 65	[Compound 4-65] 	¹H-NMR (CDCl₃) : 8.226(s, 1H), 7.356~7.340(m, 5H), 7.004(d, 1H, J=8Hz), 6.535(d, 1H, J=8.4Hz), 6.466(s, 1H), 6.391(d, 1H, J=10Hz), 5.589(d, 1H, J=10Hz), 5.140(s, 2H), 5.090(s, 2H), 4.503(s, 2H), 3.880(s, 3H), 3.304(br, 1H), 1.369(s, 6H) ¹³C-NMR (CDCl₃) : 192.960, 160.781, 159.785, 154.001, 153.726, 135.344, 134.899, 130.429,

		129.713, 128.860, 128.773, 127.840, 126.024, 118.387, 117.098, 114.380, 112.214, 103.874, 96.809, 80.664, 75.542, 71.436, 61.290, 56.447, 27.550
Example 66	[Compound 4-66] 	¹H-NMR (CDCl₃) : 8.153(s, 1H), 7.899~7.305(m, 5H), 7.101(d, 1H, J=8.4Hz), 6.902(s, 1H), 6.537(d, 1H, J=8.4Hz), 6.385(d, 1H, J=9.6Hz), 5.487(d, 1H, J=10Hz), 5.111(s, 4H), 4.479(s, 2H), 3.15(br, 1H), 2.741(q, 2H), 1.366(s, 6H), 1.213(t, 3H) ¹³C-NMR (CDCl₃) : 194.067, 157.790, 153.830, 153.714, 150.582, 135.130, 134.619, 130.479, 129.690, 128.744, 128.611, 127.874, 125.907, 123.793, 116.989, 115.933, 114.364, 113.804, 112.275, 80.706, 75.554, 71.223, 61.183, 29.899, 27.539, 13.716
Example 67	[Compound 4-107]	¹H-NMR (CDCl₃) : 7.979(d, 1H, J=8.8Hz), 7.022~6.970(m, 2H), 6.852(d, 1H, J=6.8Hz),

		6.569(d, 1H, J=8.4Hz), 6.179(s, 1H), 5.183(s, 2H), 4.547(s, 2H), 3.704(t, 2H, J=6.8Hz), 3.1(br, 1H), 2.783(t, 2H, J=6.4Hz), 2.521(s, 6H), 2.325(s, 3H), 1.772~1.681(m, 4H), 1.325(s, 6H), 0.960(t, 3H, J=6.4Hz) ¹³C-NMR (CDCl₃) : 193.349, 163.498, 156.236, 154.929, 149.805, 144.620, 140.311, 132.573, 131.963, 130.804, 127.966, 124.781, 122.253, 114.952, 113.711, 113.148, 107.229, 77.984, 73.991, 70.016, 32.154, 26.639, 22.598, 22.074, 17.789, 10.197
Example 68	[Compound 4-121] 	¹H-NMR (CDCl₃) : 7.875(d, 1H, J=8.8Hz), 7.640(d, 2H, J=8.4Hz), 7.223(d, 2H, J=8Hz), 7.042(d, 1H, J=8.4Hz), 6.890(d, 1H, J=2.8Hz), 6.703(s, 1H), 6.627(d, 1H, J=8.4Hz), 5.046(s, 2H), 4.546(s, 2H), 3.794(s, 3H), 3.1(br, 1H), 2.749(t, 2H, J=6.8Hz), 2.415(s, 3H), 1.741(t, 2H, J=6.4Hz), 1.332(s, 6H)

		¹³ C-NMR (CDCl ₃) : 193.321, 163.945, 156.181, 154.994, 149.466, 147.364, 146.315, 132.356, 131.660, 130.052, 128.307, 128.143, 124.754, 122.182, 114.848, 113.260, 113.172, 108.098, 77.774, 74.030, 61.494, 55.824, 32.133, 26.675, 21.734, 17.811
--	--	--

[00138]

[00139] Using the method disclosed in the above Examples, it is possible to commercially produce 2-((6-
5 (hydroxymethyl)chromen-5-yl)oxy)-1-phenylethanone derivatives under mild conditions in a simple, easy and economical manner.

