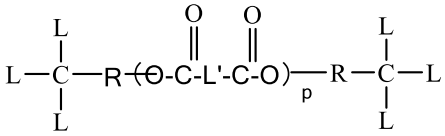
CLAIMS

1. An ester compound, which has a structure as shown in formula (I):



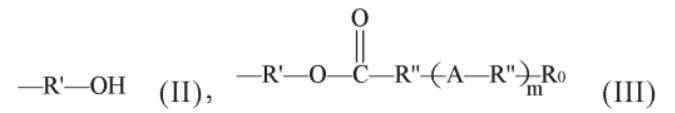
(I)

wherein, the L' groups, identical to or different from each other, are each independently selected from C_{1-16} linear or branched alkylene (preferably C_{2-10} linear or branched alkylene);

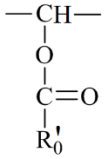
the R groups, identical to or different from each other, are each independently selected from a single bond, a C_{1-50} linear or branched alkylene (preferably a C_{1-20} linear or branched alkylene, more preferably a C_{1-6} linear or branched alkylene);

p is an integral number of 0-10 (preferably an integral number of 0-5, more preferably 0, 1, 2, or 3);

the L groups, identical to or different from each other, are each independently selected from a hydrogen atom, an optionally substituted C_{1-10} linear or branched alkyl, a group represented by formula (II), a group represented by formula (III) (preferably selected from an optionally substituted C_{1-6} linear or branched alkyl, a group represented by formula (II), a group represented by formula (III)), wherein at least two L groups are selected from a group represented by formula (III),



in the formula (II) and the formula (III), the R' group is selected from a single bond, a C_{1-10} linear or branched alkylene (preferably a single bond, a C_{1-6} linear or branched alkylene), and the carbon atoms bonded to L are at most directly bonded to one oxygen atom, the R" groups, identical to or different from each other, are each independently selected from a single bond, ~~a C_{1-10} hydrocarbylene (preferably~~ a C_{1-10} linear or branched alkylene~~, more~~ (preferably a C_{1-8} linear or branched alkylene, ~~more preferably a C_{1-8} linear or branched alkylene,~~ more preferably a C_{1-6} linear or branched alkylene); the R_0 group is selected from ~~H, an optionally substituted C_{1-10} hydrocarbyl (preferably~~ an optionally substituted C_{1-10} linear or branched alkyl, ~~more~~ preferably an optionally substituted C_{1-6} linear or branched alkyl~~)~~; m is an integral number of 1-10 (preferably an integral number of 1-6, more preferably an integral number of 1-5); m A groups, identical to or different from each other, are each independently selected from a group represented by formula (III-A), —C=C—, methylene and ethylene, and at least one A group is selected from a group represented by formula (III-A);



(III-A)

the R_0' groups, at each occurrence, are each independently selected from ~~an optionally substituted C_{1-17} hydrocarbyl (preferably~~ an optionally substituted C_{1-15} linear or branched alkyl, ~~more~~ preferably an optionally substituted C_{1-11} linear or branched alkyl~~)~~,

said substituents that optionally substitute are selected from halogen atoms, hydroxy, amino, C_{1-6} linear or branched alkyl, C_{6-10} aryl, C_{3-10} cycloalkyl.

2. The ester compound according to claim 1, which is characterized in that when p is not 0, the L groups, identical to or different from each other, are each independently selected from a group represented by formula (III).

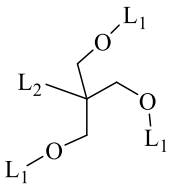
3. The ester compound according to claim 1, which is characterized in that when none of three L groups connected to one terminal carbon atom is a group represented by formula (III) or formula (II), three L groups connected to the other terminal carbon atom are each independently selected from a group represented by formula (III).

4. The ester compound according to claim 1, which is characterized in that, of three L groups connected to each terminal carbon atom, if two L groups are not a group represented by formula (III), the remaining one L group is each independently selected from a group represented by formula (III).

5. The ester compound according to claim 1, which is characterized in that in case that p is not 0, of three L groups connected to each terminal carbon atom, at least one L group is selected from an optionally substituted C_{1-6} linear or branched alkyl.

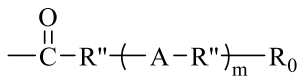
6. The ester compound according to claim 1, which is characterized in that in case p is not 0, of three L groups connected to each terminal carbon atom, there is at least one L group, which is selected from an optionally substituted C_{1-6} linear or branched alkyl, and other L groups, which, identical to or different from each other, are each independently selected from a group represented by formula (III).

