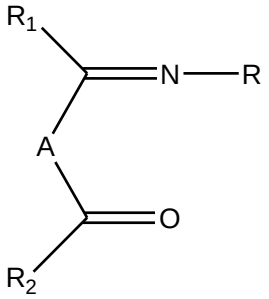
1. A catalyst component for olefin polymerization, comprising magnesium, titanium, halogen, and an internal electron donor, wherein the internal electron donor comprises an imine compound with a ketone group as shown in Formula I,



Formula I

wherein in Formula I, R is selected from the group consisting of hydroxyl, C_1-C_{20} alkyl with or without a halogen atom substitute, C_2-C_{20} alkenyl with or without a halogen atom substitute group, and C_6-C_{30} aryl with or without a halogen atom substitute group; R_1 and R_2 are identical to or different from each other, each independently selected from the group consisting of hydrogen, C_1-C_{20} alkyl, C_2-C_{20} alkenyl, C_1-C_{20} alkoxy, C_6-C_{30} arylalkyl, C_6-C_{30} alkylaryl, C_9-C_{40} fused aryl, halogen atoms, and hydroxyl; A is $(CR_3R_4)_n$ or a heteroatom, wherein R_3 and R_4 are identical to or different from each other, each independently selected from the group consisting of hydrogen, C_1-C_{20} alkyl, C_2-C_{20} alkenyl, C_6-C_{30} arylalkyl, C_6-C_{30} alkylaryl, and C_9-C_{40} fused aryl, and n is 0, 1, 2, 3, 4, 5, or 6.

2. The catalyst component according to claim 1, wherein based on the weight of the catalyst component, a content of magnesium is in a range of 5 wt%-50 wt%, a content of titanium is in a range of 1.0 wt%-8.0 wt%, a content of halogen is in a range of 10 wt%-70 wt%, and a content of the internal electron donor is in a range of 0.1 wt%-20 wt%.

3. The catalyst component according to claim 1, wherein R is methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, sec-butyl, tert-butyl, pentyl, hexyl, hydroxyalkyl, phenyl, halogenated phenyl, alkyl-substituted phenyl, naphthyl, biphenyl, or a heterocycle-containing group.

4. The catalyst component according to claim 1, wherein each of R_1, R_2, R_3, and R_4 is independently selected from the group consisting of methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, sec-butyl, tert-butyl, and pentyl.

5. The catalyst component according to claim 1, wherein the heteroatom is halogen, nitrogen, oxygen, phosphorus, or silicon atom.

