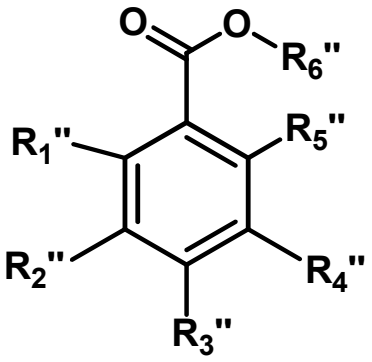
monocarboxylic acid having 2-10 carbon atoms and an aliphatic mono- or polyhydric alcohol having 1-15 carbon atoms or an aromatic alcohol having 6-15 carbon atoms.

According to some embodiments of the catalyst component of the present invention, the aromatic monocarboxylic ester is a monoester formed by an aromatic monocarboxylic acid having 7-10 carbon atoms and an aliphatic mono- or polyhydric alcohol having 1-15 carbon atoms or an aromatic alcohol having 6-15 carbon atoms.

According to some embodiments of the catalyst component of the present invention, the aromatic monocarboxylic ester is an aromatic monocarboxylic ester as shown in Formula III.



Formula III

In Formula III, R_1"-R_5" are identical to or different from each other, each independently selected from a group consisting of hydrogen, hydroxyl, halogen, amino, substituted or unsubstituted C_1-C_{10} linear or branched alkyl, substituted or unsubstituted C_1-C_{10} alkoxy, substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{10} aryl, substituted or unsubstituted C_7-C_{10} aralkyl, and substituted or unsubstituted C_7-C_{10} alkaryl; or any two of R_1"-R_5" form an aromatic ring or an aliphatic ring; R_6" is selected from a group consisting of substituted or unsubstituted C_1-C_{10} linear or branched alkyl, substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{10} aryl, substituted or unsubstituted C_7-C_{10} aralkyl, and substituted or unsubstituted C_7-C_{10} alkaryl, preferably selected from substituted or unsubstituted C_1-C_6 linear or branched alkyl.

The aromatic monocarboxylic ester may specifically be at least one selected from a group consisting of benzoate, o-hydroxybenzoate, o-methoxybenzoate, and

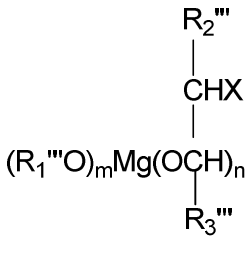
o-ethoxybenzoate.

According to the present invention, the internal electron donor comprises a diether compound and a monocarboxylic ester compound. The diether compound and the monocarboxylic ester compound may produce a certain synergistic effect. Based on an amount of the internal electron donor, a total amount of the monocarboxylic ester compound and the diether compound is preferably 70-100% by weight, more preferably 80-100% by weight, further more preferably 90-100% by weight, most preferably 100% by weight.

According to some embodiments of the catalyst component of the present invention, the catalyst component is a product resulted from a reaction of a magnesium source, a titanium source, and the internal electron donor.

According to some embodiments of the catalyst component of the present invention, the magnesium source comprises one or more magnesium compounds selected from a group consisting of magnesium dihalide, magnesium alkoxide, magnesium alkyl, a hydrate or alcoholate of magnesium dihalide, and a derivative derived by substituting a halogen atom in a formula of magnesium dihalide with alkoxy or halogenated alkoxy.

According to some embodiments of the catalyst component of the present invention, the magnesium source comprises a magnesium compound as shown in Formula IV.