7. The ester compound according to claim 1, which is characterized in that it has a structure as shown in the following formula (IV)



(IV)

wherein, the L_1 groups are a hydrogen atom or a group represented by the following formula (III-1)



(III-1),

and, at least two L_1 groups are a group represented by formula (III-1);

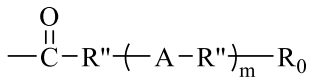
L_2 is an optionally substituted C_{1-10} linear or branched alkyl or a group represented by (III-1);

preferably, L_1 is a group represented by formula (III-1), m is 1, 2 or 3, each R" groups, identical to or different from each other, are each independently selected from a single bond, preferably a C_{1-10} linear or branched alkylene, more preferably a C_{1-8} linear or branched alkylene, the R_0 group is an optionally substituted C_{1-10} linear or branched alkyl, the A group is selected from a group represented by formula (III-A), the R_0' group is independently selected from an optionally substituted C_{1-11} linear or branched alkyl.

8. The ester compound according to claim 1, which is characterized in that it has a structure as shown in the following formula (V)

L_1-O-L"-O-L_1 (V)

wherein, L_1 is a group represented by the following formula (III-1)

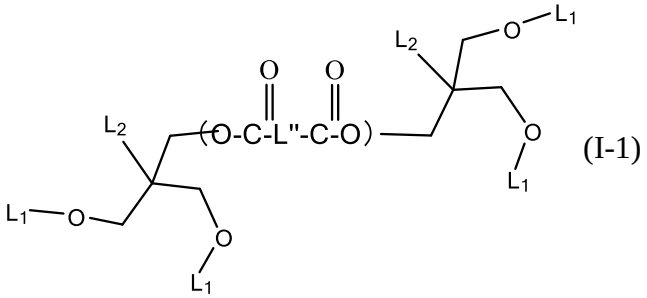


(III-1),

the L" group is C_{2-100} hydrocarbylene (preferably C_{2-50} linear or branched alkylene, more preferably C_{2-20} linear or branched alkylene),

preferably, the L" group is a C_{2-20} linear or branched alkylene, m is 1, 2 or 3, each R" groups, identical to or different from each other, are each independently selected from a single bond, preferably a C_{1-10} linear or branched alkylene, more preferably a C_{1-8} linear or branched alkylene, the R_0 group is an optionally substituted C_{1-10} linear or branched alkyl, the A group is selected from a group represented by formula (III-A), the R_0' group is independently selected from an optionally substituted C_{1-11} linear or branched alkyl.

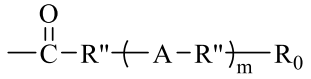
9. The ester compound according to claim 1, which is characterized in that it has a structure as shown in the following formula (I-1)



(I-1)

wherein, the L" group is a C_{2-100} hydrocarbylene (preferably a C_{2-50} linear or branched alkylene, more preferably a C_{2-20} linear or branched alkylene),

L_1 is a hydrogen atom or a group represented by the following formula (III-1)



(III-1),

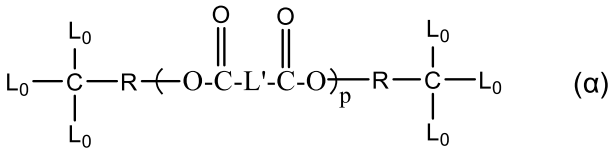
and, at least two L_1 groups are a group represented by formula (III-1);

L_2 is an optionally substituted C_{1-10} linear or branched alkyl or a group represented by (III-1);

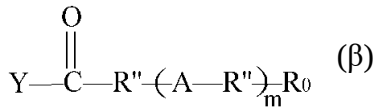
preferably, the L" group is a C_{2-20} linear or branched alkylene, L_1 is a group represented by formula (III-1), m is 1, 2 or 3, each R" groups, identical to or different from each other, are each independently selected from a single bond, preferably a C_{1-10} linear or branched alkylene, more preferably a C_{1-8} linear or branched alkylene, the R_0 group is an optionally substituted C_{1-10} linear or branched alkyl, the A group is selected from a group represented by formula (III-A), the R_0' group is independently selected from an optionally substituted C_{1-11} linear or branched alkyl.

10. A process for preparing an ester compound, comprising the following steps:

step (1): a step of reacting a compound represented by formula (α) and a compound represented by formula (β),



(α)



(β)

in formula (α), the L' groups, identical to or different from each other, are each independently selected from C_{1-16} linear or branched alkylene (preferably C_{2-10} linear or branched alkylene);

the R groups, identical to or different from each other, are each independently selected from a single bond, a C_{1-50} linear or branched alkylene (preferably a C_{1-20} linear or branched alkylene, more preferably a C_{1-6} linear or branched alkylene);

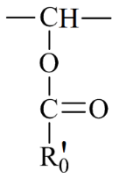
p is an integral number of 0-10 (preferably an integral number of 0-5, more preferably 0, 1, 2 or 3);

the L_0 groups, identical to or different from each other, are each independently selected from hydrogen atom, an optionally substituted C_{1-10} linear or branched alkyl, a group represented by formula (δ) (preferably selected from an optionally substituted C_{1-6} linear or branched alkyl, a group represented by formula (δ)), wherein at least two L_0 groups are selected from a group represented by formula (δ),

