The method disclosed in Patent Literature 1 includes addition of an additive containing hydrazine to a compound to be stored. In such a case, the amine composition contains the additive itself or a substance derived from the additive. Use of the amine composition in the production process of pharmaceutical products and the like may possibly cause production of a product that does not meet the required properties.

[0006]

In view of the above issue, the present disclosure aims to provide an alkylamine composition that contains a small amount of an ingredient which is unlikely to have an adverse effect in the production process of pharmaceutical products and the like, that has excellent storage stability, and that is unlikely to suffer an increase in impurities even after long-term storage. The present disclosure also aims to provide a method for stably storing the alkylamine composition.

- Solution to Problem

[0007]

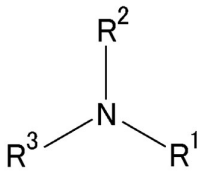
The present inventors made intensive studies to find that the formation of imines during long-term storage of alkylamines causes a decline in purity, and that in alkylamine compositions containing a small amount of water, a decline in purity due to the formation of imines during long-term storage can be reduced and the total amount of impurities, including water, can also be reduced. Thus, the present disclosure was completed.

[0007a] In an aspect, there is provided an alkylamine composition comprising:

an alkylamine represented by the following formula (1) in an amount of 99.5% by volume or more; and

water in an amount of 10 ppm by mass or more and 100 ppm by mass or less:

[Chem. 1]



(1)

wherein N is a nitrogen atom; R^1 is a C1-C10 hydrocarbon group optionally having a ring, a heteroatom, or a halogen atom; R^2 and R^3 are hydrogen atoms; provided that the hydrocarbon group, when it has a carbon number of 3 or more, may have a branched chain structure or a ring structure and that the heteroatom in the hydrocarbon group is an oxygen atom, a sulfur atom, or a phosphorus atom; further, R^1 has at least one hydrogen atom at α carbon bonded to the nitrogen atom.

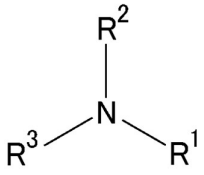
[0007b] In another aspect, there is provided a method for storing an alkylamine composition, comprising:

filling a container with the alkylamine composition comprising:

an alkylamine represented by the following formula (1) in an amount of 99.5% by volume or more; and

water in an amount of 10 ppm by mass or more and 100 ppm by mass or less:

[Chem. 1]



(1)

wherein N is a nitrogen atom; R^1 is a C1-C10 hydrocarbon group optionally having a ring, a heteroatom, or a halogen atom; R^2 and R^3 are each independently a hydrogen atom or a C1-C10 hydrocarbon group optionally having a ring, a heteroatom, or a halogen atom; provided that the hydrocarbon group, when it has a carbon number of

3 or more, may have a branched chain structure or a ring structure and that the heteroatom in the hydrocarbon group is an oxygen atom, a sulfur atom, or a phosphorus atom; further, R^1 and R^2, when both of them are hydrocarbon groups having a carbon number of 1 or more, may be directly bonded to each other to form a ring structure; further, R^1 or R^2, which is directly bonded by a double bond to form a ring structure, may form an aromatic ring in the absence of R^3; R^1, R^2, and R^3 may be hydrocarbon groups which are the same as or different from one another; and R^1 has at least one hydrogen atom at α carbon bonded to the nitrogen atom; and

storing the container filled with the alkylamine composition at 10°C or higher and 45°C or lower,

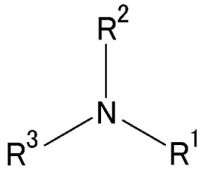
wherein the container is made of stainless steel (SUS), manganese steel, nickel steel, or chrome molybdenum steel.

[0007c] In another aspect, there is provided a container filled with an alkylamine composition comprising:

an alkylamine represented by the following formula (1) in an amount of 99.5% by volume or more; and

water in an amount of 10 ppm by mass or more and 100 ppm by mass or less:

[Chem. 1]



(1)

wherein N is a nitrogen atom; R^1 is a C1-C10 hydrocarbon group optionally having a ring, a heteroatom, or a halogen atom; R^2 and R^3 are each independently a hydrogen atom or a C1-C10 hydrocarbon group optionally having a ring, a heteroatom, or a halogen atom; provided that the hydrocarbon group, when it has a carbon number of 3 or more, may have a branched chain structure or a ring structure and that the

heteroatom in the hydrocarbon group is an oxygen atom, a sulfur atom, or a phosphorus atom; further, R^1 and R^2, when both of them are hydrocarbon groups having a carbon number of 1 or more, may be directly bonded to each other to form a ring structure; further, R^1 or R^2, which is directly bonded by a double bond to form a ring structure, may form an aromatic ring in the absence of R^3; R^1, R^2, and R^3 may be hydrocarbon groups which are the same as or different from one another; and R^1 has at least one hydrogen atom at α carbon bonded to the nitrogen atom,

wherein the container is made of stainless steel (SUS), manganese steel, nickel steel, or chrome molybdenum steel.

[0008]

In one example, there is provided an alkylamine composition comprising: an alkylamine represented by the following formula (1) in an amount of 99.5% by volume or more; and water in an amount of 10 ppm by mass or more and 100 ppm by mass or less:

and 1000 ppm by volume or less, which inhibits the formation of an imine for a long period of time.

[0013]

In the alkylamine composition of the present disclosure, setting the oxygen content to less than 1 ppm by volume is difficult. In contrast, setting the oxygen content to higher than 1000 ppm by volume may increase the imine content even when the water content is within the above range. Use of such an alkylamine composition as a raw material in the production of pharmaceutical products and the like may allow the imine itself to possibly affect the properties of the product.

