Claims

What is claimed is:

1. A method for producing a polymer comprising: a polymerization step of polymerizing at least a conjugated diene monomer in a hydrocarbon solvent using an organolithium compound as a polymerization initiator, and obtaining a polymer; and, following steps (1) to (4), successively performing after the polymerization step:

(1) a step of mixing an acid and 20 to 300 parts by mass of water into 100 parts by mass of a solution containing the polymer,

(2) a step of adjusting an amount of the water to 10 parts by mass or less based on 100 parts by mass of the solution containing the polymer,

(3) a step of adding a carbon oxide gas and/or a compound to be decarboxylated to the solution containing the polymer, and

(4) a step of removing a solvent from the solution containing the polymer until a concentration of the polymer reaches 95 mass% or more.

2. The method for producing the polymer according to claim 1, wherein the solution containing the polymer contains a titanium compound and a lithium compound in steps (1)-(4).

3. The method for producing the polymer according to claim 2, wherein a molar ratio of titanium in the titanium compound to the acid mixed in step (1), molar quantity of titanium in the titanium compound/molar quantity of the acid, is 0.02 to 0.35.

4. The method for producing the polymer according to any one of claims 1 to 3, wherein a molar ratio of the acid mixed in step (1) to the carbon oxide gas and/or the compound to be decarboxylated mixed in step (3), molar quantity of the acid/molar quantity of a sum of the carbon oxide gas and the compound to be decarboxylated, is 0.1 to 2.0.

5. The method for producing the polymer according to any one of claims 1 to 3, wherein the acid mixed in step (1) is an inorganic acid.

6. The method for producing the polymer according to any one of claims 1 to 3, wherein the carbon oxide gas is added in step (3).

7. The method for producing the polymer according to any one of claims 1 to 3, wherein the solvent is directly removed in step (4).

8. The method for producing the polymer according to any one of claims 1 to 3, further comprising step (A) of adding an antioxidant to the solution containing the polymer after step (3).

9. The method for producing the polymer according to any one of claims 1 to 3, further comprising a step of removing a part of the solvent in the solution containing the polymer after step (3) and before step (4).

10. The method for producing the polymer according to any one of claims 1 to 3, wherein step (2) is performed by decantation.

11. The method for producing the polymer according to any one of claims 1 to 3, wherein step (2) is performed using a centrifuge.

12. The method for producing the polymer according to any one of claims 1 to 3, wherein the polymer is a block copolymer formed of the conjugated diene monomer and an aromatic vinyl monomer.

13. The method for producing the polymer according to any one of claims 1 to 3, wherein the polymer has a vinyl content based on a total amount of conjugated diene monomer units before hydrogenation of 50 mol% or more.