

Claims

[Claim 1]

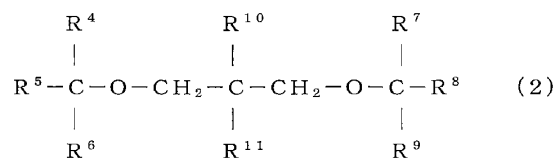
A method for producing a solid catalyst component for polymerization of an olefin, comprising the following steps sequentially performed:

(i) a first step of bringing one or two or more compounds selected from phthalic acid ester compounds (A) represented by the following general formula (1), a magnesium compound and a halogen-containing titanium compound into contact with each other, thereby obtaining a first contact product:



wherein R^1 represents an alkyl group having 1 to 8 carbon atoms or a halogen atom; R^2 and R^3 each represent an alkyl group having 1 to 12 carbon atoms and may be the same as or different from each other; and the number of the substituent R^1 , k , is 0, 1 or 2, and when k is 2, a plurality of R^1 may be the same as or different from each other;

(ii) a second step of further bringing the first contact product obtained in the step (i) and one or two or more compounds selected from diether compounds (B) represented by the following general formula (2) into contact with each other, thereby obtaining a second contact product, and then washing the obtained second contact product:



wherein R^4 to R^9 each represent any of a hydrogen atom, a linear alkyl group having 1 to 6 carbon atoms, a branched alkyl group having 3 to 6 carbon atoms, a cycloalkyl group having 3 to 6 carbon atoms and a phenyl group, and may be the same as or different from each other; and R^{10} and R^{11} each represent any of a hydrogen atom, a linear alkyl group having 1 to 6 carbon atoms, a branched alkyl group having 3 to 6 carbon atoms, a cycloalkyl group having 3 to 6 carbon atoms and a phenyl group, and may be the same as or different from each other, or may be bonded to each other to form a ring; and

(iii) a third step of bringing the washed second contact product and a halogen-containing titanium compound into contact with each other to obtain a contact product, then washing the obtained contact product,

and further bringing the washed contact product, one or two or more compounds selected from phthalic acid ester compounds (A) represented by the above general formula (1) and a halogen-containing titanium compound into contact with each other, thereby obtaining a third contact product.

[Claim 2]

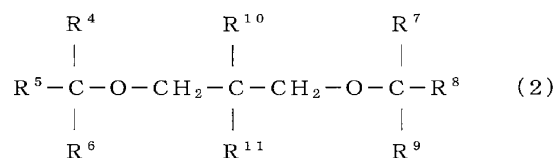
A solid catalyst component for polymerization of an olefin, obtained by sequentially performing the following steps:

(i) a first step of bringing one or two or more compounds selected from phthalic acid ester compounds (A) represented by the following general formula (1), a magnesium compound and a halogen-containing titanium compound into contact with each other, thereby obtaining a first contact product:



wherein R^1 represents an alkyl group having 1 to 8 carbon atoms or a halogen atom; R^2 and R^3 each represent an alkyl group having 1 to 12 carbon atoms and may be the same as or different from each other; and the number of the substituent R^1 , k , is 0, 1 or 2, and when k is 2, a plurality of R^1 may be the same as or different from each other;

(ii) a second step of further bringing the first contact product obtained in the step (i) and one or two or more compounds selected from diether compounds (B) represented by the following general formula (2) into contact with each other, thereby obtaining a second contact product, and then washing the obtained second contact product:



wherein R^4 to R^9 each represent any of a hydrogen atom, a linear alkyl group having 1 to 6 carbon atoms, a branched alkyl group having 3 to 6 carbon atoms, a cycloalkyl group having 3 to 6 carbon atoms and a phenyl group, and may be the same as or different from each other; and R^{10} and R^{11} each represent any of a hydrogen atom, a linear alkyl group having 1 to 6 carbon atoms, a branched alkyl group having 3 to 6 carbon atoms, a cycloalkyl group having 3 to 6 carbon atoms and a phenyl group, and may be the same as or different from each other, or may be bonded to each other to form a ring; and

(iii) a third step of bringing the washed second contact product and

a halogen-containing titanium compound into contact with each other to obtain a contact product, then washing the obtained contact product, and further bringing the washed contact product, one or two or more compounds selected from phthalic acid ester compounds (A) represented by the above general formula (1) and a halogen-containing titanium compound into contact with each other, thereby obtaining a third contact product.

[Claim 3]

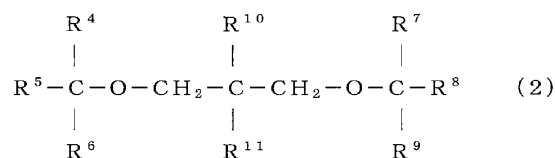
The solid catalyst component for polymerization of an olefin according to claim 2, wherein:

the solid catalyst component for polymerization of an olefin comprises titanium, magnesium, halogen and an internal electron-donating compound;

the internal electron-donating compound comprises one or two or more compounds selected from phthalic acid ester compounds (A) represented by the following general formula (1):



wherein R^1 represents an alkyl group having 1 to 8 carbon atoms or a halogen atom; R^2 and R^3 each represent an alkyl group having 1 to 12 carbon atoms and may be the same as or different from each other; and the number of the substituent R^1 , k , is 0, 1 or 2, and when k is 2, each R^1 may be the same as or different from each other, and one or two or more compounds selected from diether compounds (B) represented by the following general formula (2):



wherein R^4 to R^9 each represent any of a hydrogen atom, a linear alkyl group having 1 to 6 carbon atoms, a branched alkyl group having 3 to 6 carbon atoms, a cycloalkyl group having 3 to 6 carbon atoms and a phenyl group, and may be the same as or different from each other; and R^{10} and R^{11} each represent any of a hydrogen atom, a linear alkyl group having 1 to 6 carbon atoms, a branched alkyl group having 3 to 6 carbon atoms, a cycloalkyl group having 3 to 6 carbon atoms and a phenyl group, and may be the same as or different from each other, or may be bonded to each other to form a ring;

a total amount of the phthalic acid ester compounds (A) and the

diether compounds (B) per g of the solid catalyst component for polymerization of an olefin is 0.5 to 1.2 mmol; and

a ratio represented by the entire molar amount of the phthalic acid ester compounds (A)/the entire molar amount of the diether compounds (B) is 0.5 to 1.2.