Formula IV

In Formula IV,

R_1''' is selected from a group consisting of substituted or unsubstituted C_1-C_{10} linear alkyl, substituted or unsubstituted C_3-C_{10} branched alkyl, substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{20} aryl, substituted or

unsubstituted C_7-C_{20} aralkyl, and substituted or unsubstituted C_7-C_{20} alkaryl; preferably, R_1''' is selected from a group consisting of substituted or unsubstituted C_1-C_8 linear alkyl, substituted or unsubstituted C_3-C_8 branched alkyl, substituted or unsubstituted C_3-C_8 cycloalkyl, substituted or unsubstituted C_6-C_{15} aryl, substituted or unsubstituted C_7-C_{15} aralkyl, and substituted or unsubstituted C_7-C_{15} alkaryl; more preferably, R_1''' is selected from a group consisting of substituted or unsubstituted C_1-C_6 linear alkyl, substituted or unsubstituted C_3-C_6 branched alkyl, substituted or unsubstituted C_3-C_6 cycloalkyl, substituted or unsubstituted C_6-C_{10} aryl, substituted or unsubstituted C_7-C_{10} aralkyl, and substituted or unsubstituted C_7-C_{10} alkaryl.

R_2''' and R_3''' are identical to or different from each other, each independently selected from a group consisting of hydrogen, substituted or unsubstituted C_1-C_{10} linear alkyl, substituted or unsubstituted C_3-C_{10} branched alkyl, substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{20} aryl, substituted or unsubstituted C_7-C_{20} aralkyl, and substituted or unsubstituted C_7-C_{20} alkaryl; preferably, R_2''' and R_3''' are each independently selected from a group consisting of hydrogen, substituted or unsubstituted C_1-C_{10} linear alkyl, substituted or unsubstituted C_3-C_8 branched alkyl, substituted or unsubstituted C_3-C_8 cycloalkyl, substituted or unsubstituted C_6-C_{10} aryl, substituted or unsubstituted C_7-C_{10} aralkyl, and substituted or unsubstituted C_7-C_{10} alkaryl; more preferably, R_2''' and R_3''' are each independently selected from a group consisting of hydrogen, substituted or unsubstituted C_1-C_6 linear alkyl, substituted or unsubstituted C_3-C_6 branched alkyl, substituted or unsubstituted C_3-C_6 cycloalkyl, substituted or unsubstituted C_6-C_8 aryl, substituted or unsubstituted C_7-C_9 aralkyl, and substituted or unsubstituted C_7-C_9 alkylaryl.

X is a halogen, preferably chlorine or bromine.

m is 0.1-1.9; n is 0.1-1.9; and m+n=2.

According to some embodiments of the catalyst component of the present invention, the titanium source comprises titanium halide, titanium alkoxide halide, and titanium alkoxide. More preferably, the titanium source comprises a compound represented by a general formula Ti(OR′)3-aZa and/or Ti(OR')4-bZb, where R' is C_1-C_{20}

Example 2		o-methoxybenzoate				
Comparative Example 3	Com- Cat-3	ethyl benzoate	0		90.2	36
Comparative Example 4	Com- Cat-4	ethyl o-ethoxybenzoate	fluorene ether	0.003:1	95.2	68
Comparative Example 5	Com- Cat-5	ethyl o-methoxybenzoate	ether	0.75:1	94.5	45
Comparative Example 6	Com- Cat-6	ethyl o-ethoxybenzoate	ether	0.80:1	94.5	38

In Table 1, "ether" represents "2-isopropyl-2-isopentyl-1,3-dimethoxypropane"; "fluorenyl ether" represents "9,9-dimethoxymethylfluorene"; contents of internal electron donors A and B in the catalyst component were measured by a gas chromatograph (thermoelectric Trace GC Ultra).

Table 2

	Average particle diameter of catalyst particles (μm)
Example 1	13
Example 2	17
Example 3	18
Example 4	16
Example 5	17
Example 6	16

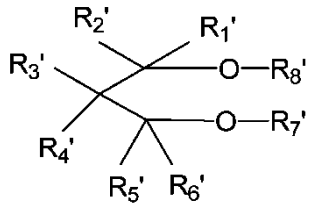
As can be seen from the results of the Examples and Comparative Examples in Table 1, when the catalyst component of the present invention in which the internal electron donor comprises both a monocarboxylic ester compound and a diether compound, especially when the molar ratio of the monocarboxylic ester compound to the diether compound is (0.0035-0.7):1, preferably (0.0040-0.7):1, more preferably (0.0045-0.6):1, further more preferably (0.005-0.5):1, still more preferably (0.01-0.35):1, is used, the prepared polypropylene has a significantly improved isotactic index as well as a high melt index. In other words, the catalyst of the present

Claims

1. A catalyst component for olefin polymerization, comprising magnesium, titanium, a halogen, and an internal electron donor, wherein the internal electron donor comprises a monocarboxylic ester compound and a diether compound, a molar ratio of the monocarboxylic ester compound to the diether compound being (0.0035-0.7):1.

