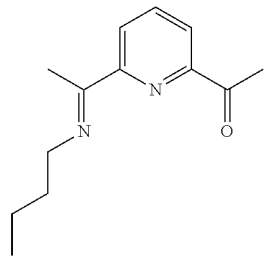
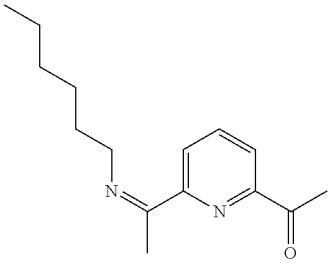
Claims

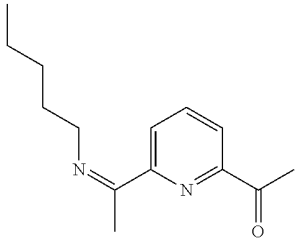
1. A catalyst component for olefin polymerization, comprising magnesium, titanium, halogen, and an internal electron donor, wherein the internal electron donor comprises an imine compound having a ketone group selected from:



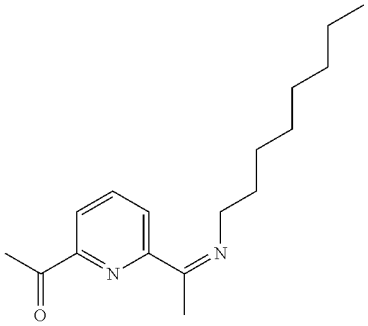
6-(butylimino)ethyl-2-acetylpyridine,



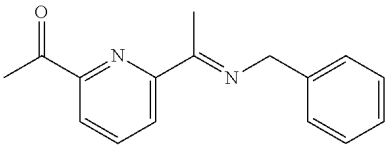
6-(hexylimino)ethyl-2-acetylpyridine,



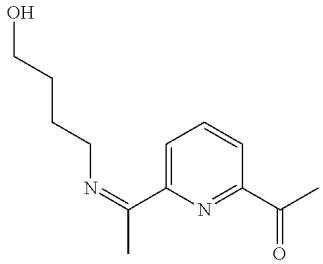
6-(pentylimino)ethyl-2-acetylpyridine,



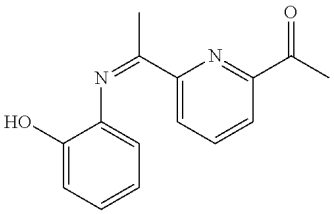
6-(octylimino)ethyl-2-acetylpyridine,



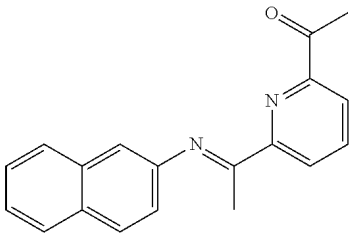
6-(benzylimino)ethyl-2-acetylpyridine,



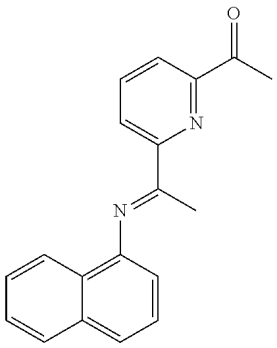
6-(4-hydroxy butylimino)ethyl-2-acetylpyridine,



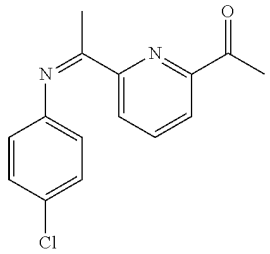
6-(2-hydroxy phenylimino)ethyl-2-acetylpyridine,



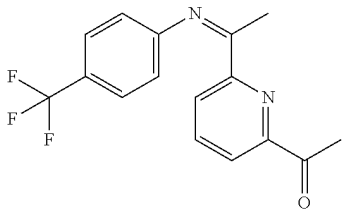
6-(2-naphthylimino)ethyl-2-acetylpyridine,



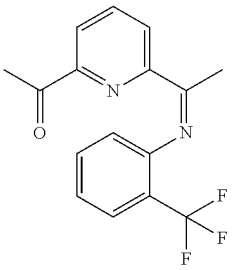
6-(1-naphthylimino)ethyl-2-acetylpyridine,



