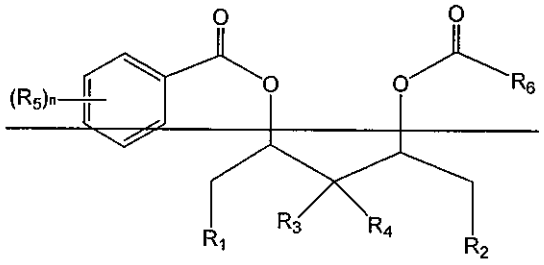
Claims

1. A catalyst component for olefin polymerization, comprising magnesium, titanium, a halogen, and an electron donor, wherein the electron donor is at least one selected from the group consisting of diol diester compounds as shown in Formula (I):



(I)

wherein, R_1 to R_4, identical with or different from each other, can be independently selected from hydrogen, halogens, and substituted or non-substituted C_1 to C_{10} hydrocarbyl groups, with at least one of R_1 and R_2 being a substituted or non-substituted C_1 to C_{10} hydrocarbyl group, and R_3 and R_4 optionally being bonded to form a ring;

wherein R_5 is selected from substituted or non-substituted C_2 to C_{10} hydrocarbyl groups, with n being an integer in the range from 1 to 5; and

wherein R_6 is selected from substituted or non-substituted C_1 to C_{15} hydrocarbyl groups.

2. The catalyst component according to claim 1, wherein in the diol diester compounds as shown in Formula (I), R_1 to R_4, identical with or different from each other, can be independently selected from hydrogen, halogens, substituted or non-substituted C_1 to C_{10} straight alkyl groups, C_3 to C_{10} branched alkyl groups, C_3 to C_{10} cycloalkyl groups, C_6 to C_{10} aryl groups, C_7 to C_{10} alkaryl groups, and C_7 to C_{10} aralkyl groups;

wherein R_5 is selected from substituted or non substituted C_2 to C_{10} straight alkyl groups, C_3 to C_{10} branched alkyl groups, C_3 to C_{10} cycloalkyl groups, C_6 to C_{10} aryl groups, C_7 to C_{10} alkaryl groups, and C_7 to C_{10} aralkyl groups; and

wherein R_6 is selected from substituted or non-substituted C_1 to C_{10} straight alkyl groups, C_3 to C_{10} branched alkyl groups, C_3 to C_{10} cycloalkyl groups, C_6 to C_{10} aryl groups, C_7 to C_{15} hydrocarbyl aryl groups, and C_7 to C_{15} aryl hydrocarbyl groups.

~~3. The catalyst component according to claim 1, wherein in the diol diester compounds as shown in Formula (I), R_1 and R_2 are selected from hydrogen and halogenated or non-halogenated C_1 to C_6 straight alkyl groups and C_3 to C_6 branched alkyl groups;~~

~~wherein R_3 and R_4 are selected from hydrogen, halogens, and halogenated or non-halogenated C_1 to C_6 straight alkyl groups and C_3 to C_6 branched alkyl groups;~~

~~wherein R_5 is selected from halogenated or non-halogenated C_2 to C_6 straight alkyl groups and C_3 to C_6 branched alkyl groups, with n equaling 1 or 2, preferably, n being 1 and R_5 being a para- or ortho-substituted group; and~~

~~wherein R_6 is selected from halogenated or non-halogenated C_4 to C_{10} straight or branched alkyl groups, C_5 to C_{10} cycloalkyl groups, C_6 to C_{10} aryl groups, C_8 to C_{15} aryl alkenyl groups, C_7 to C_{15} alkaryl groups, and C_7 to C_{15} aralkyl groups, preferably halogenated or non-halogenated C_8 to C_{12} aryl alkenyl groups, C_7 to C_{15} alkaryl groups, and C_7 to C_{15} aralkyl groups.~~

4<u>1</u>. <u>A</u>~~The~~ catalyst component ~~according to any one of claims 1 to 3,~~ <u>for olefin polymerization, comprising magnesium, titanium, a halogen, and an electron donor, wherein the electron donor is at least one selected from the group consisting of diol diester compounds,</u> wherein the diol diester compounds ~~as shown in Formula (I)~~ are one or more selected from the group consisting of 2,4-hexanediol-bis(4-ethyl benzoate),