2. The catalyst component according to claim 1, wherein the molar ratio of the monocarboxylic ester compound to the diether compound is (0.0040-0.7):1, preferably (0.0045-0.6):1, more preferably (0.005-0.5):1, further more preferably (0.01-0.35):1, most preferably (0.02-0.25):1.

3. The catalyst component according to claim 1 or 2, wherein the diether compound is a 1,3-diether compound, preferably a diether compound as shown in Formula I,



Formula I

wherein in Formula I,

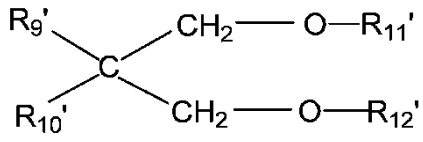
R_1', R_2', R_3', R_4', R_5' and R_6' are identical to or different from each other, each independently selected from the group consisting of hydrogen, halogen, substituted or unsubstituted C_1-C_{20} linear or branched alkyl, substituted or unsubstituted C_3-C_{20} cycloalkyl, substituted or unsubstituted C_6-C_{20} aryl, substituted or unsubstituted C_7-C_{20} aralkyl, and substituted or unsubstituted C_7-C_{20} alkaryl, preferably selected from the group consisting of hydrogen, halogen, substituted or unsubstituted C_1-C_{18} linear or branched alkyl, substituted or unsubstituted C_3-C_{18} cycloalkyl, substituted or unsubstituted C_6-C_{18} aryl, substituted or unsubstituted C_7-C_{18} aralkyl, and substituted or unsubstituted C_7-C_{18} alkaryl; or, two or more of R_1', R_2', R_3', R_4', R_5' and R_6' are bonded to each other to form a ring;

R_7' and R_8' are identical to or different from each other, each independently selected from the group consisting of substituted or unsubstituted C_1-C_{20} linear or branched alkyl, substituted or unsubstituted C_3-C_{20} cycloalkyl, substituted or

unsubstituted C_6-C_{20} aryl, substituted or unsubstituted C_7-C_{20} aralkyl, and substituted or unsubstituted C_7-C_{20} alkaryl, preferably selected from the group consisting of substituted or unsubstituted C_1-C_{10} linear or branched alkyl, substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{15} aryl, substituted or unsubstituted C_7-C_{15} aralkyl, and substituted or unsubstituted C_7-C_{15} alkaryl; and

the monocarboxylic ester compound is selected from an aromatic monocarboxylic ester and an aliphatic monocarboxylic ester; preferably, the aliphatic monocarboxylic ester is a monoester formed by an aliphatic monocarboxylic acid having 2-10 carbon atoms and an aliphatic mono- or polyhydric alcohol having 1-15 carbon atoms or an aromatic alcohol having 6-15 carbon atoms; preferably, the aromatic monocarboxylic ester is a monoester formed by an aromatic monocarboxylic acid having 7-10 carbon atoms and an aliphatic mono- orpolyhydric alcohol having 1-15 carbon atoms or an aromatic alcohol having 6-15 carbon atoms.