—R'—OH (δ)

In the formula (δ), the R' group is selected from a single bond, a C_{1-10} linear or branched alkylene (preferably a single bond, a C_{1-6} linear or branched alkylene), and the carbon atoms bonded to the L_0 group are at most directly bonded to one oxygen atom,

In the formula (β), the R" groups, identical to or different from each other, are each independently selected from a single bond, a C_{1-10} hydrocarbylene (preferably a C_{1-10} linear or branched alkylene, more preferably a C_{1-8} linear or branched alkylene, more preferably a C_{1-6} linear or branched alkylene); the R_0 group is selected from H, an optionally substituted C_{1-10} hydrocarbyl (preferably an optionally substituted C_{1-10} linear or branched alkyl, more preferably an optionally substituted C_{1-6} linear or branched alkyl); m is an integral number of 1-10 (preferably an integral number of 1-6, more preferably an integral number of 1-5); m A groups, identical to or different from each other, are each independently selected from a group represented by formula (ε), —C=C—, methylene and ethylene, and at least one A group is selected from a group represented by formula (ε);



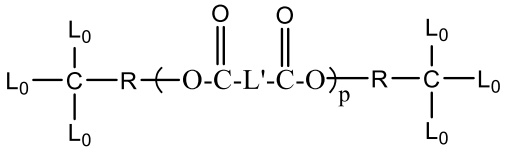
(ε)

The R_0' groups, at each occurrence, are each independently selected from an optionally substituted C_{1-17} hydrocarbyl (preferably an optionally substituted C_{1-15} linear or branched alkyl, more preferably an optionally substituted C_{1-11} linear or branched alkyl);

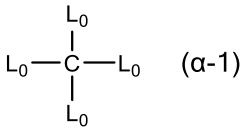
the Y group is selected from OH, F, Cl, Br or I (preferably OH, Cl or Br),

in case that p is not 0, the process further comprises the following steps:

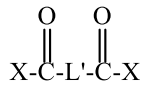
step (2): optionally reacting a compound represented by formula (α-1) with a compound represented by formula (α-2) to produce a compound represented by formula (α), wherein step (2) is carried out before step (1),



(α) ,



(α-1)

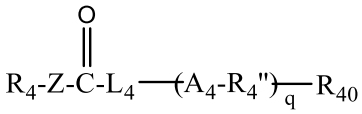


(α-2)

in formula (α-1), the L_0 groups, identical to or different from each other, are each independently selected from hydrogen atom, an optionally substituted C_{1-10} linear or branched alkyl, a group represented by formula (δ) (preferably selected from an optionally substituted C_{1-6} linear or branched alkyl, a group represented by formula (δ)), wherein at least three L_0 groups are selected from a group represented by formula (δ), in formula (α-2), the X groups, identical to or different from each other, are each independently selected from OH, F, Cl, Br or I (preferably OH, Cl or Br),

said substituents that optionally substitute are selected from halogen atoms, hydroxy, amino, C_{1-6} linear or branched alkyl, C_{6-10} aryl, C_{3-10} cycloalkyl.

11. An ester compound, which has a structure as shown in the following formula (VI),



(VI)

wherein the R_4 group is selected from an optionally substituted C_{1-10} linear or branched alkyl, $-L_4'-(OH)_n$, H (preferably selected from an optionally substituted C_{1-6} linear or branched alkyl, $-L_4'-(OH)_n$, H, more preferably selected from an optionally substituted C_{1-3} linear or branched alkyl, $-L_4'-(OH)_n$, H), wherein n is an integral number of 1-10 (preferably an integral number of 1-6, more preferably 1, 2 or 3), the L_4' group is an (n+1)-valent C_{1-15} linear or branched alkyl (preferably an (n+1)-valent C_{1-10} linear or branched alkyl, more preferably an (n+1)-valent C_{1-6} linear or branched alkyl, further preferably an (n+1)-valent C_{1-3} linear or branched alkyl);

Z represents an oxygen atom or NR_z, R_z is selected from H, an optionally substituted C_{1-6} linear or branched alkyl (preferably selected from H, a C_{1-3} linear or branched alkyl);

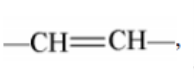
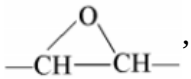
the L_4 group is selected from a single bond, a C_{1-30} linear or branched hydrocarbylene (preferably selected from a C_{1-20} linear or branched alkylene, more preferably selected from a C_{1-10} linear or branched alkylene);

