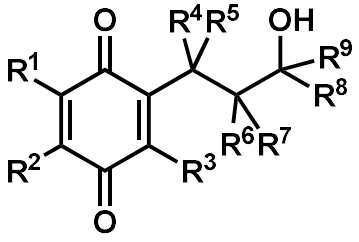
Claims

[Claim 1]

A method of manufacturing a compound of formula I:

[Chemical Formula 1]

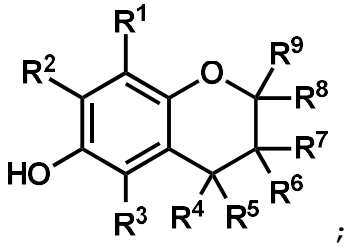


,

comprising the steps of:

contacting, in a solvent, an oxidizing agent with a compound of formula II:

[Chemical Formula 2]



; and

contacting a base with the solvent to promote a reaction between the compound of formula II and the oxidizing agent;

wherein

R^1, R^2, R^3, R^4, R^5, R^6, R^7, R^8, and R^9 each independently represent a hydrogen atom, halogen, optionally substituted C_{1-6} alkyl, optionally substituted C_{1-6} alkoxy, or $-C(=O)NR^AR^B$, and

R^A and R^B each independently represent a hydrogen atom, optionally substituted C_{1-6} alkyl, or optionally substituted C_{1-6} alkoxy.

[Claim 2]

The method of claim 1, wherein R^1 is a hydrogen atom or optionally substituted C_{1-6} alkyl.

[Claim 3]

The method of claim 1 or 2, wherein

i. R^1 is methyl,

ii. R^2 is a hydrogen atom or optionally substituted C_{1-6} alkyl,

iii. R^2 is methyl,

iv. R^3 is a hydrogen atom or optionally substituted C_{1-6} alkyl,

v. R^3 is methyl,

vi. R^4 is a hydrogen atom or optionally substituted C_{1-6} alkyl,

vii. R^4 is a hydrogen atom,

viii. R^5 is a hydrogen atom or optionally substituted C_{1-6} alkyl,

ix. R^5 is a hydrogen atom,

x. R^6 is a hydrogen atom or optionally substituted C_{1-6} alkyl,

xi. R^6 is a hydrogen atom,

xii. R^7 is a hydrogen atom or optionally substituted C_{1-6} alkyl,

xiii. R^7 is a hydrogen atom,

xiv. R^8 is a hydrogen atom, optionally substituted C_{1-6} alkyl, or $-C(=O)NR^AR^B$

xv. R^8 is $-C(=O)NR^AR^B$,

xvi. R^9 is a hydrogen atom or optionally substituted C_{1-6} alkyl,

xvii. R^9 is methyl, and/or

xviii. R^A and R^B each represent a hydrogen atom.

[Claim 4]

The method of any one of claims 1 to 3, wherein R^A and R^B each represent a hydrogen atom.

[Claim 5]

The method of any one of claims 1 to 4, wherein the solvent is a polar aprotic solvent, or
wherein the solvent is a polar protic solvent.

[Claim 6]

The method of any one of claims 1 to 4, wherein the solvent is selected from the group consisting of isopropyl acetate, ethyl acetate, tetrahydrofuran, 2-methyl-tetrahydrofuran, acetone, toluene, anisole, methyl tert-butyl ether, cyclopentyl methyl ether, methanol, ethanol, 2-propanol, 4-methyltetrahydropyran, acetonitrile, N-methylpyrrolidone, and dimethylsulfoxide.

[Claim 7]

The method of any one of claims 1 to 6, wherein the solvent is dimethylsulfoxide.

[Claim 8]

The method of any one of claims 1 to 7, wherein the oxidizing agent

(i) comprises a compound comprising iron,

(ii) is iron(III) chloride or iron(III) nitrate, and/or

(iii) is iron(III) chloride hexahydrate.

[Claim 9]

The method of any one of claims 1 to 8, wherein the base is selected from the group consisting of sodium hydroxide, potassium hydroxide, calcium hydroxide, barium hydroxide, potassium carbonate, sodium carbonate, sodium hydrogen carbonate, triethylamine, diisopropylethylamine, and ammonia water.