4. The catalyst component according to any one of claims 1 to 3, wherein the diether compound is a 1,3-diether compound as shown in Formula II,



Formula II

wherein in Formula II,

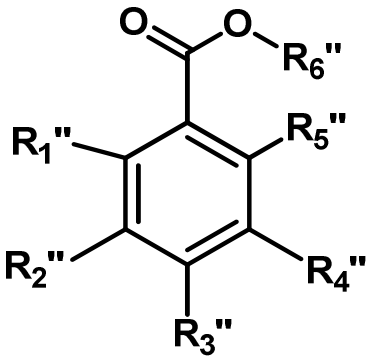
R_9' and R_{10}' are identical to or different from each other, each independently selected from the group consisting of hydrogen, halogen, substituted or unsubstituted C_1-C_{18} linear or branched alkyl, substituted or unsubstituted C_3-C_{18} cycloalkyl, substituted or unsubstituted C_6-C_{18} aryl, substituted or unsubstituted C_7-C_{18} aralkyl, and substituted or unsubstituted C_7-C_{18} alkaryl, preferably selected from the group consisting of hydrogen, halogen, substituted or unsubstituted C_1-C_{10} linear or branched alkyl, substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{15} aryl, substituted or unsubstituted C_7-C_{15} aralkyl, and substituted or unsubstituted C_7-C_{15} alkaryl; or, R_9' and R_{10}' are bonded to each other to form a ring; preferably R_9' and R_{10}' are bonded to each other to form a fluorene ring; and

R_{11}' and R_{12}' are identical to or different from each other, each independently being substituted or unsubstituted C_1-C_{10} linear or branched alkyl.

5. The catalyst component according to any one of claims 1 to 4, wherein the aliphatic monocarboxylic ester is a monoester formed by an aliphatic monocarboxylic acid having 2-10 carbon atoms and an aliphatic mono- or polyhydric alcohol having 1-15 carbon atoms or an aromatic alcohol having 6-15 carbon atoms; and

the aromatic monocarboxylic ester is a monoester formed by an aromatic monocarboxylic acid having 7-10 carbon atoms and an aliphatic mono- or polyhydric alcohol having 1-15 carbon atoms or an aromatic alcohol having 6-15 carbon atoms.

6. The catalyst component according to any one of claims 1 to 5, wherein the aromatic monocarboxylic ester is an aromatic monocarboxylic ester as shown in Formula III:



Formula III

wherein in Formula III,

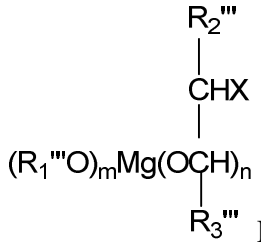
R_1"-R_5" are identical to or different from each other, each independently selected from the group consisting of hydrogen, hydroxyl, halogen, amino, substituted or unsubstituted C_1-C_{10} linear or branched alkyl, substituted or unsubstituted C_1-C_{10} alkoxy, substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{10} aryl, substituted or unsubstituted C_7-C_{10} aralkyl, and substituted or unsubstituted C_7-C_{10} alkaryl; or any two of R_1"-R_5" form an aromatic ring or an aliphatic ring; R_6" is selected from the group consisting of substituted or unsubstituted C_1-C_{10} linear or branched alkyl, substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{10} aryl, substituted or unsubstituted C_7-C_{10} aralkyl, and substituted or unsubstituted C_7-C_{10} alkaryl, preferably selected from substituted or unsubstituted C_1-C_6 linear or branched alkyl.

7. The catalyst component according to any one of claims 1 to 6, wherein the catalyst component is a product produced from a reaction of a magnesium source, a

titanium source, and the internal electron donor;

preferably, the magnesium source comprises one or more magnesium compounds selected from the group consisting of magnesium dihalide, magnesium alkoxide, magnesium alkyl, a hydrate or alcoholate of magnesium dihalide, and a derivative derived by substituting a halogen atom in a formula of magnesium dihalide with alkoxy or halogenated alkoxy.