[00140]

[00141] So far, the present invention has been described with
10 reference to the preferred embodiments. Those skilled in the art will appreciate that the present invention can be embodied in modified forms without departing from the essential features of the present invention. Therefore, the disclosed embodiments should be considered in descriptive
15 sense only and not for purposes of limitation. Therefore, the scope of the present invention is defined not by the

detailed description of the present invention but by the appended claims, and all modifications within a range equivalent to the scope of the appended claims should be construed as being included in the present invention.

CLAIMS

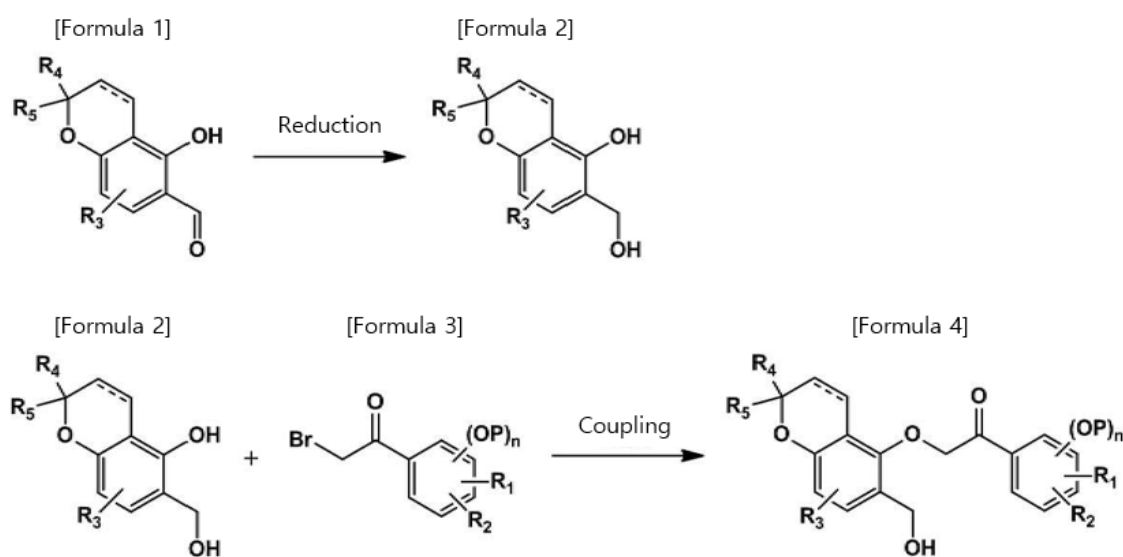
1. A method for synthesizing a 2-((6-(hydroxymethyl)chromen-5-yl)oxy)-1-phenylethanone derivative represented by Formula 4, the method comprising

5 steps of:

(a) reducing a compound of Formula 1 to produce a compound of Formula 2; and

(b) coupling the compound of Formula 2 with a compound of Formula 3:

10 [Reaction Scheme 1]



wherein

the dotted line is an optional double bond;

15 R₁ and R₂ are each independently any one of a hydrogen atom; a substituted or unsubstituted linear or branched C₁-C₆ alkyl group; a halogen atom; a substituted or unsubstituted

linear or branched C₁-C₆ alkoxy group; a substituted or unsubstituted linear or branched C₁-C₄ thioalkyl group; a substituted or unsubstituted allyloxy group; a substituted or unsubstituted aryloxy group; and a phenyl group;

5 R₃ is any one of a hydrogen atom; a C₁-C₃ alkyl group; a C₁-C₃ alkoxy group; and a halogen atom;

R₄ and R₅ are each independently any one of a hydrogen atom and a C₁-C₂ alkyl group;

P is any one of a substituted or unsubstituted linear or
10 branched C₁-C₄ alkyl group; a substituted or unsubstituted benzyl group; an allyl group; a t-butyldimethylsilyl group; t-butyldiphenylsilyl group; a dimethylphenylsilyl group; a trimethylsilyl group; MeSO₂, a p-toluenesulfonyl group; and a 2,4,6-trimethylbenzenesulfonyl group;

15 n is from 1 to 3;

when OP is plural in number, they are the same or different;
and

the substituent for the substituted alkyl group, substituted alkoxy group, substituted thioalkyl group,
20 substituted allyloxy group, substituted aryloxy group or substituted benzyl group is any one of a benzyloxy group, a halogen atom, a linear or branched C₁-C₅ alkyl group, a linear or branched C₁-C₅ alkoxy group, a linear or branched C₁-C₃ thioalkyl group, a nitro group, and a naphthalene

group.