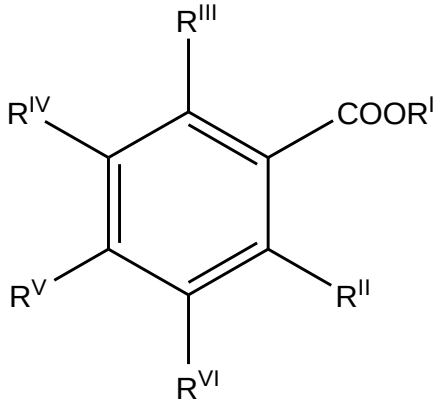
6. The catalyst component according to claim 1, wherein the imine compound with a ketone group as shown in Formula I is one or more selected from the following compounds: 4-butylimino-2-pentanone, 4-pentylimino-2-pentanone, 4-hexylimino-2-pentanone, 4-octylimino-2-pentanone, 4-[(1-hydroxymethyl)propylimino]-2-pentanone, 4-hydroxypropylimino-2-pentanone, 4-hydroxyethylimino-2-pentanone, 4-hydroxybutylimino-2-pentanone, 4-isopropylimino-2-pentanone, 4-(4-chlorophenylimino)-2-pentanone, 4-(2,4-dichlorophenylimino)-2-pentanone, 4-(4-trifluoromethylphenylimino)-2-pentanone, 4-phenylimino-2-pentanone, 4-(1-naphthylimino)-2-pentanone, 4-(2-naphthylimino)-2-pentanone, 4-(2,6-dimethylphenylimino)-2-pentanone, 4-(2-hydroxypropylphenylimino)-2-pentanone, 4-(2,6-diisopropylphenylimino)-2-pentanone, 4-(2,4,6-trimethylphenylimino)-2-pentanone, 4-(8-quinolylimino)-2-pentanone, 4-(4-quinolylimino)-2-pentanone, 4-(3-quinolylimino)-2-pentanone, 4-(2-chloro-6-hydroxyphenylimino)-2-pentanone, 1,1,1-trifluoro-4-(2,6-diisopropylphenylimino)-2-pentanone, 1,1,1-trifluoro-4-(2,6-dimethylphenylimino)-2-pentanone, 3-methyl-4-(2,6-dimethylphenylimino)-2-pentanone, 3-ethyl-4-(2,6-dimethylphenylimino)-2-pentanone, 3-isopropyl-4-(2,6-dimethylphenylimino)-2-pentanone, 3-butyl-4-(2,6-dimethylphenylimino)-2-pentanone, 3-methyl-4-(2,6-diisopropylphenylimino)-2-pentanone, 3-ethyl-4-(2,6-diisopropylphenylimino)-2-pentanone, 3-isopropyl-4-(2,6-diisopropylphenylimino)-2-pentanone, 3-butyl-4-(2,6-diisopropylphenylimino)-2-pentanone, 1-(2-furyl)-3-(2,6-diisopropylphenylimino)-4,4,4-trifluoro-1-butanone, 1-(2-furyl)-3-(8-quinolylimino)-4,4,4-trifluoro-1-butanone, 1-(2-furyl)-3-(2,6-dimethylphenylimino)-4,4,4-trifluoro-1-butanone, 2-hexylimino-4-heptanone, 2-isopropylimino-4-heptanone, 4-hexylimino-2-

heptanone, 4-isopropylimino-2-heptanone, 4-(2-trimethylsilyl)ethylimino-2-pentanone, 5-phenylimino-3-heptanone, 5-(1-naphthylimino)-3-heptanone, 5-(2-naphthylimino)-3-heptanone, 5-(8-quinolylimino)-3-heptanone, 5-(4-quinolylimino)-3-heptanone, 5-(3-quinolylimino)-3-heptanone, 5-(2,6-diisopropylphenylimino)-3-heptanone, 5-(2,6-dimethylphenylimino)-3-heptanone, 5-butylimino-3-heptanone, 5-isopropylimino-3-heptanone, 5-hydroxyethylimino-3-heptanone, 5-hydroxybutylimino-3-heptanone, 4-ethyl-5-(8-quinolylimino)-3-heptanone, 4-methyl-5-(8-quinolylimino)-3-heptanone, 4-ethyl-5-(1-naphthylimino)-3-heptanone, 4-ethyl-5-(2-naphthylimino)-3-heptanone, 4-ethyl-5-phenylimino-3-heptanone, 4-butyl-5-phenylimino-3-heptanone, 4-methyl-5-(2,6-diisopropylphenylimino)-3-heptanone, 4-ethyl-5-(2,6-diisopropylphenylimino)-3-heptanone, 4-isopropyl-5-(2,6-diisopropylphenylimino)-3-heptanone, 4-butyl-5-(2,6-diisopropylphenylimino)-3-heptanone, 4-methyl-5-(2,6-dimethylphenylimino)-3-heptanone, 4-ethyl-5-(2,6-dimethylphenylimino)-3-heptanone, 3-isopropylimino-5-octanone, 3-(2,6-diisopropylphenylimino)-5-octanone, 5-isopropylimino-3-octanone, 6-isopropylimino-4-octanone, 5-(2,6-diisopropylphenylimino)-2-heptanone, 5-(2,4,6-trimethylphenylimino)-2-heptanone, 4-methyl-5-(2,6-dimethylphenylimino)-2-heptanone, 4-ethyl-6-(2,6-diisopropylphenylimino)-2-heptanone, 4-isopropyl-6-(2,6-diisopropylphenylimino)-2-heptanone, 6-(2,6-dimethylphenylimino)-3-octanone, 3-(2,6-diisopropylphenylimino)-1,3-diphenyl-1-acetone, 4-(2,6-diisopropylphenylimino)-4-phenyl-2-butanone, 3-(2,6-dimethylphenylimino)-1,3-diphenyl-1-acetone, 3-(2,6-diisopropylphenylimino)-1-phenyl-1-butanone, 3-(2,6-dimethylphenylimino)-1-phenyl-1-butanone, 3-(8-quinolylimino)-1,3-diphenyl-1-acetone, and 3-(3-quinolylimino)-1,3-diphenyl-1-acetone.