2,4-hexanediol-bis(4-n-propyl benzoate),

2,4-hexanediol-bis(4-n-butyl benzoate),

2,4-hexanediol-bis(4-iso-butyl benzoate),

2,4-hexanediol-bis(4-tert-butyl benzoate),

2,4-hexanediol-bis(4-hexyl benzoate),

3-methyl-2,4-hexanediol-bis(4-ethyl benzoate),

3-methyl-2,4-hexanediol-bis(4-n-propyl benzoate),

3-methyl-2,4-hexanediol-bis(4-n-butyl benzoate),

3-methyl-2,4-hexanediol-bis(4-iso-butyl benzoate),

3-methyl-2,4-hexanediol-bis(4-tert-butyl benzoate),

3-methyl-2,4-hexanediol-bis(4-hexyl benzoate),

3-ethyl-2,4-hexanediol-bis(4-ethyl benzoate),

3-ethyl-2,4-hexanediol-bis(4-n-propyl benzoate),

3-ethyl-2,4-hexanediol-bis(4-n-butyl benzoate),

3-ethyl-2,4-hexanediol-bis(4-iso-butyl benzoate),

3-ethyl-2,4-hexanediol-bis(4-tert-butyl benzoate),

3-ethyl-2,4-hexanediol-bis(4-hexyl benzoate),

~~3,5-heptanediol-bis(4-ethyl benzoate),~~

3,5-heptanediol-bis(4-n-propyl benzoate),

3,5-heptanediol-bis(4-iso-propyl benzoate),

~~3,5-heptanediol-bis(4-n-butyl benzoate),~~

3,5-heptanediol-bis(4-iso-butyl benzoate),

3,5-heptanediol-bis(4-tert-butyl benzoate),

3,5-heptanediol-bis(4-pentyl benzoate),

3,5-heptanediol-bis(4-hexyl benzoate),

3,5-heptanediol-cinnamic acid-4-ethyl benzoate,

4-methyl-3,5-heptanediol-bis(4-ethyl benzoate),

4-methyl-3,5-heptanediol-bis(4-n-propyl benzoate),

4-methyl-3,5-heptanediol-bis(4-iso-propyl benzoate),

4-methyl-3,5-heptanediol-bis(4-n-butyl benzoate),

4-methyl-3,5-heptanediol-bis(4-iso-butyl benzoate),

4-methyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

4-methyl-3,5-heptanediol-bis(4-pentyl benzoate),

4-methyl-3,5-heptanediol-bis(4-hexyl benzoate),

4-methyl-3,5-heptanediol-cinnamic acid-4-ethyl benzoate,

4-ethyl-3,5-heptanediol-bis(4-ethyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-n-propyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-iso-propyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-n-butyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-iso-butyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-pentyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-hexyl benzoate),

4-ethyl-3,5-heptanediol-cinnamic acid-4-ethyl benzoate,

4-n-propyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

4-n-butyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

4,4-dimethyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

4-methyl-4-ethyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

4-methyl-4-n-propyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

3-methyl-2,4-heptanediol-bis(4-n-propyl benzoate),

3-methyl-2,4-heptanediol-bis(4-iso-propyl benzoate),

4-methyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4-ethyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4-n-propyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4-n-butyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4,4-dimethyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4,4-diethyl-3,5-octanediol-bis(4-n-propyl benzoate),

4,4-di-n-propyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4-methyl-4-ethyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4,6-nonanediol-bis(4-ethyl benzoate),