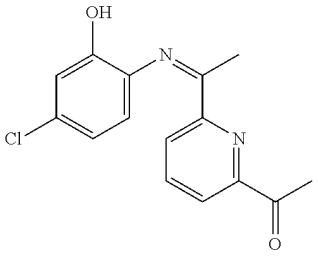
6-(4-chlorophenylimino)ethyl-2-acetylpyridine,



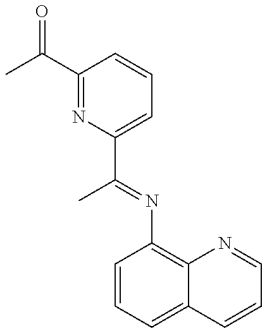
6-(4-trifluoromethylphenylimino)ethyl-2-acetylpyridine,



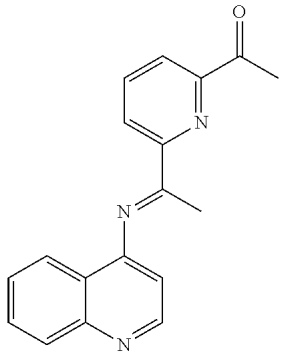
6-(2-trifluoromethylphenylimino)ethyl-2-acetylpyridine,



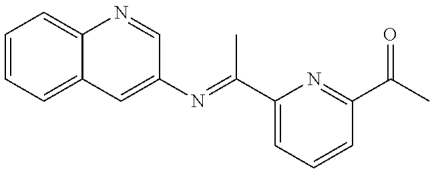
6-(2-hydroxy -4-chlorophenylimino)ethyl-2-acetylpyridine,



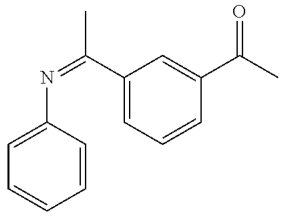
6-(8-quinolylimino)ethyl-2-acetylpyridine,



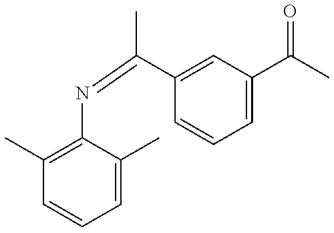
6-(4-quinolylimino)ethyl-2-acetylpyridine,



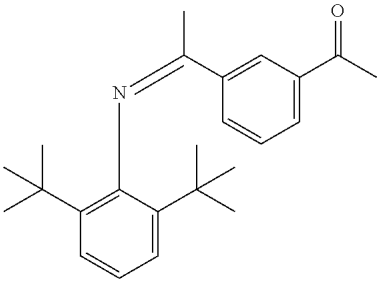
6-(3-quinolylimino)ethyl-2-acetylpyridine,



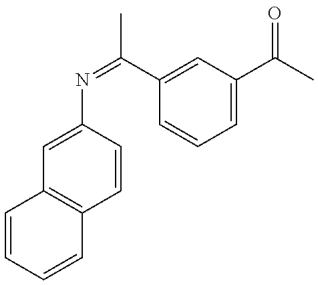
3-(phenylimino)ethylacetophenone,



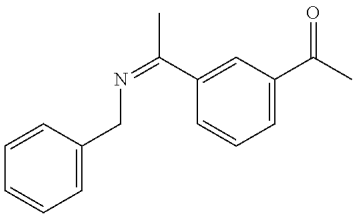
3-(2,6-dimethylphenylimino)ethylacetophenone,



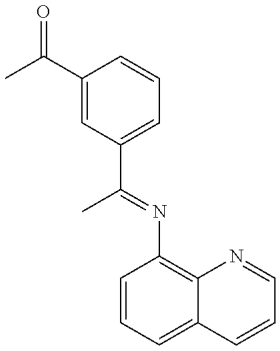
3-(2,6-diisopropylphenylimino)ethylacetophenone,