7. The catalyst component according to claim 1, wherein the internal electron donor further comprises at least one additional electron donor compound selected from the group consisting of aromatic carboxylate ester compounds, diol ester compounds, diether compounds, and mixtures thereof.

8. The catalyst component according to claim 7, wherein a molar ratio of the imine compound with a ketone group as shown in Formula I to the additional electron donor compound is in a range of 1:(0.05-20).

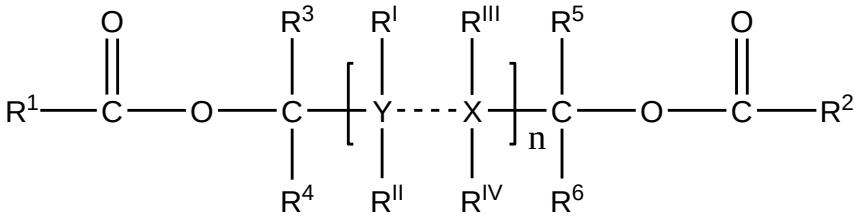
9. The catalyst component according to claim 7, wherein the aromatic carboxylate ester compound is as shown in Formula II,



Formula II

wherein in Formula II, R^I is C_1-C_{20} alkyl with or without a halogen atom substitute, C_2-C_{20} alkenyl with or without a halogen atom substitute, C_2-C_{20} alkynyl with or without a halogen atom substitute, or C_6-C_{30} alkylaryl with or without a halogen atom substitute; R^{II} is C_1-C_{20} alkyl, C_2-C_{20} alkenyl, C_2-C_{20} alkynyl, or C_6-C_{30} alkylaryl or ester group or amido group; R^{III}, R^{IV}, R^V, and R^{VI} are identical to or different from each other, each independently selected from the group consisting of C_1-C_{20} alkyl, C_2-C_{20} alkenyl, C_2-C_{20} alkynyl, C_1-C_{20} alkoxy, C_6-C_{30} arylalkyl, C_6-C_{30} alkylaryl, C_9-C_{40} fused aryl, and halogen;

the diol ester compound is as shown in Formula III,

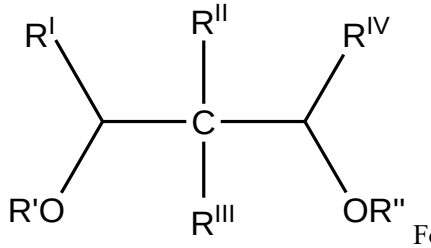


Formula III

wherein in Formula III, each of X and Y is independently selected from the group consisting of carbon, oxygen, sulfur, nitrogen, boron, and silicon; R^1 and R^2 are identical