8. The catalyst component according to claim 7, wherein the magnesium source comprises a magnesium compound as shown in Formula IV,



Formula IV

wherein in Formula IV,

R_1''' is selected from the group consisting of substituted or unsubstituted C_1-C_{10} linear alkyl, substituted or unsubstituted C_3-C_{10} branched alkyl, substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{20} aryl, substituted or unsubstituted C_7-C_{20} aralkyl, and substituted or unsubstituted C_7-C_{20} alkaryl; preferably, R_1''' is selected from the group consisting of substituted or unsubstituted C_1-C_8 linear alkyl, substituted or unsubstituted C_3-C_8 branched alkyl, substituted or unsubstituted C_3-C_8 cycloalkyl, substituted or unsubstituted C_6-C_{15} aryl, substituted or unsubstituted C_7-C_{15} aralkyl, and substituted or unsubstituted C_7-C_{15} alkaryl; more preferably, R_1''' is selected from the group consisting of substituted or unsubstituted C_1-C_6 linear alkyl, substituted or unsubstituted C_3-C_6 branched alkyl, substituted or unsubstituted C_3-C_6 cycloalkyl, substituted or unsubstituted C_6-C_{10} aryl, substituted or unsubstituted C_7-C_{10} aralkyl, and substituted or unsubstituted C_7-C_{10} alkaryl;

R_2''' and R_3''' are identical to or different from each other, each independently selected from the group consisting of hydrogen, substituted or unsubstituted C_1-C_{10} linear alkyl, substituted or unsubstituted C_3-C_{10} branched alkyl, substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{20} aryl, substituted or unsubstituted C_7-C_{20} aralkyl, and substituted or unsubstituted C_7-C_{20} alkaryl; preferably, R_2''' and R_3''' are each independently selected from the group consisting of hydrogen,

substituted or unsubstituted C_1-C_{10} linear alkyl, substituted or unsubstituted C_3-C_8 branched alkyl, substituted or unsubstituted C_3-C_8 cycloalkyl, substituted or unsubstituted C_6-C_{10} aryl, substituted or unsubstituted C_7-C_{10} aralkyl, and substituted or unsubstituted C_7-C_{10} alkaryl; more preferably, R_2''' and R_3''' are each independently selected from the group consisting of hydrogen, substituted or unsubstituted C_1-C_6 linear alkyl, substituted or unsubstituted C_3-C_6 branched alkyl, substituted or unsubstituted C_3-C_6 cycloalkyl, substituted or unsubstituted C_6-C_8 aryl, substituted or unsubstituted C_7-C_9 aralkyl, and substituted or unsubstituted C_7-C_9 alkylaryl;

X is a halogen, preferably chlorine or bromine;

m is 0.1-1.9; n is 0.1-1.9; and m+n=2;

preferably, the titanium source comprises titanium halide, titanium alkoxide halide, and titanium alkoxide; more preferably, the titanium source comprises a compound represented by a general formula $Ti(OR')_{3-a}Z_a$ and/or $Ti(OR')_{4-b}Z_b$, wherein R' is C_1-C_{20} alkyl; Z is F, Cl, Br or I; a is an integer from 1 to 3; and b is an integer from 1 to 4.

9. The catalyst component according to claim 7 or 8, wherein the magnesium source further comprises sulfur, a molar ratio of sulfur to magnesium in the magnesium source is q:1, wherein $0<q\leqq 0.5$, preferably $0.001<q\leqq 0.2$.

10. The catalyst component according to any one of claims 7 to 9, wherein the magnesium source is prepared by a method comprising the following steps:

(1) preparing a mixture, wherein the mixture comprises elemental sulfur, a magnesium halide represented by a general formula MgX_1Y, a compound represented by a general formula R_1OH, an optional inert liquid medium, and an optional surfactant; preferably, the mixture is obtained by mixing the elemental sulfur, the magnesium halide represented by the general formula MgX_1Y, the compound represented by the general formula R_1OH, the optional inert liquid medium, and the optional surfactant together at one time or step by step and then heating a resulting mixture; and

