is passed through a narrow pipe where insoluble solids easily clog, the easily polymerizable substance is likely to become retained in the pipe, and thus the easily polymerizable substance is feared to undergo polymerization at the retained portion. Further, a bottoms liquid immediately after being extracted from a distillation column has a high temperature. Thus, for example, if a bottoms liquid containing an easily polymerizable substance is handled in a high temperature state, a polymerized product is likely to be formed since the liquid is in a high temperature state. Therefore, apparatuses, devices, or the like having a narrow pipe diameter have not conventionally been used in a handling process of a hot bottoms liquid containing an easily polymerizable substance.

However, the present inventors have extensively studied to solve the above problems. As a result, contrary to the above conventional wisdom, the present inventors have found that a wet cyclone having a narrow pipe diameter may be used to separate insoluble solids contained in a hot bottoms liquid, and improve the troublesome matters caused by cleaning operations, to efficiently purify an easily polymerizable substance. Based on this finding, the present invention has been made.

[0007]

In one aspect, there is provided a method for purifying an at least one easily polymerizable substance selected from an unsaturated carboxylic acid and an ester of an unsaturated carboxylic acid, comprising: a step of introducing a crude liquid containing the easily polymerizable substance into a distillation column, and a first separation step of introducing a bottoms liquid extracted from a collection part of the distillation column into a wet cyclone, to separate a first purified liquid containing the easily polymerizable substance from a liquid containing an insoluble solid.

That is, a method for purifying an easily polymerizable substance of the present invention is characterized by comprising:

a step of introducing a crude liquid containing the easily polymerizable substance into a distillation column, and

a first separation step of introducing a bottoms liquid extracted from a collection part of the distillation column into a wet cyclone, to separate a first purified liquid containing the easily polymerizable substance from a liquid containing an insoluble solid. The insoluble solid contained in the bottoms liquid was separated by the wet cyclone, that makes it possible to remove the insoluble solid having a relatively large grain diameter efficiently. Thereby, the conventional problem about the clogging by the insoluble solid in the filtration

CLAIMS

[Claim 1] A method for purifying an at least one easily polymerizable substance selected from an unsaturated carboxylic acid and an ester of an unsaturated carboxylic acid, comprising:

a step of introducing a crude liquid containing the easily polymerizable substance into a distillation column, and

a first separation step of introducing a bottoms liquid extracted from a collection part of the distillation column into a wet cyclone, to separate a first purified liquid containing the easily polymerizable substance from a liquid containing an insoluble solid.

[Claim 2] The method according to claim 1, wherein,

the insoluble solid having a grain diameter of not less than 450 μm is removed by the wet cyclone, and

a ratio of removing the insoluble solid having a grain diameter of not less than 450 μm is not less than 90%.

[Claim 3] The method according to claim 1 or 2, wherein

a speed of introducing the bottoms liquid into the wet cyclone is not less than 0.1 $m \cdot s^{-1}$ and not more than 2.0 $m \cdot s^{-1}$.

[Claim 4] The method according to any one of claims 1 to 3, wherein

the bottoms liquid introduced into the wet cyclone has a temperature of higher than 70°C and lower than 120°C.

[Claim 5] The method according to any one of claims 1 to 4, wherein

a flow rate per unit time of the liquid containing the insoluble solid is not more than 10% of that of the bottoms liquid.