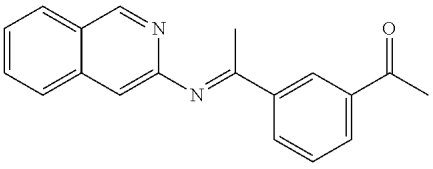
3-(2-naphthylimino)ethylacetophenone,



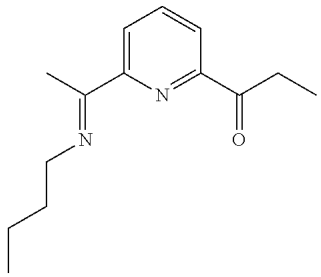
3-(benzylimino)ethylacetophenone,



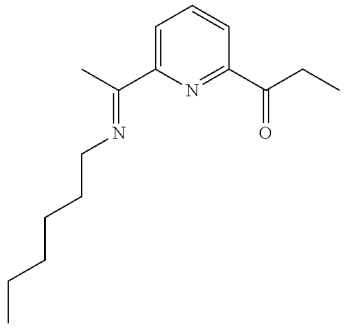
3-(8-quinolylimino)ethylacetophenone,



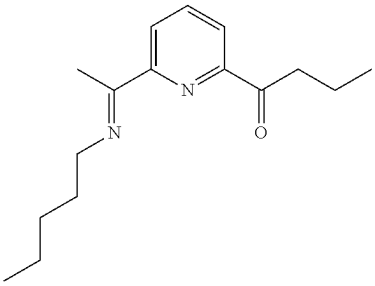
3-(2-quinolylimino)ethylacetophenone,



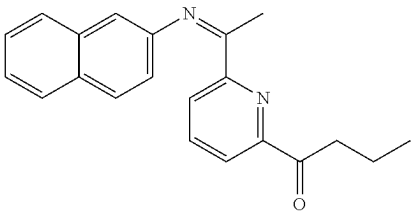
6-(butylimino)ethyl-2-propionylpyridine,



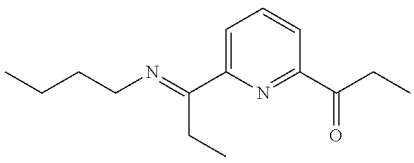
6-(hexylimino)ethyl-2-propionylpyridine,



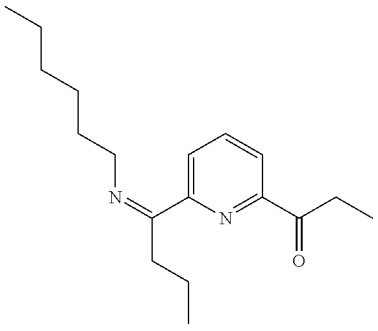
6-(pentylimino)ethyl-2-butyrylpyridine,



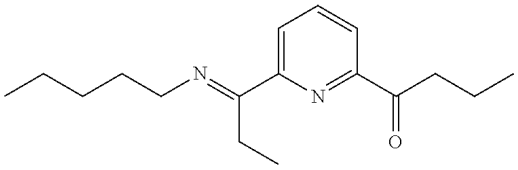
6-(2-naphthylimino)ethpyl-2-butyrylpyridine,



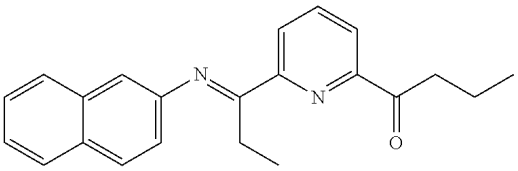
6-(butylimino)propyl-2-propionylpyridine,



6-(hexylimino)butyl-2-propionylpyridine,



6-(pentylimino)propyl-2-butyrylpyridine, and



6-(2-naphthylimino)propyl-2-butyrylpyridine.

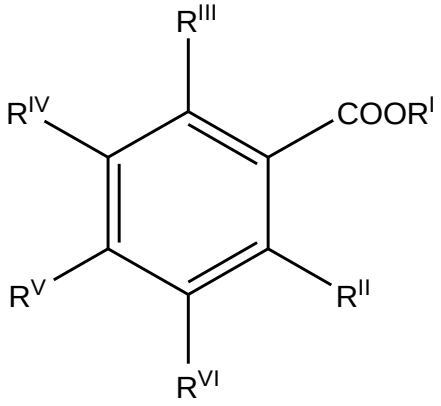
2. The catalyst component according to claim 1, wherein based on the weight of the catalyst component, a content of magnesium is in a range of 5wt%-50wt%, a content of titanium is in a range of 1.0 wt%-8.0wt%, a content of halogen is in a range of 10 wt%-70 wt%, and a content of the internal electron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

3. The catalyst component according to any one of claim 1, wherein the internal electron donor further comprises at least one additional electron donor compound, which is one, two, or three selected from the group consisting of aromatic carboxylate ester compounds, diol ester compounds, and diether compounds.