4,6-nonanediol-bis(4-n-propyl benzoate),

4,6-nonanediol-bis(4-n-butyl benzoate),

4,6-nonanediol-bis(4-iso-butyl benzoate),

4,6-nonanediol-bis(4-tert-butyl benzoate),

4,6-nonanediol-bis(4-hexyl benzoate),

4,6-nonanediol-cinnamic acid-4-ethyl benzoate,

5-methyl-4,6-nonanediol-bis(4-ethyl benzoate),

5-methyl-4,6-nonanediol-bis(4-n-propyl benzoate),

5-methyl-4,6-nonanediol-bis(4-n-butyl benzoate),

5-methyl-4,6-nonanediol-bis(4-iso-butyl benzoate),

5-methyl-4,6-nonanediol-bis(4-tert-butyl benzoate),

5-methyl-4,6-nonanediol-bis(4-hexyl benzoate),

5-ethyl-4,6-nonanediol-bis(4-ethyl benzoate),

5-ethyl-4,6-nonanediol-bis(4-n-propyl benzoate),

5-ethyl-4,6-nonanediol-bis(4-n-butyl benzoate),

5-ethyl-4,6-nonanediol-bis(4-iso-butyl benzoate),

5-ethyl-4,6-nonanediol-bis(4-tert-butyl benzoate),

5-ethyl-4,6-nonanediol-bis(4-hexyl benzoate),

5-n-propyl-4,6-nonanediol-bis(4-tert-butyl benzoate),

5-n-butyl-4,6-nonanediol-bis(4-n-butyl benzoate),

5,5-dimethyl-4,6-nonanediol-bis(4-tert-butyl benzoate),

5,5-diethyl-4,6-nonanediol-bis(4-hexyl benzoate),

5,5-di-n-propyl-4,6-nonanediol-bis(4-pentyl benzoate), and

5,5-dibutyl-4,6-nonanediol-bis(4-tert-butyl benzoate).

~~5~~2. The catalyst component according to ~~any one of~~ claims ~~1 to 4~~1, wherein the catalyst component is prepared by reacting magnesium compounds, titanium compounds, and the diol diester compounds ~~as shown in Formula (I)~~.

~~6~~3. The catalyst component according to claim ~~5~~2, wherein the magnesium compounds are selected from the group consisting of magnesium dihalides, alkoxy magnesium compounds, alkyl magnesium compounds, hydrates or alcoholates of magnesium dihalides, and derivatives of magnesium dihalides with halogen atoms thereof being substituted by alkoxy groups or halogenated alkoxy groups, preferably magnesium dihalides and alcoholates thereof; and

wherein the titanium compounds have a general formula of $TiX_m(OR^1)_{4-m}$, with R^1 being a C_1 to C_{20} hydrocarbyl group, X a halogen, and $1 \leq m \leq 4$, preferably being titanium tetrachloride.

~~7~~4. The catalyst component according to claim ~~5~~2 or ~~6~~3, wherein based on one mol of the magnesium compounds, the dosage of the titanium compounds is in the range from 0.5 mol to 150 mol, and that of the diol diester compounds ~~as shown in Formula (I)~~ in the range from 0.01 mol to 5 mol, preferably from 0.02 mol to 2 mol, and more preferably from 0.02 mol to 4 mol.

~~8~~5. A catalyst for olefin polymerization, comprising the following components:

component a): the catalyst component according to any one of claims ~~1~~1 to ~~7~~4; and

component b): alkylaluminum compounds.

~~9~~6. The catalyst according to claim ~~8~~5, further comprising component c): an external electron donor, which is selected from the group consisting of organosilicon compounds, ethers, and esters.

~~10~~7. The catalyst according to claim ~~8~~5 or ~~9~~6, wherein the molar ratio of

component a) to component b) based on the molar ratio of titanium to aluminum is in the range from 1:5 to 1:1,000, and/or the molar ratio of component c) to component a) is in the range from 0:1 to 500:1.

~~11~~8. A prepolymerization catalyst for olefin polymerization, comprising the catalyst according to any one of claims ~~8~~ 5 to ~~10~~7, and a prepolymer generated by prepolymerization between said catalyst and olefins, with the prepolymerization multiples thereof being 0.1 g to 1,000 g of olefin polymers per g of the catalyst component.

~~12~~9. A method for olefin polymerization, wherein the olefin polymerization is performed in the presence of the catalyst component according to any one of claims ~~1~~ 1 to ~~7~~4, the catalyst according to any one of claims ~~8~~ 5 to ~~10~~7, or the prepolymerization catalyst according to claim ~~11~~8.

~~13~~10. The method according to claim ~~12~~9, wherein the olefins have a general formula of CH_2=CHR, with R being hydrogen or a C_1 to C_{12} alkyl or aryl group, preferably selected from propylene and ethylene.