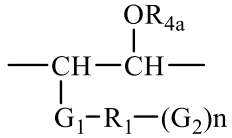
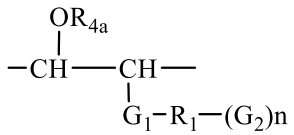
q is an integral number of 1-12 (preferably an integral number of 1-8, more preferably an integral number of 1-5);

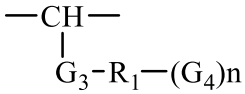
the R_4" group(s), identical to or different from each other, are each independently selected from single bond, a C_{1-10} linear or branched hydrocarbylene (preferably a C_{1-10} linear or branched alkylene, more preferably a C_{1-6} linear or branched alkylene, more preferably a C_{1-3} linear or

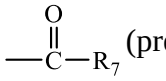
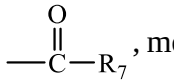
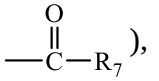
branched alkylene);

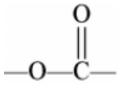
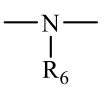
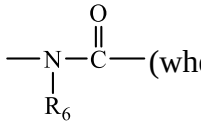
the R_{40} group is selected from H, an optionally substituted C_{1-10} hydrocarbyl (preferably an optionally substituted C_{1-10} linear or branched alkyl, more preferably an optionally substituted C_{1-6} linear or branched alkyl, more preferably an optionally substituted C_{1-3} linear or branched alkyl);

the A_4 groups, identical to or different from each other, are each independently selected from a group represented by formula (VII), a group represented by formula (VIII), , , an ethylene group, a propylene group, and at least one A group is selected from a group represented by formula (VII), a group represented by formula (VIII), or at least two A groups are selected from a group represented by formula (IX);

 (VII),  (VIII),

 (IX),

in the above formulae, R_{4a} is independently selected from H, an optionally substituted C_{1-10} hydrocarbyl,  (preferably H, an optionally substituted C_{1-6} linear or branched alkyl, , more preferably H, an optionally substituted C_{1-3} linear or branched alkyl, ), the R_7 groups are each independently selected from H, an optionally substituted C_{1-10} linear or branched alkyl (preferably selected from an optionally substituted C_{1-6} linear or branched alkyl, more preferably selected from an optionally substituted C_{1-3} linear or branched alkyl);

the G_1 groups are each independently selected from , , , (wherein the carbonyl carbon is attached to the R_1 group), the R_6 groups are each independently selected from H, an optionally substituted C_{1-6} linear or branched alkyl, optionally substituted C_{3-10} cycloalkyl, an optionally substituted C_{6-15} aryl, an optionally substituted C_{7-15} alkylaryl (preferably selected from H, an optionally substituted C_{1-3} linear or branched alkyl, an optionally substituted C_{3-6} cycloalkyl, an optionally substituted C_{6-10} aryl, an optionally substituted C_{7-12} alkylaryl);

R_1 is selected from a single bond, an (n+1)-valent optionally substituted C_{1-17} hydrocarbyl (preferably selected from an (n+1)-valent C_{1-15} linear or branched alkyl, an (n+1)-valent optionally substituted C_{3-10} cycloalkyl, an (n+1)-valent optionally substituted C_{6-15} aryl, an (n+1)-valent optionally substituted C_{7-15} alkylaryl, more preferably selected from an (n+1)-valent optionally substituted C_{1-11} linear or branched alkyl, an (n+1)-valent optionally substituted C_{3-6} cycloalkyl, an (n+1)-valent optionally substituted C_{6-10} aryl, an (n+1)-valent optionally substituted C_{7-12} alkylaryl);

the G_2 groups are each independently selected from —OR_2, —C(=O)—R_3, -$N(R_5)_2$, wherein the R_2 groups are each independently selected from H, an optionally substituted C_{1-10} linear or branched alkyl (preferably selected from H, an optionally substituted C_{1-6} linear or branched alkyl, more preferably selected from H, an optionally substituted C_{1-3} linear or branched alkyl), the R_3 groups are each independently selected from OH, an optionally substituted C_{1-10} linear or branched alkyl, an optionally substituted C_{1-6} linear or branched alkoxyl, an optionally substituted C_{3-10} cycloalkyl, an optionally substituted C_{6-15} aryl, an optionally substituted C_{7-15} alkylaryl (preferably selected from OH, an optionally substituted C_{1-6} linear or branched alkyl, an optionally substituted C_{1-6} linear or branched alkoxyl, an optionally substituted C_{3-6} cycloalkyl, an optionally substituted C_{6-10} aryl, an optionally substituted C_{7-12} alkylaryl; the R_5 groups are each independently selected from H, an optionally substituted C_{1-10} linear or branched alkyl (preferably selected from H, an optionally substituted C_{1-6} linear or branched alkyl, more preferably selected from H, an optionally substituted C_{1-3} linear or branched alkyl);

n is an integral number of 0-10 (preferably an integral number of 0-6, more preferably 0, 1, 2, or 3);

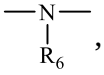
the G_3 group is selected from —O—C(=O)— (wherein the carbonyl carbon is attached to the R_1 group); the G_4 groups are each independently selected from —C(=O)—R_3;

at least one -C(O)-O- group is present in the compound,

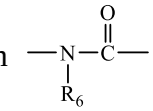
said substituents that optionally substitute are selected from halogen atoms, hydroxy, amino, C_{1-6} linear or branched alkyl, C_{6-10} aryl, C_{3-10} cycloalkyl.