to or different from each other, each independently selected from the group consisting of halogen, alkyl, cycloalkyl, aryl, alkenyl, fused aryl, and ester group; R^3-R^6 are identical to or different from each other, each independently selected from the group consisting of hydrogen, substituted or unsubstituted alkyl, substituted or unsubstituted cycloalkyl, substituted or unsubstituted aryl, substituted or unsubstituted alkenyl, substituted or unsubstituted fused aryl, and substituted or unsubstituted ester group; R^I-R^{IV} are identical to or different from each other, each independently selected from the group consisting of hydrogen, substituted or unsubstituted alkyl, substituted or unsubstituted cycloalkyl, substituted or unsubstituted aryl, substituted or unsubstituted alkenyl, substituted or unsubstituted fused aryl, and substituted or unsubstituted ester group; R^3-R^6 and R^I-R^{IV} each optionally contain one or more heteroatoms as a substitute of a carbon or hydrogen atom or both, the heteroatom being oxygen, sulfur, nitrogen, boron, silicon, phosphorus, or a halogen atom; one or more of R^3-R^6, and R^I to R^{IV} are bonded together to form a ring; and n is an integer ranging from 1 to 10; and/or

the diether compound is as shown in Formula IV,



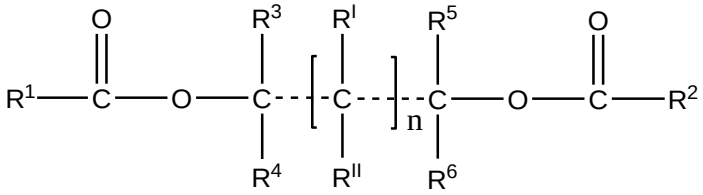
Formula IV

wherein in Formula IV, R′ and R″ are identical to or different from each other, each independently selected from the group consisting of C_1-C_{20} hydrocarbyls; n is an integer ranging from 0 to 6; R^I-R^{IV} are identical to or different from each other, each independently selected from the group consisting of hydrogen, alkoxy, substituted amino, halogen atoms, C_1-C_{20} hydrocarbyl, and C_6-C_{20} aryl, and optionally two or more of R^I-R^{IV} are bonded together to form a ring.

10. The catalyst component according to claim 9, wherein in Formula II, R^I is selected from the group consisting of methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, sec-butyl, tert-butyl, pentyl, isopentyl, neopentyl, hexyl, ethenyl, allyl, ethynyl, phenyl, halogenated phenyl, alkyl-substituted phenyl, naphthyl, and biphenyl; and/or,

R^{II} is selected from the group consisting of methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, sec-butyl, tert-butyl, pentyl, isopentyl, neopentyl, hexyl, ethenyl, allyl, ethynyl, phenyl, halogenated phenyl, alkyl-substituted phenyl, naphthyl, biphenyl, ethoxycarbonyl, propoxycarbonyl, isopropoxycarbonyl, butoxycarbonyl, isobutoxycarbonyl, hexoxycarbonyl, isohexoxycarbonyl, neohexoxycarbonyl, heptyloxycarbonyl, isoheptyloxycarbonyl, neoheptyloxycarbonyl, octyloxycarbonyl, isooctyloxycarbonyl, and neooctyloxycarbonyl.

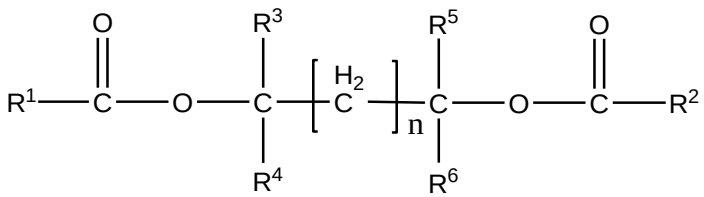
11. The catalyst component according to claim 9, wherein the diol ester compound is as shown Formula IIIa:



Formula IIIa

wherein in Formula IIIa, R^1, R^2 and R^3-R^6 are identical to or different from each other, each independently selected from the group consisting of C_1-C_{20} alkyl, C_3-C_{20} cycloalkyl, C_2-C_{20} alkenyl, C_6-C_{30} arylalkyl, C_6-C_{30} alkylaryl, and C_9-C_{40} fused aryl and ester group; R^I and R^{II} are identical to or different from each other, each independently selected from the group consisting of hydrogen, C_1-C_{20} alkyl, C_3-C_{20} cycloalkyl, C_2-C_{20} alkenyl, C_6-C_{30} arylalkyl, C_6-C_{30} alkylaryl, and C_9-C_{40} fused aryl and ester group; R^3-R^6 and R^I-R^{IV} each optionally contains one or more heteroatoms as a substitute of a carbon or hydrogen atom or both, the heteroatom being oxygen, sulfur, nitrogen, boron, silicon, phosphorus, or halogen atom; one or more of R^3-R^6, R^I, and R^{II} are optionally bonded to form a ring; n is an integer ranging from 1 to 5.

12. The catalyst component according to claim 11, wherein the diol ester compound is as shown in Formula IIIb:



Formula IIIb

13．The catalyst component according to claim 9, wherein in Formula III, Formula IIIa and/or Formula IIIb, each of $R^1$and R^2 is independently selected from the group consisting of methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, sec-butyl, tert-butyl, pentyl, hexyl, hydroxyalkyl, phenyl, halogenated phenyl, alkyl-substituted phenyl, naphthyl, biphenyl, and a heterocycle-containing group.

14．The catalyst component according to claim 9, wherein in Formula III, each of R^I and R^{II} is independently selected from the group consisting of methyl, ethyl, n-propyl, isopropyl, n-butyl, isobutyl, sec-butyl, tert-butyl, pentyl, hexyl, hydroxyalkyl, phenyl, halogenated phenyl, and alkyl-substituted phenyl.

15．The catalyst component according to claim 7, wherein the aromatic carboxylate ester compound is one or more selected from the group consisting of ethyl benzoate, propyl benzoate, butyl benzoate, pentyl benzoate, hexyl benzoate, heptyl benzoate, octyl benzoate, nonyl benzoate, decyl benzoate, isobutyl benzoate, isopentyl benzoate, isohexyl benzoate, isoheptyl enzoate, isooctyl benzoate, isononyl benzoate, isodecyl benzoate, neopentyl benzoate, neohexyl benzoate, neoheptyl benzoate, neooctyl benzoate, neononyl benzoate, neodecyl benzoate, diethyl phthalate, dipropyl phthalate, diisobutyl phthalate, di-n-butyl phthalate, di-n-pentyl phthalate, diisopentyl phthalate, dineopentyl phthalate, dihexyl phthalate, diheptyl phthalate, dioctyl phthalate, dinonyl phthalate, diisohexyl phthalate, diisoheptyl phthalate, diisooctyl phthalate, diisononyl phthalate, diisobutyl 3-methylphthalate, di-n-butyl 3-methylphthalate, diisopentyl 3-methylphthalate, di-n-pentyl 3-methylphthalate, diisooctyl 3-methylphthalate, di-n-octyl 3-methylphthalate, diisobutyl 3-ethylphthalate, di-n-butyl 3-ethylphthalate, di-n-octyl 3-ethylphthalate, diisobutyl 3-ethylphthalate, di-n-pentyl 3-ethylphthalate, diisopentyl 3-ethylphthalate, diisobutyl 3-propylphthalate, di-n-butyl 3-propylphthalate, diisobutyl 3-chlorophthalate, diisobutyl 3-butylphthalate, di-n-butyl 3-butylphthalate, di-n-butyl 4-butylphthalate, diisobutyl 4-propylphthalate, diisopentyl 4-butylphthalate, di-n-butyl 4-chlorophthalate, diisobutyl 4-chlorophthalate, di-n-octyl 4-chlorophthalate, di-n-butyl 4-methoxyphthalate, and diisobutyl 4-methoxyphthalate;

