Claims

[Claim 1]

A method for producing a polymer by polymerization of a monomer comprising a conjugated diene compound and/or an aromatic vinyl compound by use of an organolithium compound as a polymerization initiator, comprising

step (1) of mixing an organolithium compound solution I and a non-polar solvent to provide an organolithium compound solution II, and

step (2) of feeding the organolithium compound solution II to a polymerization tank,

wherein at least one selected from the group consisting of the organolithium compound solution I, the organolithium compound solution II and the non-polar solvent is in the state of turbulent flow in step (1), and

a concentration of the organolithium compound in the organolithium compound solution II is from 0.002 to 0.1% by mass.

[Claim 2]

The method for producing the polymer according to claim 1, wherein

step (1) is performed in a pipe,

the pipe has a pipe (i) through which the organolithium compound solution I passes, a pipe (ii) through which the non-polar solvent passes, and a pipe (iii) through which the organolithium compound solution II passes,

the pipe (i) and the pipe (ii) are coupled in the pipe to thereby combine the organolithium compound solution I and the non-polar solvent, and

one or more pipes selected from the group consisting of the pipes (i), (ii) and (iii) have at least one point, at which a cross-sectional area is 50% to 99% relative to a maximum cross-sectional area of the pipe within 100 cm from a coupling point (Z) of the pipe (i) and the pipe (ii), within 100 cm from the coupling point (Z).

[Claim 3]

The method for producing the polymer according to claim 2, wherein the pipe (ii) has at least one point, at which a cross-sectional area is 50% to 99% relative to a maximum cross-sectional area of the pipe within 100 cm from the coupling point (Z), within 100 cm from the coupling point (Z).

[Claim 4]

The method for producing the polymer according to any one of claims 1 to 3, wherein step (1) is performed in a Venturi tube.

[Claim 5]

The method for producing the polymer according to any one of claims 1 to 3, wherein step (1) is performed by a static mixer or by stirring in a pipe by a stirring blade.

[Claim 6]

The method for producing the polymer according to any one of claims 1 to 5, wherein the polymerization tank is a continuous type tank.

[Claim 7]

An apparatus for producing a polymer, comprising

a polymerization tank,

a pipe a for feeding a monomer comprising a conjugated diene compound and/or an aromatic vinyl compound to the polymerization tank,

a pipe b for feeding an organolithium compound solution II, in which an organolithium compound solution I and a non-polar solvent are mixed, to the polymerization tank,

a pipe c for feeding the non-polar solvent to the pipe b, and

a pipe d for feeding the organolithium compound solution I to the pipe b,

wherein one or more pipes selected from the group consisting of the pipes b, c and d have a structure that forms turbulent flow, and

a concentration of an organolithium compound in the organolithium compound solution II is from 0.002 to 0.1% by mass.

[Claim 8]

The apparatus for producing the polymer according to claim 7, wherein one or more pipes selected from the group consisting of the pipes b, c and d have a structure that forms turbulent flow within 100 cm from a coupling point of the pipe c and the pipe d.

[Claim 9]

The apparatus for producing the polymer according to claim 7 or 8, wherein one or more pipes selected from the group consisting of the pipes b, c and d have at least one point, at which a cross-sectional area is 50% to 99% relative to a maximum cross-sectional area of the pipe within 100 cm from a coupling point of the pipe c and the pipe d, within 100 cm from the coupling point of the pipe c and the pipe d.

[Claim 10]

The apparatus for producing the polymer according to any one of claim 7 to 9, wherein the pipe c has at least one point, at which a cross-sectional area is 50% to 99% relative to a maximum cross-sectional area of the pipe within 100 cm from a coupling point of the pipe c and the pipe d, within 100 cm from the coupling point of the pipe c and the pipe d.

[Claim 11]

The apparatus for producing the polymer according to any one of claim 7 to 10, wherein one or more pipes selected from the group consisting of the pipes b, c and d are a Venturi tube.