12. The ester compound according to claim 11, wherein Z represents an oxygen atom, R_{4a} is independently selected from H, an optionally substituted C_{1-6} linear or branched alkyl (more preferably H, an optionally substituted C_{1-3} linear or branched alkyl); the G_1 groups are each independently selected from —O—; R_1 is selected from an (n+1)-valent optionally substituted C_{1-15} linear or branched alkyl, an (n+1)-valent optionally substituted C_{3-10} cycloalkyl, an (n+1)-valent optionally substituted C_{6-15} aryl, an (n+1)-valent optionally substituted C_{7-15} alkylaryl, n represents an integral number of 1-6; the G_2 groups are each independently selected from —OR_2, wherein the R_2 groups are each independently selected from H, an optionally substituted C_{1-10} linear or branched alkyl.

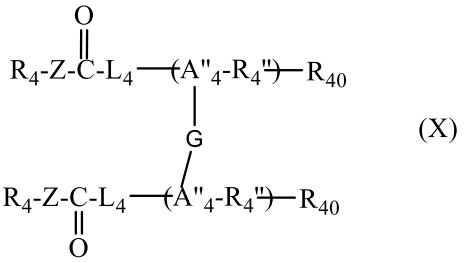
13. The ester compound according to claim 11, wherein Z represents an oxygen atom, R_{4a} is independently selected from H, an optionally substituted C_{1-6} linear or branched alkyl (more preferably H, an optionally substituted C_{1-3} linear or branched alkyl); the G_1 groups are each independently selected from —O—C(=O)—; R_1 is selected from an (n+1)-valent optionally substituted C_{1-15} linear or branched alkyl, an (n+1)-valent optionally substituted C_{3-10} cycloalkyl, an (n+1)-valent optionally substituted C_{6-15} aryl, an (n+1)-valent optionally substituted C_{7-15} alkylaryl, n represents an integral number of 1-6; the G_2 groups are each independently selected from —C(=O)—R_3, the R_3 groups are each independently selected from OH, an optionally substituted C_{1-6} linear or branched alkyl.

14. The ester compound according to claim 11, wherein R_{4a} is independently selected from H, an optionally substituted C_{1-6} linear or branched alkyl; the G_1 groups are each independently selected from , the R_6 groups are each independently selected from H, an optionally substituted C_{1-6} linear or branched alkyl, an optionally substituted C_{3-10} cycloalkyl, an optionally substituted C_{6-15} aryl, an optionally substituted C_{7-15} alkylaryl; R_1 is selected from an (n+1)-valent optionally substituted C_{1-15} linear or branched alkyl, an (n+1)-valent optionally substituted C_{3-10} cycloalkyl, an (n+1)-valent C_{6-15} aryl, an (n+1)-valent optionally substituted C_{7-15} alkylaryl, n represents an integral number of 0-6; the G_2 groups are each independently selected from —OR_2, -$N(R_5)_2$, the R_2 groups are each independently selected from H, an optionally substituted C_{1-10} linear or branched alkyl, the R_5 groups are each independently selected from H, an optionally substituted C_{1-10} linear or branched alkyl;

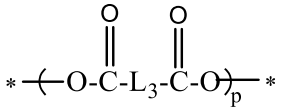
or

R_{4a} is independently selected from H, an optionally substituted C_{1-6} linear or branched alkyl; the G_1 groups are each independently selected from , the R_6 groups are each independently selected from H, an optionally substituted C_{1-6} linear or branched alkyl, an optionally substituted C_{3-10} cycloalkyl, an optionally substituted C_{6-15} aryl, an optionally substituted C_{7-15} alkylaryl; R_1 is selected from an (n+1)-valent optionally substituted C_{1-15} linear or branched alkyl, an (n+1)-valent optionally substituted C_{3-10} cycloalkyl, an (n+1)-valent optionally substituted C_{6-15} aryl, an (n+1)-valent optionally substituted C_{7-15} alkylaryl, n represents 0.