[0014]

The alkylamine composition of the present disclosure preferably contains the alkylamine in an amount of 99.9% by volume or more.

The alkylamine composition of the present disclosure containing the alkylamine in an amount of 99.9% by volume or more has a high alkylamine purity and can keep an impurity content small over a long period of time. Such a composition can be more suitable for use in pharmaceutical products and the like.

[0015]

In another example, there is provided a method for storing an alkylamine composition, comprising: filling a container with the alkylamine composition as defined above; and storing the container filled with the alkylamine composition at 10°C or higher and 45°C or lower.

[0016]

The method for storing an alkylamine composition of the present disclosure includes: filling a container with an alkylamine composition; and storing the container filled with the alkylamine composition at 10°C or higher and 45°C or lower. In the method, the alkylamine composition used

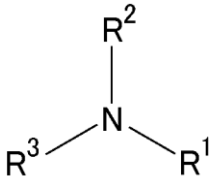
CLAIMS

Claim 1. An alkylamine composition comprising:

an alkylamine represented by the following formula (1) in an amount of 99.5% by volume or more; and

water in an amount of 10 ppm by mass or more and 100 ppm by mass or less:

[Chem. 1]



(1)

wherein N is a nitrogen atom; R^1 is a C1-C10 hydrocarbon group optionally having a ring, a heteroatom, or a halogen atom; R^2 and R^3 are hydrogen atoms; provided that the hydrocarbon group, when it has a carbon number of 3 or more, may have a branched chain structure or a ring structure and that the heteroatom in the hydrocarbon group is an oxygen atom, a sulfur atom, or a phosphorus atom; further, R^1 has at least one hydrogen atom at α carbon bonded to the nitrogen atom.

Claim 2. The alkylamine composition according to claim 1,

wherein R^1 in the formula (1) is a hydrocarbon group having no heteroatom or halogen atom.

Claim 3. The alkylamine composition according to claim 1 or 2,

wherein R^1 in the formula (1) has a carbon number of 3 to 6.

Claim 4. The alkylamine composition according to claim 1,

wherein the alkylamine is n-butylamine.

Claim 5. The alkylamine composition according to any one of claims 1 to 4, further comprising oxygen in an amount of 1 ppm by volume or more and 1000 ppm by volume or less.

Claim 6. The alkylamine composition according to any one of claims 1 to 5,

wherein the alkylamine composition contains the alkylamine in an amount of 99.9% by volume or more.

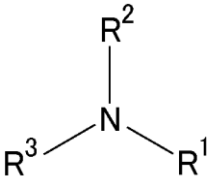
Claim 7. A method for storing an alkylamine composition, comprising:

filling a container with the alkylamine composition comprising:

an alkylamine represented by the following formula (1) in an amount of 99.5% by volume or more; and

water in an amount of 10 ppm by mass or more and 100 ppm by mass or less:

[Chem. 1]



(1)

wherein N is a nitrogen atom; R^1 is a C1-C10 hydrocarbon group optionally having a ring, a heteroatom, or a halogen atom; R^2 and R^3 are each independently a hydrogen atom or a C1-C10 hydrocarbon group optionally having a ring, a heteroatom, or a halogen atom; provided that the hydrocarbon group, when it has a carbon number of 3 or more, may have a branched chain structure or a ring structure and that the heteroatom in the hydrocarbon group is an oxygen atom, a sulfur atom, or a phosphorus atom; further, R^1 and R^2, when both of them are hydrocarbon

groups having a carbon number of 1 or more, may be directly bonded to each other to form a ring structure; further, R^1 or R^2, which is directly bonded by a double bond to form a ring structure, may form an aromatic ring in the absence of R^3; R^1, R^2, and R^3 may be hydrocarbon groups which are the same as or different from one another; and R^1 has at least one hydrogen atom at α carbon bonded to the nitrogen atom; and

storing the container filled with the alkylamine composition at 10°C or higher and 45°C or lower,

wherein the container is made of stainless steel (SUS), manganese steel, nickel steel, or chrome molybdenum steel.

Claim 8. The method for storing an alkylamine composition according to claim 7,

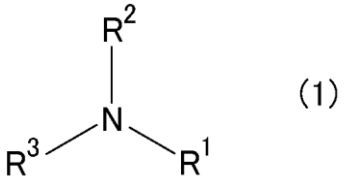
wherein an increase in an imine compound is not more than 100 ppm by volume even after storage at 25°C for a month in the storing.

Claim 9. A container filled with an alkylamine composition comprising:

an alkylamine represented by the following formula (1) in an amount of 99.5% by volume or more; and

water in an amount of 10 ppm by mass or more and 100 ppm by mass or less:

[Chem. 1]



(1)

wherein N is a nitrogen atom; R^1 is a C1-C10 hydrocarbon group optionally having a ring, a heteroatom, or a halogen atom; R^2 and R^3 are each independently a hydrogen atom or a C1-C10 hydrocarbon group optionally having a ring, a

heteroatom, or a halogen atom; provided that the hydrocarbon group, when it has a carbon number of 3 or more, may have a branched chain structure or a ring structure and that the heteroatom in the hydrocarbon group is an oxygen atom, a sulfur atom, or a phosphorus atom; further, R^1 and R^2, when both of them are hydrocarbon groups having a carbon number of 1 or more, may be directly bonded to each other to form a ring structure; further, R^1 or R^2, which is directly bonded by a double bond to form a ring structure, may form an aromatic ring in the absence of R^3; R^1, R^2, and R^3 may be hydrocarbon groups which are the same as or different from one another; and R^1 has at least one hydrogen atom at α carbon bonded to the nitrogen atom,

wherein the container is made of stainless steel (SUS), manganese steel, nickel steel, or chrome molybdenum steel.