2. The method of claim 1, wherein step (b) is performed under a basic condition.

5

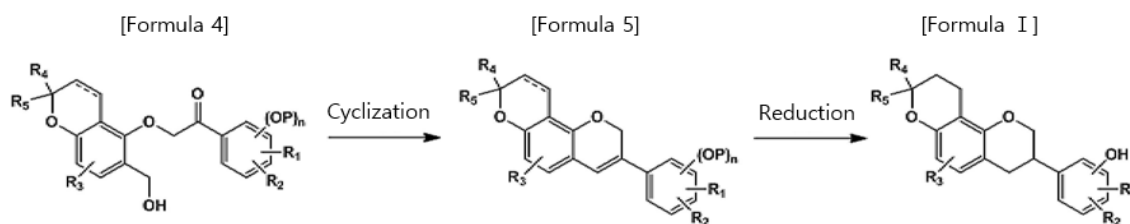
3. The method of claim 2, wherein the basic condition is formed by adding at least one basic compound selected from among sodium hydroxide (NaOH), potassium hydroxide (KOH), sodium carbonate (Na₂CO₃), lithium carbonate (Li₂CO₃), potassium carbonate (K₂CO₃), sodium hydrogen carbonate (NaHCO₃), potassium hydrogen carbonate (KHCO₃), triethylamine, and pyridine.

4. A method for synthesizing a 3-phenyl-2,3,4,8,9,10-hexahydropyrano[2,3-f]chromene derivative of Formula I, the method comprising steps of:

(i) producing a compound of Formula 4 using the method according to any one of claims 1 to 3, and cyclizing the compound of Formula 4 to produce a compound of Formula 5; and

(ii) reducing the compound of Formula 5:

[Reaction Scheme 2]



wherein

the dotted line is an optional double bond;

R₁ and R₂ are each independently any one of a hydrogen atom;

5 a substituted or unsubstituted linear or branched C₁-C₆ alkyl group; a halogen atom; a substituted or unsubstituted linear or branched C₁-C₆ alkoxy group; a substituted or unsubstituted linear or branched C₁-C₄ thioalkyl group; a substituted or unsubstituted allyloxy group; a substituted or unsubstituted aryloxy group; and a phenyl group;

R₃ is any one of a hydrogen atom; a C₁-C₃ alkyl group; a C₁-C₃ alkoxy group; and a halogen atom;

R₄ and R₅ are each independently any one of a hydrogen atom; and a C₁-C₂ alkyl group;

15 P is any one of a substituted or unsubstituted linear or branched C₁-C₄ alkyl group; a substituted or unsubstituted benzyl group; an allyl group; a t-butyldimethylsilyl group; t-butyldiphenylsilyl group; a dimethylphenylsilyl group; a trimethylsilyl group; MeSO₂; a p-toluenesulfonyl group; and a 2,4,6-trimethylbenzenesulfonyl group;

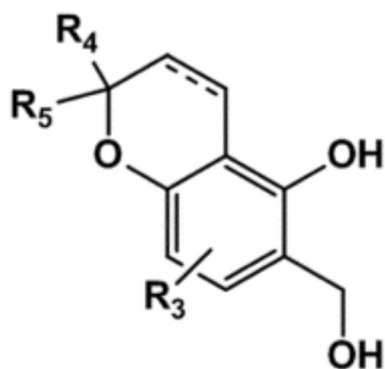
n is from 1 to 3;

when OP is plural in number, they are the same or different;
and

the substituent for the substituted alkyl group,
substituted alkoxy group, substituted thioalkyl group,
5 substituted allyloxy group, substituted aryloxy group or
substituted benzyl group is any one of a benzyloxy group, a
halogen atom, a linear or branched C₁-C₅ alkyl group, a
linear or branched C₁-C₅ alkoxy group, a linear or branched
C₁-C₃ thioalkyl group, a nitro group, and a naphthalene
10 group.

5. A 6-(hydroxymethyl)chromen-5-ol derivative
represented by the following Formula 2 or a solvate thereof:

[Formula 2]



wherein

R₃ is any one of a hydrogen atom; a C₁-C₃ alkyl group; a C₁-
C₃ alkoxy group; and a halogen atom; and

R₄ and R₅ are each independently any one of a hydrogen atom;

and a C₁-C₂ alkyl group.