CLAIMS

~~[Claim 1]~~

1. A polymerization catalyst composition comprising:

a rare earth element carboxylate; and

a phosphate ester represented by the following general formula (1),

wherein the polymerization catalyst composition is obtained by a method comprising the following steps (a), (b) and (c):

a step (a) of adjusting a content of a phosphoric acid ester represented by the general formula (1) within a range of 0.01 to 20 eq relative to the rare earth element contained in the rare earth element carboxylate;

a step (b) of adjusting a content of water to 0.5 eq or less relative to the rare earth element contained in the rare earth element carboxylate at a reaction temperature of 80 to 160°C; and

a step (c) of adjusting a total content of free fatty acid and water to 0.6 eq or less relative to the rare earth element contained in the rare earth element carboxylate:

[Formula 1]



~~(~~wherein Rs are each independently an alkyl group having 5 to 20 carbon atoms~~)~~.

2. A polymerization catalyst composition comprising:

a rare earth element carboxylate; and

a phosphate ester represented by the following general formula (1), provided that a composition containing organoaluminum compound is excluded from the polymerization catalyst composition:

[Formula 1]



wherein Rs are each independently an alkyl group having 5 to 20 carbon atoms.

~~[Claim 2]~~

3. The polymerization catalyst composition according to claim 1 or 2, wherein the rare earth element carboxylate is a carboxylate containing one or more types of rare earth

elements selected from the group consisting of neodymium, gadolinium, praseodymium, lanthanum, samarium, and yttrium.

~~[Claim 3]~~

4. The polymerization catalyst composition according to ~~claim 1 or 2~~ any one of claims 1 to 3, wherein a content of the phosphoric acid ester is 0.01 to 20 eq relative to the rare earth element contained in the rare earth element carboxylate.

~~[Claim 4]~~

5. The polymerization catalyst composition according to any one of claims 1 to ~~3~~4, wherein a content of water is 0.5 eq or less relative to the rare earth element contained in the rare earth element carboxylate.

~~[Claim 5]~~

6. The polymerization catalyst composition according to any one of claims 1 to ~~4~~5, wherein a content of a free fatty acid is 0.1 eq or less relative to the rare earth element contained in the rare earth element carboxylate.

~~[Claim 6]~~

~~A method for producing the polymerization catalyst composition according to any one of claims 1 to 5, the method comprising:~~

~~a step (a) of adjusting a content of a phosphoric acid ester represented by the general formula (1) within a range of 0.01 to 20 eq relative to the rare earth element contained in the rare earth element carboxylate;~~

~~a step (b) of adjusting a content of water to 0.5 eq or less relative to the rare earth element contained in the rare earth element carboxylate; and~~

~~a step (c) of adjusting a total content of free fatty acid and water to 0.6 eq or less relative to the rare earth element contained in the rare earth element carboxylate.~~

~~[Claim 7]~~

7. A method for producing a conjugated diene polymer, the method comprising polymerizing a conjugated diene monomer in presence of the polymerization catalyst composition according to any one of claims 1 to ~~5~~6.