Claims

1. A catalyst component for olefin polymerization, comprising magnesium, titanium, a halogen, and an electron donor, wherein the electron donor is at least one selected from the group consisting of diol diester compounds, wherein the diol diester compounds are one or more selected from the group consisting of
2,4-hexanediol-bis(4-ethyl benzoate),
2,4-hexanediol-bis(4-n-propyl benzoate),
2,4-hexanediol-bis(4-n-butyl benzoate),
2,4-hexanediol-bis(4-iso-butyl benzoate),
2,4-hexanediol-bis(4-tert-butyl benzoate),
2,4-hexanediol-bis(4-hexyl benzoate),
3-methyl-2,4-hexanediol-bis(4-ethyl benzoate),
3-methyl-2,4-hexanediol-bis(4-n-propyl benzoate),
3-methyl-2,4-hexanediol-bis(4-n-butyl benzoate),
3-methyl-2,4-hexanediol-bis(4-iso-butyl benzoate),
3-methyl-2,4-hexanediol-bis(4-tert-butyl benzoate),
3-methyl-2,4-hexanediol-bis(4-hexyl benzoate),
3-ethyl-2,4-hexanediol-bis(4-ethyl benzoate),
3-ethyl-2,4-hexanediol-bis(4-n-propyl benzoate),
3-ethyl-2,4-hexanediol-bis(4-n-butyl benzoate),
3-ethyl-2,4-hexanediol-bis(4-iso-butyl benzoate),
3-ethyl-2,4-hexanediol-bis(4-tert-butyl benzoate),
3-ethyl-2,4-hexanediol-bis(4-hexyl benzoate),
3,5-heptanediol-bis(4-n-propyl benzoate),
3,5-heptanediol-bis(4-iso-propyl benzoate),
3,5-heptanediol-bis(4-iso-butyl benzoate),
3,5-heptanediol-bis(4-tert-butyl benzoate),
3,5-heptanediol-bis(4-pentyl benzoate),
3,5-heptanediol-bis(4-hexyl benzoate),
3,5-heptanediol-cinnamic acid-4-ethyl benzoate,
4-methyl-3,5-heptanediol-bis(4-ethyl benzoate),
4-methyl-3,5-heptanediol-bis(4-n-propyl benzoate),
4-methyl-3,5-heptanediol-bis(4-iso-propyl benzoate),

4-methyl-3,5-heptanediol-bis(4-n-butyl benzoate),

4-methyl-3,5-heptanediol-bis(4-iso-butyl benzoate),

4-methyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

4-methyl-3,5-heptanediol-bis(4-pentyl benzoate),

4-methyl-3,5-heptanediol-bis(4-hexyl benzoate),

4-methyl-3,5-heptanediol-cinnamic acid-4-ethyl benzoate,

4-ethyl-3,5-heptanediol-bis(4-ethyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-n-propyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-iso-propyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-n-butyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-iso-butyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-pentyl benzoate),

4-ethyl-3,5-heptanediol-bis(4-hexyl benzoate),

4-ethyl-3,5-heptanediol-cinnamic acid-4-ethyl benzoate,

4-n-propyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

4-n-butyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

4,4-dimethyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

4-methyl-4-ethyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

4-methyl-4-n-propyl-3,5-heptanediol-bis(4-tert-butyl benzoate),

3-methyl-2,4-heptanediol-bis(4-n-propyl benzoate),

3-methyl-2,4-heptanediol-bis(4-iso-propyl benzoate),

4-methyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4-ethyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4-n-propyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4-n-butyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4,4-dimethyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4,4-diethyl-3,5-octanediol-bis(4-n-propyl benzoate),

4,4-di-n-propyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4-methyl-4-ethyl-3,5-octanediol-bis(4-tert-butyl benzoate),