15. An ester compound, which has a structure as shown in the following formula (X),



(X)

wherein, the G group represents , the L_3 group is selected from single bond, a C_{1-30} linear or branched hydrocarbylene (preferably single bond, C_{1-20} linear or branched alkylene, C_{3-20} cycloalkylene, C_{6-20} arylene, C_{7-15} alkylarylene; more preferably single bond, C_{1-10} linear or branched alkylene, C_{5-10} cycloalkylene, C_{6-10} arylene, C_{7-12} alkylarylene), p is an integral number of 1-10 (preferably an integral number of 1-5, more preferably 1, 2 or 3);

the R_4 group is independently selected from an optionally substituted C_{1-10} linear or branched alkyl, $-L_4'-(OH)_n$, H (preferably selected from an optionally substituted C_{1-6} linear or branched alkyl, $-L_4'-(OH)_n$, H, more preferably selected from an optionally substituted C_{1-3} linear or branched alkyl, $-L_4'-(OH)_n$, H), wherein n is an integral number of 1-10 (preferably an integral number of 1-6, more preferably 1, 2 or 3), the L_4' group is an (n+1)-valent C_{1-15} linear

or branched alkyl (preferably an (n+1)-valent C_{1-10} linear or branched alkyl, more preferably an (n+1)-valent C_{1-6} linear or branched alkyl, further preferably an (n+1)-valent C_{1-3} linear or branched alkyl);

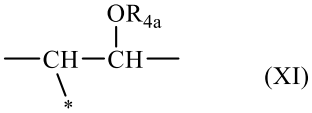
Z independently represents an oxygen atom or NR_z, R_z is selected from H, an optionally substituted C_{1-6} linear or branched alkyl (preferably selected from H, an optionally substituted C_{1-3} linear or branched alkyl);

the L_4 group is independently selected from a single bond, a C_{1-30} linear or branched hydrocarbylene (preferably selected from a C_{1-20} linear or branched alkylene, more preferably selected from a C_{1-10} linear or branched alkylene);

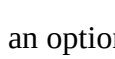
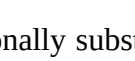
R_4" is independently selected from a single bond, a C_{1-10} linear or branched hydrocarbylene (preferably a C_{1-6} linear or branched alkylene, more preferably a C_{1-3} linear or branched alkylene);

the R_{40} group is selected from H, an optionally substituted C_{1-10} hydrocarbyl (preferably an optionally substituted C_{1-6} linear or branched alkyl, more preferably an optionally substituted C_{1-3} linear or branched alkyl);

the A"$_4$ group is independently selected from a group represented by formula (XI);



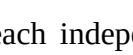
(XI)

R_{4a} is independently selected from H, an optionally substituted C_{1-10} hydrocarbyl,  (preferably H, an optionally substituted C_{1-6} linear or branched alkyl, , more preferably H, an optionally substituted C_{1-3} linear or branched alkyl, ), the R_7 groups are each independently selected from H, an optionally substituted C_{1-10} linear or branched alkyl (preferably selected from an optionally substituted C_{1-6} linear or branched alkyl, more preferably selected from an optionally substituted C_{1-3} linear or branched alkyl);

* is the bonding site between the G group and the A"$_4$ group,

said substituents that optionally substitute are selected from halogen atoms, hydroxy, amino, C_{1-6} linear or branched alkyl, C_{6-10} aryl, C_{3-10} cycloalkyl.

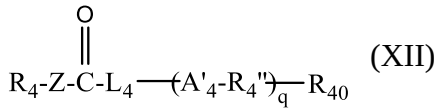
16. The ester compound according to claim 15, wherein p is 1, the R_4 group is an optionally substituted C_{1-6} linear or branched alkyl, Z represents O, R_{4a} is independently selected from H, an optionally substituted C_{1-6} linear or branched alkyl, , the R_7 groups are each independently selected from an optionally substituted C_{1-6} linear or branched alkyl.

17. The ester compound according to claim 15, wherein p is 1, the R_4 group is an optionally substituted C_{1-6} linear or branched alkyl, Z represents O, R_{4a} is an optionally substituted C_{1-6} linear or branched alkyl, , the R_7 groups are each independently selected from an optionally substituted C_{1-6} linear or branched alkyl.

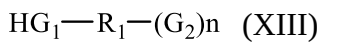
18. A process for preparing an ester compound, comprising:

(1) epoxidizing at least one olefinic bond in a compound represented by formula (XII), and

(2) reacting the product of step (1) with a compound represented by formula (XIII);



(XII)



(XIII)

the R_4 group is selected from an optionally substituted C_{1-10} linear or branched alkyl, $-L_4'-(OH)_n$, H (preferably selected from an optionally substituted C_{1-6} linear or branched alkyl, $-L_4'-(OH)_n$, H, more preferably selected from an optionally substituted C_{1-3} linear or branched alkyl, $-L_4'-(OH)_n$, H), wherein n is an integral number of 1-10 (preferably an integral number of 1-6, more preferably 1, 2 or 3), the L_4' group is an (n+1)-valent C_{1-15} linear or branched alkyl (preferably an (n+1)-valent C_{1-10} linear or branched alkyl, more preferably an (n+1)-valent C_{1-6} linear or branched alkyl, further preferably an (n+1)-valent C_{1-3} linear or branched alkyl);