[Claim 10]

The method of any one of claims 1 to 9, wherein the base is selected from the group consisting of sodium hydroxide, potassium carbonate, sodium carbonate, sodium hydrogen carbonate, triethylamine, and ammonia water.

[Claim 11]

The method of claim 10, wherein the base is sodium hydroxide.

[Claim 12]

The method of any one of claims 1 to 11, wherein the step of contacting the oxidizing agent is performed in a flow reactor.

[Claim 13]

The method of claim 12, wherein an inner diameter of the flow reactor is about 0.1 mm to about 100 mm in the step of contacting the oxidizing agent.

[Claim 14]

The method of claim 12 or 13, wherein a residence time of the step of contacting the oxidizing agent is 60 seconds or less.

[Claim 15]

The method of claim 14, wherein the residence time is 0.1 seconds to 10 seconds.

[Claim 16]

The method of any one of claims 1 to 15, wherein the step of contacting the oxidizing agent is performed at

(i) a temperature from 0°C to 100°C, or

(ii) a temperature of 75°C or higher, or

(iii) a temperature from 60°C to 90°C.

[Claim 17]

The method of any one of claims 1 to 16, wherein the step of contacting the base is performed after the step of contacting the oxidizing agent.

[Claim 18]

The method of any one of claims 1 to 17, wherein the step of contacting the base is performed by contacting a base with a reaction mixture produced by the step of contacting the oxidizing agent.

[Claim 19]

The method of any one of claims 1 to 18, wherein the oxidizing agent is in the solvent in the step of contacting the base.

[Claim 20]

The method of any one of claims 1 to 19, wherein the step of contacting the base is performed in a flow reactor.

[Claim 21]

The method of claim 20, wherein an inner diameter of the flow reactor is about 0.1 mm to about 100 mm in the step of contacting the base.

[Claim 22]

The method of claim 20 or 21, wherein a residence time of the step of contacting the base is 60 seconds or less.

[Claim 23]

The method of claim 22, wherein the residence time is 0.1 seconds to 10 seconds.

[Claim 24]

The method of any one of claims 1 to 23, wherein the step of contacting the base is performed at

(i) a temperature from 0°C to 100°C, or

(ii) a temperature from 60°C to 90°C.

[Claim 25]

The method of claim 24, wherein the step of contacting the oxidizing agent is performed at a temperature of 75°C or higher.

[Claim 26]

The method of any one of claims 1 to 25, wherein a carbon atom, attached with R^8, R^9, and OH, is asymmetric carbon in the compound of formula I.

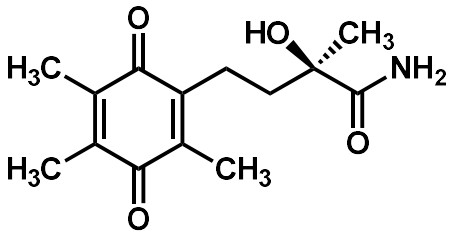
[Claim 27]

The method of claim 26, wherein the compound of formula II is an optically active substance and optical purity is maintained in a reaction between the compound of formula II and the oxidizing agent.

[Claim 28]

The method of any one of claims 1 to 27, wherein the compound of formula I is

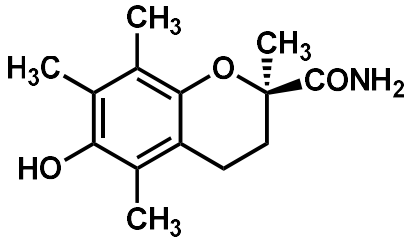
[Chemical Formula 3]



, and

the compound of formula II is

[Chemical Formula 4]



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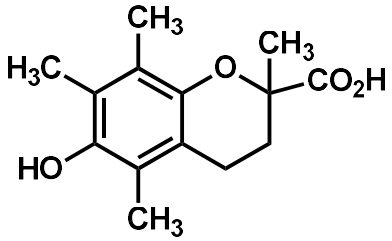
[Claim 29]

The method of claim 28, wherein the compound of formula II is manufactured by the step of optically resolving and amidating a compound of formula III:

[Chemical Formula 5]



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