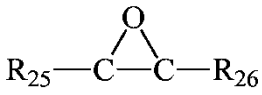
(2) subjecting the mixture obtained in step (1) to a contact reaction with an ethylene oxide compound;

wherein in the general formula MgX_1Y, X_1 is a halogen, and is preferably chlorine or bromine; Y is selected from the group consisting of halogen, substituted or unsubstituted C_1-C_{10} linear alkyl, substituted or unsubstituted C_3-C_{10} branched alkyl,

substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{20} aryl, substituted or unsubstituted C_1-C_{10} alkoxy, substituted or unsubstituted C_6-C_{20} aryloxy, substituted or unsubstituted C_7-C_{20} aralkyl, and substituted or unsubstituted C_7-C_{20} alkaryl;

in the general formula R_1OH, R_1 is selected from the group consisting of substituted or unsubstituted C_1-C_{10} linear alkyl, substituted or unsubstituted C_3-C_{10} branched alkyl, substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{20} aryl, substituted or unsubstituted C_7-C_{20} aralkyl, and substituted or unsubstituted C_7-C_{20} alkaryl; preferably, R_1 is selected from the group consisting of substituted or unsubstituted C_1-C_8 linear alkyl, substituted or unsubstituted C_3-C_8 branched alkyl, substituted or unsubstituted C_3-C_8 cycloalkyl, substituted or unsubstituted C_6-C_{15} aryl, substituted or unsubstituted C_7-C_{15} aralkyl, and substituted or unsubstituted C_7-C_{15} alkaryl; more preferably, R_1 is selected from the group consisting of substituted or unsubstituted C_1-C_6 linear alkyl, substituted or unsubstituted C_3-C_6 branched alkyl, substituted or unsubstituted C_3-C_6 cycloalkyl, substituted or unsubstituted C_6-C_{10} aryl, substituted or unsubstituted C_7-C_{10} aralkyl, and substituted or unsubstituted C_7-C_{10} alkaryl;

the ethylene oxide compound has a structure shown in Formula V:



Formula V

wherein in Formula V, R_{25} and R_{26} are each independently selected from the group consisting of hydrogen, substituted or unsubstituted C_1-C_{10} linear alkyl, substituted or unsubstituted C_3-C_{10} branched alkyl, substituted or unsubstituted C_3-C_{10} cycloalkyl, substituted or unsubstituted C_6-C_{20} aryl, substituted or unsubstituted C_7-C_{20} aralkyl, and substituted or unsubstituted C_7-C_{20} alkaryl; preferably, R_{25} and R_{26} are each independently selected from the group consisting of hydrogen, substituted or unsubstituted C_1-C_8 linear alkyl, substituted or unsubstituted C_3-C_8 branched alkyl, substituted or unsubstituted C_3-C_8 cycloalkyl, substituted or unsubstituted C_6-C_{10} aryl, substituted or unsubstituted C_7-C_{10} aralkyl, and substituted or unsubstituted C_7-C_{10} alkaryl; more preferably, R_{25} and R_{26} are each independently selected from the group consisting of hydrogen, substituted or unsubstituted C_1-C_6 linear alkyl, substituted or unsubstituted C_3-C_6 branched alkyl, substituted or unsubstituted C_3-C_6 cycloalkyl,

substituted or unsubstituted C_6-C_8 aryl, substituted or unsubstituted C_7-C_9 aralkyl, and substituted or unsubstituted C_7-C_9 alkylaryl.

11. The catalyst component according to claim 10, wherein based on 1 mol of the magnesium halide represented by the general formula MgX_1Y, the elemental sulfur is present in an amount of 0.0001-0.5 mol, the compound represented by the general formula R_1OH is present in an amount of 4-30 mol, and the ethylene oxide compound is present in an amount of 1-10 mol;

preferably, based on 1 mol of the magnesium halide represented by the general formula MgX_1Y, the compound represented by the general formula R_1OH is present in an amount of 6-20 mol, and the ethylene oxide compound is present in an amount of 2-6 mol.