4. The catalyst component according to claim 3, wherein a molar ratio of the imine compound having a ketone group to the additional electron donor compound is in a range of 1:(0.05-20).

5. The catalyst component according to claim 4, wherein the molar ratio of the imine compound having a ketone group to the additional electron donor compound is in a range of 1:(0.1-10).

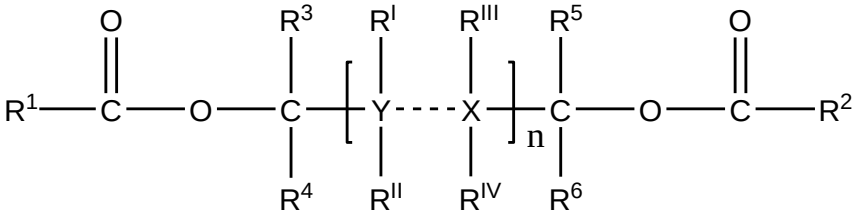
6. The catalyst component according to claim 3, wherein the aromatic carboxylate ester compound is as shown in Formula II,



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,

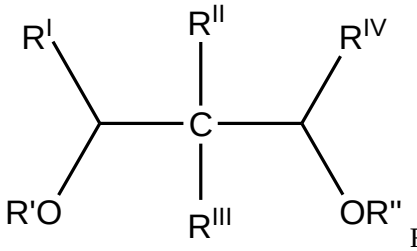


Formula III

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 a 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 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 a halogen atom; one or more of R^3-R^6, and R^I to R^{IV} are optionally 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,



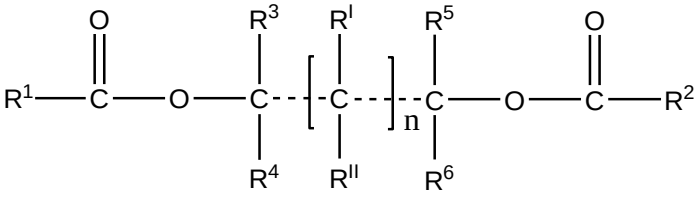
Formula IV

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}hydrocarbyl; 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 two or more of R^I-R^{IV} are bonded together to form a ring.

7. The catalyst component according to claim 6, 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, or 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.

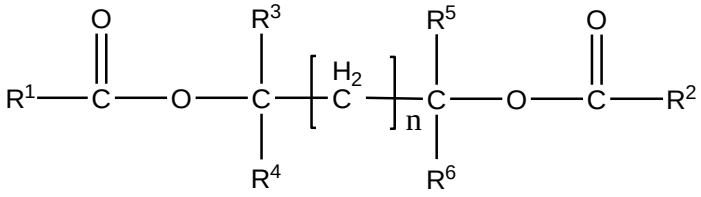
8. The catalyst component according to any one of claim 6, wherein the diol ester compound is as shown in Formula IIIa:



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, 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, 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.

9. The catalyst component according to claim 8, wherein the diol ester compound is as shown in Formula IIIb:



Formula IIIb.

10. The catalyst component according to claim 6, wherein in at least one of Formula III, Formula IIIa, and 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, a heterocycle-containing group; the heterocycle-containing group is selected from a pyrrole-containing group, a pyridine-containing group, pyrimidine-containing group, and a quinoline-containing group.

11. The catalyst component according to claim 6, 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.

12. The catalyst component according to claim 3, 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-ethyl phthalate, 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 from the 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.

13. A catalyst for olefin polymerization, comprising:

A) the catalyst component according to claim 1;

B) an organoaluminium compound; and optionally,

C) an organosilicon compound.

14. The catalyst according to claim 13, wherein the olefin is propene.

15. A method for olefin polymerization, comprising polymerizing an olefin feedstock in presence of the catalyst comprising the catalyst component of claim 1.

16. The method of claim 15, wherein the olefin feedstock comprises propylene.

17. A method for olefin polymerization, comprising polymerizing an olefin feedstock in presence of the catalyst comprising the catalyst component of claim 13.