4,6-nonanediol-bis(4-ethyl benzoate),

4,6-nonanediol-bis(4-n-propyl benzoate),

4,6-nonanediol-bis(4-n-butyl benzoate),

4,6-nonanediol-bis(4-iso-butyl benzoate),

4,6-nonanediol-bis(4-tert-butyl benzoate),
4,6-nonanediol-bis(4-hexyl benzoate),
4,6-nonanediol-cinnamic acid-4-ethyl benzoate,
5-methyl-4,6-nonanediol-bis(4-ethyl benzoate),
5-methyl-4,6-nonanediol-bis(4-n-propyl benzoate),
5-methyl-4,6-nonanediol-bis(4-n-butyl benzoate),
5-methyl-4,6-nonanediol-bis(4-iso-butyl benzoate),
5-methyl-4,6-nonanediol-bis(4-tert-butyl benzoate),
5-methyl-4,6-nonanediol-bis(4-hexyl benzoate),
5-ethyl-4,6-nonanediol-bis(4-ethyl benzoate),
5-ethyl-4,6-nonanediol-bis(4-n-propyl benzoate),
5-ethyl-4,6-nonanediol-bis(4-n-butyl benzoate),
5-ethyl-4,6-nonanediol-bis(4-iso-butyl benzoate),
5-ethyl-4,6-nonanediol-bis(4-tert-butyl benzoate),
5-ethyl-4,6-nonanediol-bis(4-hexyl benzoate),
5-n-propyl-4,6-nonanediol-bis(4-tert-butyl benzoate),
5-n-butyl-4,6-nonanediol-bis(4-n-butyl benzoate),
5,5-dimethyl-4,6-nonanediol-bis(4-tert-butyl benzoate),
5,5-diethyl-4,6-nonanediol-bis(4-hexyl benzoate),
5,5-di-n-propyl-4,6-nonanediol-bis(4-pentyl benzoate), and
5,5-dibutyl-4,6-nonanediol-bis(4-tert-butyl benzoate).

2. The catalyst component according to claim 1, wherein the catalyst component is prepared by reacting magnesium compounds, titanium compounds, and the diol diester compounds.

3. The catalyst component according to claim 2, wherein the magnesium compounds are selected from the group consisting of magnesium dihalides, alkoxy magnesium compounds, alkyl magnesium compounds, hydrates or alcoholates of magnesium dihalides, and derivatives of magnesium dihalides with halogen atoms thereof being substituted by alkoxy groups or halogenated alkoxy groups, preferably magnesium dihalides and alcoholates thereof; and

wherein the titanium compounds have a general formula of $TiX_m(OR^1)_{4-m}$, with R^1 being a C_1 to C_{20} hydrocarbyl group, X a halogen, and $1 \leq m \leq 4$, preferably being

titanium tetrachloride.

4. The catalyst component according to claim 2 or 3, wherein based on one mol of the magnesium compounds, the dosage of the titanium compounds is in the range from 0.5 mol to 150 mol, and that of the diol diester compounds in the range from 0.01 mol to 5 mol, preferably from 0.02 mol to 2 mol, and more preferably from 0.02 mol to 4 mol.

5. A catalyst for olefin polymerization, comprising the following components: component a): the catalyst component according to any one of claims 1 to 4; and

component b): alkylaluminum compounds.

6. The catalyst according to claim 5, further comprising component c): an external electron donor, which is selected from the group consisting of organosilicon compounds, ethers, and esters.

7. The catalyst according to claim 5 or 6, wherein the molar ratio of component a) to component b) based on the molar ratio of titanium to aluminum is in the range from 1:5 to 1:1,000, and/or the molar ratio of component c) to component a) is in the range from 0:1 to 500:1.

8. A prepolymerization catalyst for olefin polymerization, comprising the catalyst according to any one of claims 5 to 7, and a prepolymer generated by prepolymerization between said catalyst and olefins, with the prepolymerization multiples thereof being 0.1 g to 1,000 g of olefin polymers per g of the catalyst component.

9. A method for olefin polymerization, wherein the olefin polymerization is performed in the presence of the catalyst component according to any one of claims 1 to 4, the catalyst according to any one of claims 5 to 7, or the prepolymerization catalyst according to claim 8.

10. The method according to claim 9, wherein the olefins have a general formula

of CH_2=CHR, with R being hydrogen or a C_1 to C_{12} alkyl or aryl group, preferably selected from propylene and ethylene.