Thus, the major objects of the present invention are to provide a method and an apparatus for producing a polyvinyl alcohol that can remove unreacted monomers efficiently from the polymerization solution with energy smaller than that by traditional methods.

Summary

In one aspect, there is provided a method for producing a polyvinyl alcohol, comprising: a polymerization step of polymerizing one or more vinyl esters or copolymerizing a vinyl ester with other monomers copolymerizable therewith; a monomer-removing step of bringing the pasty polymerization solution obtained in the polymerization step into contact with methanol vapor for removal of unreacted monomers; and a saponification step of saponifying the unreacted monomer-free polymer solution in an organic solvent in the presence of an alkali catalyst, wherein the concentration of the polymerization solution is adjusted so that the polymer concentration of the polymerization solution is 10 to 70 mass % and the viscosity of the polymerization solution is 0.001 to 2.0 Pa·s, by addition of liquid methanol to the pasty polymerization solution before contact of the pasty polymerization solution with methanol vapor, in the monomer-removing step, and further comprising a step of concentrating the monomer/methanol mixture generated by contact between the polymerization solution and methanol vapor to its azeotropic composition.

In another aspect, there is provided a method for producing a polyvinyl alcohol, comprising: a polymerization step of polymerizing one or more vinyl esters or copolymerizing a vinyl ester with other monomers copolymerizable therewith; a monomer-removing step of bringing the pasty polymerization solution obtained in the polymerization step into contact with methanol vapor for removal of unreacted monomers; and a saponification step of saponifying the unreacted monomer-free polymer solution in an organic solvent in the presence of an alkali catalyst, wherein the concentration of the polymerization solution is adjusted so that the polymer concentration of the polymerization solution is 10 to 70 mass % and the viscosity of the polymerization solution is 0.001 to 2.0 Pa·s, by addition of liquid methanol to the pasty polymerization solution before contact of the pasty polymerization solution with methanol vapor, in the monomer-removing step, and further comprising a step of concentrating the monomer/methanol mixture generated by contact between the polymerization solution and methanol vapor to its azeotropic composition, wherein the monomers are recovered from the solution after concentration.

In another aspect, there is provided an apparatus for producing a polyvinyl alcohol, comprising: a column main body; perforated plates placed in multiple stages in the column main body; a polymerization solution-introducing mechanism for supply of the polymerization solution into the top region of the column main body, the mechanism having a methanol-introducing pipe for supply of liquid methanol to a pasty

polymerization solution a methanol vapor-introducing mechanism for supply of methanol vapor into the bottom region of the column main body; and a concentration unit of concentrating a mixture discharged from the top of the column main body, wherein a diluted polymerization solution diluted by the liquid methanol to have the polymer concentration of 10 to 70 mass % and the viscosity of 0.001 to 2.0 Pa·s is introduced into the column main body, and the monomer/methanol mixture generated by contact between the polymerization solution and methanol vapor is concentrated to its azeotropic composition.

Solution to Problem

[0007]

The method for producing a polyvinyl alcohol resin according to the present invention includes at least a polymerization step of polymerizing one or more vinyl esters or copolymerizing a vinyl ester with other monomers copolymerizable therewith, a monomer-removing step of bringing the polymerization solution obtained in the polymerization step into contact with methanol vapor for removal of unreacted monomers, and a saponification step of saponifying the unreacted monomer-free polymer solution in an organic solvent in the presence of an alkali catalyst, and the concentration of the polymer solution is adjusted by addition of liquid methanol before contact with methanol vapor in the monomer-removing step.

In the present invention, because liquid methanol is added to the polymerization solution, it is possible to reduce the amount of the methanol vapor injected.

This production method may include additionally a step of concentrating the monomer/methanol mixture generated by contact between the polymerization solution and methanol vapor to its azeotropic composition.

It is also possible to recover the monomers from the solution after

CLAIMS:

1. A method for producing a polyvinyl alcohol, comprising:

a polymerization step of polymerizing one or more vinyl esters or copolymerizing a vinyl ester with other monomers copolymerizable therewith;

a monomer-removing step of bringing the pasty polymerization solution obtained in the polymerization step into contact with methanol vapor for removal of unreacted monomers; and

a saponification step of saponifying the unreacted monomer-free polymer solution in an organic solvent in the presence of an alkali catalyst, wherein

the concentration of the polymerization solution is adjusted so that the polymer concentration of the polymerization solution is 10 to 70 mass % and the viscosity of the polymerization solution is 0.001 to 2.0 Pa·s, by addition of liquid methanol to the pasty polymerization solution before contact of the pasty polymerization solution with methanol vapor, in the monomer-removing step , and

further comprising a step of concentrating the monomer/methanol mixture generated by contact between the polymerization solution and methanol vapor to its azeotropic composition.

2. A method for producing a polyvinyl alcohol, comprising:

a polymerization step of polymerizing one or more vinyl esters or copolymerizing a vinyl ester with other monomers copolymerizable therewith;

a monomer-removing step of bringing the pasty polymerization solution obtained in the polymerization step into contact with methanol vapor for removal of unreacted monomers; and

a saponification step of saponifying the unreacted monomer-free polymer solution in an organic solvent in the presence of an alkali catalyst, wherein

the concentration of the polymerization solution is adjusted so that the polymer concentration of the polymerization solution is 10 to 70 mass % and the viscosity of the polymerization solution is 0.001 to 2.0 Pa·s, by addition of liquid methanol to the pasty polymerization solution before contact of the pasty polymerization solution with methanol vapor, in the monomer-removing step, and

further comprising a step of concentrating the monomer/methanol mixture generated by contact between the polymerization solution and methanol vapor to its azeotropic composition,

wherein the monomers are recovered from the solution after concentration.

3. An apparatus for producing a polyvinyl alcohol, comprising:

a column main body;

perforated plates placed in multiple stages in the column main body;

a polymerization solution-introducing mechanism for supply of the polymerization solution into the top region of the column main body, the mechanism having a methanol-introducing pipe for supply of liquid methanol to a pasty polymerization solution

a methanol vapor-introducing mechanism for supply of methanol vapor into the bottom region of the column main body; and

a concentration unit of concentrating a mixture discharged from the top of the column main body, wherein a

diluted polymerization solution diluted by the liquid methanol to have the polymer concentration of 10 to 70 mass % and the viscosity of 0.001 to 2.0 Pa·s is introduced into the column main body, and the monomer/methanol mixture generated by contact between the polymerization solution and methanol vapor is concentrated to its azeotropic composition

4. The apparatus for producing a polyvinyl alcohol according to Claim 3, wherein the polymerization solution and the methanol vapor are brought into contact with each other in counter-current flow in the column main body.