[Claim 4]

A catalyst for polymerization of an olefin, comprising:

(I) the solid catalyst component for polymerization of an olefin according to claim 2; and

(II) one or two or more organoaluminum compounds selected from the following general formula (3):



wherein p is a real number of $0 < p \leq 3$; R^{12} represents an alkyl group having 1 to 6 carbon atoms, and when a plurality of R^{12} is present, a plurality of R^{12} may be the same as or different from each other; and Q represents a hydrogen atom or halogen, and when a plurality of Q is present, a plurality of Q may be the same as or different from each other.

[Claim 5]

The catalyst for polymerization of an olefin according to claim 4, comprising:

(I) the solid catalyst component for polymerization of an olefin according to claim 2;

(II) one or two or more organoaluminum compounds selected from the following general formula (3):



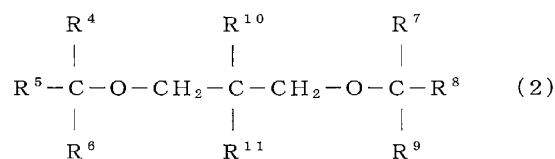
wherein p is a real number of $0 < p \leq 3$; R^{12} represents an alkyl group having 1 to 6 carbon atoms, and when a plurality of R^{12} is present, a plurality of R^{12} may be the same as or different from each other; and Q represents a hydrogen atom or halogen, and when a plurality of Q is present, a plurality of Q may be the same as or different from each other; and

(III) an external electron-donating compound.

[Claim 6]

The catalyst for polymerization of an olefin according to claim 5, wherein (III) the external electron-donating compound is one or two or more selected from:

diether compounds (B) represented by the following general formula (2):



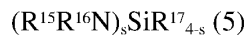
wherein R^4 to R^9 each represent any of a hydrogen atom, a linear alkyl group having 1 to 6 carbon atoms, a branched alkyl group having 3 to 6 carbon atoms, a cycloalkyl group having 3 to 6 carbon atoms and a phenyl group, and may be the same as or different from each other; and R^{10} and R^{11} each represent any of a hydrogen atom, a linear alkyl group having 1 to 6 carbon atoms, a branched alkyl group having 3 to 6 carbon atoms, a cycloalkyl group having 3 to 6 carbon atoms and a phenyl group, and may be the same as or different from each other, or may be bonded to each other to form a ring;

organosilicon compounds represented by the following general formula (4):



wherein R^{13} represents any of an alkyl group having 1 to 12 carbon atoms, a vinyl group, an allyl group, an aralkyl group, a cycloalkyl group having 3 to 12 carbon atoms, a phenyl group, an alkylamino group having 1 to 12 carbon atoms and a dialkylamino group having 1 to 12 carbon atoms; q is an integer of $0 \leq q \leq 3$ and when q is 2 or more, a plurality of R^{13} may be the same as or different from each other; and R^{14} represents an alkyl group having 1 to 4 carbon atoms, a cycloalkyl group having 3 to 6 carbon atoms, a phenyl group, a vinyl group, an allyl group or an aralkyl group, and when a plurality of R^{14} is present, a plurality of R^{14} may be the same as or different from each other; and

organosilicon compounds represented by the following general formula (5):



wherein R^{15} and R^{16} each represent a hydrogen atom, a linear alkyl group having 1 to 20 carbon atoms, a branched alkyl group having 3 to 20 carbon atoms, a vinyl group, an allyl group, an aralkyl group, a cycloalkyl group having 3 to 20 carbon atoms or an aryl group, and may be the same as or different from each other, or may be bonded to each other to form a ring; R^{17} represents a linear alkyl group having 1 to 20 carbon atoms, a branched alkyl group having 3 to 20 carbon atoms, a

vinyl group, an allyl group, an aralkyl group, a linear or branched alkoxy group having 1 to 20 carbon atoms, a vinyloxy group, an allyloxy group, a cycloalkyl group having 3 to 20 carbon atoms, an aryl group, an aryloxy group and a derivative thereof, and when a plurality of R^{17} is present, a plurality of R^{17} may be the same as or different from each other; and s is an integer of 1 to 3, and a plurality of the $R^{15}R^{16}N$ groups is present, a plurality of the $R^{15}R^{16}N$ groups may be the same as or different from each other.

[Claim 7]

A method for producing a catalyst for polymerization of an olefin, wherein a contact product is obtained by bringing the followings into contact with each other:

(I) the solid catalyst component for polymerization of an olefin according to claim 2; and

(II) one or two or more organoaluminum compounds selected from the following general formula (3):



wherein p is a real number of $0 < p \leq 3$; R^{12} represents an alkyl group having 1 to 6 carbon atoms, and when a plurality of R^{12} is present, a plurality of R^{12} may be the same as or different from each other; and Q is a hydrogen atom or halogen, and when a plurality of Q is present, a plurality of Q may be the same as or different from each other.

[Claim 8]

A method for producing a polymer of an olefin, wherein polymerization of an olefin is carried out by using the catalyst for polymerization of an olefin according to claim 4.