and/or

the diether compound is one or more selected fromthe group consisting of 2-isopropyl-1,3-dimethoxypropane, 2-butyl-1,3-dimethoxypropane, 2-cyclohexyl-1,3-dimethoxypropane, 2-benzyl-1,3-dimethoxypropane, 2-phenyl-1,3-dimethoxypropane, 2-(1-naphthyl)-1,3-dimethoxypropane, 2-isopropyl-2-isopentyl-1,3-dimethoxypropane, 2-isopropyl-2-isobutyl-1,3-dimethoxypropane, 2-isopropyl-2-butyl-1,3-dimethoxypropane, 2,2-dicyclopentyl-1,3-dibenzoyloxypropane, 2,2-dicyclohexyl-1,3-dimethoxypropane, 2,2-dibutyl-1,3-dimethoxypropane, 2,2-diisobutyl-1,3-dimethoxypropane, 2,2-diisopropyl-1,3-dimethoxypropane, 2,2-diethyl-1,3-dimethoxypropane, 2-ethyl-2-butyl-1,3-dimethoxypropane, 2,4-dimethoxypentane, 3-ethyl-2,4-dimethoxypentane, 3-methyl-2,4-dimethoxypentane, 3-propyl-2,4-dimethoxypentane, 3-isopropyl-2,4-dimethoxypentane, 3,5-dimethoxyheptane, 4-ethyl-3,5-dimethoxyheptane, 4-propyl-3,5-dimethoxyheptane, 4-isopropyl-3,5-dimethoxyheptane, 9,9-dimethoxymethylfluorene, 9,9-dimethoxymethyl-4-tert-butylfluorene, 9,9-dimethoxymethyl-4-propylfluorene, 9,9-dimethoxymethyl-1,2,3,4-tetrahydrofluorene, 9,9-dimethoxymethyl-1,2,3,4,5,6,7,8-octahydrofluorene, 9,9-dimethoxymethyl-2,3,6,7-diphenylpropylindene, 9,9-dimethoxymethyl-1,8-dichlorofluorene, 7,7-dimethoxymethyl-2,5-norbornadiene, 1,4-dimethoxybutane, 2,3-diisopropyl-1,4-dimethoxybutane, 2,3-dibutyl-1,4-dimethoxybutane, 1,2-dimethoxybenzene, 3-ethyl-1,2-dimethoxybenzene, 4-butyl-1,2-dimethoxybenzene, 1,8-dimethoxynaphthalene, 2-ethyl-1,8-dimethoxynaphthalene, 2-propyl-1,8-dimethoxynaphthalene, 2-butyl-1,8-dimethoxynaphthalene, 4-butyl-1,8-dimethoxynaphthalene, 4-isobutyl-1,8-dimethoxynaphthalene, 4-isopropyl-1,8-dimethoxynaphthalene, and 4-propyl-1,8-dimethoxynaphthalene.

16. A catalyst for olefin polymerization, comprising:

A) the catalyst component according to claim 1;

B) an organoaluminium compound; and optionally,

C) an organosilicon compound.

17. The catalyst according to claim 16, wherein the olefin is propene.

18. A method for making a polymer, comprising polymerizing olefins in the presence of the catalyst component according to claim 1.

19. A method for making a polymer, comprising polymerizing olefins in the presence of the catalyst according to claim 16.

20. The catalyst component according to claim 3, wherein the heterocycle-containing group is a pyrrole-containing group, a pyridine-containing group, a pyrimidine-containing group, or a quinolone-containing group.

21. The catalyst component according to claim 13, wherein the heterocycle-containing group is a pyrrole-containing group, a pyridine-containing group, pyrimidine-containing group, or a quinoline-containing group.

22. The catalyst component according to claim 7, wherein a molar ratio of the imine compound with a ketone group as shown in Formula I to the additional electron donor compound is in a range of 1:(0.1-10).

23. The process according to claim 18, wherein the olefin is propene.

24. The process according to claim 19, wherein the olefin is propene.