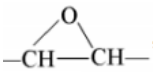
Z represents an oxygen atom or NR_z, R_z is selected from H, an optionally substituted C_{1-6} linear or branched alkyl (preferably selected from H, an optionally substituted C_{1-3} linear or branched alkyl);

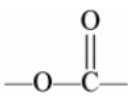
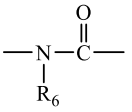
the L_4 group is selected from a single bond, a C_{1-30} linear or branched hydrocarbylene (preferably selected from a C_{1-20} linear or branched alkylene, more preferably selected from a C_{1-10} linear or branched alkylene);

q is an integral number of 1-12 (preferably an integral number of 1-8, more preferably an integral number of 1-5);

the R_4'' group(s), identical to or different from each other, are each independently selected from single bond, a C_{1-10} linear or branched hydrocarbylene (preferably a C_{1-10} linear or branched alkylene, more preferably a C_{1-6} linear or branched alkylene, more preferably a C_{1-3} linear or branched alkylene);

the R_{40} group is selected from H, an optionally substituted C_{1-10} hydrocarbyl (preferably an optionally substituted C_{1-10} linear or branched alkyl, more preferably an optionally substituted C_{1-6} linear or branched alkyl, more preferably an optionally substituted C_{1-3} linear or branched alkyl);

the A'_4 groups, identical to or different from each other, are each independently selected from , , an ethylene group, a propylene group, and at least one A'_4 group is selected from ;

the G_1 group is selected from , , ,  (wherein the carbonyl carbon is attached to the R_1 group), the R_6 group is selected from H, an optionally substituted C_{1-6} linear or branched alkyl, optionally substituted C_{3-10} cycloalkyl, an optionally substituted C_{6-15} aryl, an optionally substituted C_{7-15} alkylaryl (preferably selected from H, an optionally substituted C_{1-3} linear or branched alkyl, an optionally substituted C_{3-6} cycloalkyl, an optionally substituted C_{6-10} aryl, an optionally substituted C_{7-12} alkylaryl);

R_1 is selected from a single bond, an (n+1)-valent optionally substituted C_{1-17} hydrocarbyl (preferably selected from an (n+1)-valent optionally substituted C_{1-15} linear or branched alkyl, an (n+1)-valent optionally substituted C_{3-10} cycloalkyl, an (n+1)-valent optionally substituted C_{6-}

$_{15}$ aryl, an (n+1)-valent optionally substituted C_{7-15} alkylaryl, more preferably selected from an (n+1)-valent optionally substituted C_{1-11} linear or branched alkyl, an (n+1)-valent optionally substituted C_{3-6} cycloalkyl, an (n+1)-valent optionally substituted C_{6-10} aryl, an (n+1)-valent optionally substituted C_{7-12} alkylaryl);

the G_2 group is selected from —OR$_2$, —C(=O)—R$_3$, -N(R$_5$)$_2$, wherein R_2 is selected from H, an optionally substituted C_{1-10} linear or branched alkyl (preferably selected from H, an optionally substituted C_{1-6} linear or branched alkyl, more preferably selected from H, an optionally substituted C_{1-3} linear or branched alkyl), the R_3 group is selected from OH, an optionally substituted C_{1-10} linear or branched alkyl, an optionally substituted C_{1-6} linear or branched alkoxyl, an optionally substituted C_{3-10} cycloalkyl, an optionally substituted C_{6-15} aryl, an optionally substituted C_{7-15} alkylaryl (preferably selected from OH, an optionally substituted C_{1-6} linear or branched alkyl, an optionally substituted C_{1-6} linear or branched alkoxyl, an optionally substituted C_{3-6} cycloalkyl, an optionally substituted C_{6-10} aryl, an optionally substituted C_{7-12} alkylaryl); the R_5 groups are each independently selected from H, an optionally substituted C_{1-10} linear or branched alkyl (preferably selected from H, an optionally substituted C_{1-6} linear or branched alkyl, more preferably selected from H, an optionally substituted C_{1-3} linear or branched alkyl);

n is an integral number of 0-10 (preferably an integral number of 0-6, more preferably 0, 1, 2, or 3);

optionally, step (1') is carried out between step (1) and step (2), wherein R'$_{4a}$-OH is reacted with the product of step (1), and in step (2), the product of step (1') is reacted with the compound represented by formula (XIII);

R'$_{4a}$ is selected from an optionally substituted C_{1-10} hydrocarbyl, —C(=O)—R$_7$ (preferably an optionally substituted C_{1-6} linear or branched alkyl, —C(=O)—R$_7$, more preferably an optionally substituted C_{1-3} linear or branched alkyl, —C(=O)—R$_7$), the R_7 groups are each independently selected from H, an optionally substituted C_{1-10} linear or branched alkyl (preferably selected from an optionally substituted C_{1-6} linear or branched alkyl, more preferably selected from an optionally substituted C_{1-3} linear or branched alkyl),

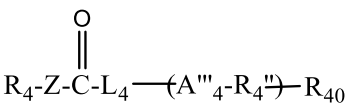
said substituents that optionally substitute are selected from halogen atoms, hydroxy, amino, C_{1-6} linear or branched alkyl, C_{6-10} aryl, C_{3-10} cycloalkyl.