12. The catalyst component according to claim 10 or 11, wherein in step (1), the heating is conducted at a temperature of 80-120°C for a time period of 0.5-5 hours, preferably at a temperature of 80-100°C for a time period of 0.5-3 hours; and

in step (2), the contact reaction is carried out at conditions comprising reacting at a temperature of 40-120°C for a time period of 15-60 minutes, preferably at a temperature of 60-100°C for a time period of 20-50 minutes.

13. The catalyst component according to any one of claims 10 to 12, wherein the inert liquid medium is a silicone oil solvent and/or a hydrocarbon solvent; preferably, the inert liquid medium is at least one selected from the group consisting of kerosene, paraffin oil, petrolatum oil, white oil, methyl silicone oil, ethyl silicone oil, methyl ethyl silicone oil, phenyl silicone oil, and methyl phenyl silicone oil; and/or

based on 1 mol of the magnesium halide represented by the general formula MgX_1Y, the inert liquid medium is present in an amount of 0.8-10 L.

14. The catalyst component according to any one of claims 10 to 13, wherein the surfactant is at least one selected from the group consisting of polyvinylpyrrolidone, polyethylene glycol, polyvinyl alcohol, polyacrylic acid, polyacrylate, polyacrylamide, polystyrene sulfonate, naphthalenesulfonic acid formaldehyde condensate, condensed alkyl phenyl ether sulfate, condensed alkyl phenol polyoxyethylene ether phosphate,

oxyalkyl acrylate copolymer modified polyethyleneimine, 1-dodeca-4-vinylpyridine bromide polymer, polyvinylbenzyltrimethylamine salt, polyethylene oxide propylene oxide block copolymer, polyvinylpyrrolidone vinyl acetate copolymer, alkyl phenyl polyoxyethylene ether, and polyalkyl methacrylate; and/or

based on 1 mol of the magnesium halide represented by the general formula MgX_1Y, the surfactant is present in an amount of 1-20 g.

15. The catalyst component according to any one of claims 10 to 14, wherein in the general formula MgX_1Y, X_1 is chlorine or bromine, and Y is chlorine, bromine, C_1-C_5 alkoxy or C_6-C_{10} aryloxy; preferably, the magnesium halide represented by the general formula MgX_1Y is at least one selected from the group consisting of magnesium chloride, magnesium bromide, phenoxymagnesium chloride, isopropoxymagnesium chloride, and n-butoxymagnesium chloride; and/or

in the general formula R_1OH, R_1 is C_1-C_8 alkyl; preferably, the compound represented by the general formula R_1OH is at least one selected from the group consisting of ethanol, n-propanol, isopropanol, n-butanol, isobutanol, n-pentanol, isopentanol, n-hexanol, 2-ethylhexanol, and n-octanol; and/or

in the ethylene oxide compound having the structure shown in Formula V, R_{25} and R_{26} are each independently hydrogen, C_1-C_3 alkyl, or C_1-C_3 halogenated alkyl; preferably, the ethylene oxide compound is at least one selected from the group consisting of ethylene oxide, epoxypropane, epoxybutane, epoxychloropropane, epoxychlorobutane, epoxybromopropane, and epoxybromobutane.

16. The catalyst component according to any one of claims 1 to 15, wherein in the catalyst component, a weight ratio of titanium as titanium element, to magnesium as magnesium element, to the halogen, and to the internal electron donor is 1:2-15:8-30:2-15, preferably 1:3-12:10-25:3-13.

17. A catalyst for olefin polymerization, comprising:

(1) the catalyst component according to any one of claims 1 to16;

(2) at least one alkyl aluminum compound; and

(3) an optional external electron donor compound.

18. Use of the catalyst according to claim 17 in polymerization of an olefin, wherein, preferably, the olefin comprises at least one olefin represented by a formula CH_2=CHR, R being hydrogen or C_1-C_6 linear or branched alkyl.

19. An olefin polymerization method, comprising: contacting the olefin with an catalyst according to claim 17 under olefin polymerization condition, wherein, preferably, the olefin comprises at least one of olefin represented by a formula CH_2=CHR, R being hydrogen or C_1-C_6 linear or branched alkyl.