19. A process for preparing an ester compound, comprising the following steps:

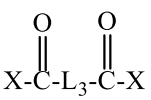
(1) epoxidizing at least one olefinic bond in a compound represented by formula (XIV),

(1') reacting R'$_{4a}$-OH with the product of step (1),

(2) reacting the product of step (1') with a compound represented by formula (XV);



(XIV)



(XV)

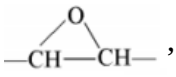
the R_4 group is selected from an optionally substituted C_{1-10} linear or branched alkyl, $-L_4'-(OH)_n$, H (preferably selected from an optionally substituted C_{1-6} linear or branched alkyl, $-L_4'-(OH)_n$, H, more preferably selected from an optionally substituted C_{1-3} linear or branched alkyl, $-L_4'-(OH)_n$, H), wherein n is an integral number of 1-10 (preferably an integral number of 1-6, more preferably 1, 2 or 3), the L_4' group is an (n+1)-valent C_{1-15} linear or branched alkyl (preferably an (n+1)-valent C_{1-10} linear or branched alkyl, more preferably an (n+1)-valent C_{1-6} linear or branched alkyl, further preferably an (n+1)-valent C_{1-3} linear or branched alkyl);

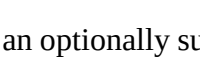
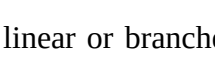
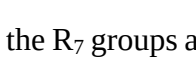
Z represents an oxygen atom or NR_z, R_z is selected from H, an optionally substituted C_{1-6} linear or branched alkyl (preferably selected from H, an optionally substituted C_{1-3} linear or branched alkyl);

the L_4 group is selected from a single bond, a C_{1-30} linear or branched hydrocarbylene (preferably selected from a C_{1-20} linear or branched alkylene, more preferably selected from a C_{1-10} linear or branched alkylene);

the R_4" group(s), identical to or different from each other, are each independently selected from single bond, a C_{1-10} linear or branched hydrocarbylene (preferably a C_{1-10} linear or branched alkylene, more preferably a C_{1-6} linear or branched alkylene, more preferably a C_{1-3} linear or branched alkylene);

the R_{40} group is selected from H, a C_{1-10} hydrocarbyl (preferably an optionally substituted C_{1-10} linear or branched alkyl, more preferably a C_{1-6} linear or branched alkyl, more preferably a C_{1-3} linear or branched alkyl);

the A'"$_4$ groups, identical to or different from each other, are each independently selected from —CH=CH—, , an ethylene group, a propylene group, and at least one A'"$_4$ group is selected from —CH=CH—;

R'$_{4a}$ is selected from an optionally substituted C_{1-10} hydrocarbyl,  (preferably an optionally substituted C_{1-6} linear or branched alkyl, , more preferably C_{1-3} linear or branched alkyl, ), the R_7 groups are each independently selected from H, an optionally substituted C_{1-10} linear or branched alkyl (preferably selected from an optionally substituted C_{1-6} linear or branched alkyl, more preferably selected from an optionally substituted C_{1-3} linear or branched alkyl),

the L_3 group is selected from a single bond, a C_{1-30} linear or branched hydrocarbylene (preferably a single bond, a C_{1-20} linear or branched alkylene, a C_{3-20} cycloalkylene, a C_{6-20} arylene, a C_{7-15} alkylarylene; more preferably a single bond, a C_{1-10} linear or branched alkylene, a C_{5-10} cycloalkylene, a C_{6-10} arylene, a C_{7-12} alkylarylene),

the X group is selected from OH, F, Cl, Br or I (preferably OH, Cl or Br),

said substituents that optionally substitute are selected from halogen atoms, hydroxy, amino, C_{1-6} linear or branched alkyl, C_{6-10} aryl, C_{3-10} cycloalkyl.

20. A lubricating oil composition, which comprises the ester compound according to any

of claims 1-9 and 11-17 or the ester compound obtained with the preparation process according to any of claims 10 and 18-19, and a lubricating base oil, relative to the total mass of the lubricating oil composition, the content of said ester compound is 0.01%-50%, further optionally 0.05%-30%, further optionally 0.1%-25%, further optionally 0.5%-20%.