to supply continuously at a constant makeup.

CITATION LIST

- Patent Literature

[0005]

Patent Literature 1: JP 2007-63159 A

Patent Literature 2: JP H03-241832 A

SUMMARY OF DISCLOSURE

- Technical Problem

[0006]

Supply methods utilizing compositional azeotropy reported include a method of supplying hydrogen fluoride and ethanol in the form of mixture (e.g., Patent Literature 2). Still, no method of supplying amines utilizing compositional azeotropy has been known.

[0007]

In response to the above issue, the present disclosure aims to provide a method for stably supplying trimethylamine containing monomethylamine and/or dimethylamine as trace impurities at a constant makeup.

- Solution to Problem

[0008]

As a result of extensive studies, the present inventors found that adding a small amount of dimethylethylamine to trimethylamine can form a stable azeotrope of trimethylamine with trace amounts of other methylamines such as monomethylamine and/or dimethylamine, which enables supply at a stable gas makeup regardless of the amount of trimethylamine used. Thus, the present disclosure was completed.

[0008a] In an aspect, there is provided a method for supplying a composition comprising:

keeping a storage container that encloses a composition therein at a constant temperature of 10°C or higher to supply a gas of the composition to a predetermined device,

the composition containing, in a gaseous phase, trimethylamine, dimethylethylamine, and at least one of

dimethylamine or monomethylamine, wherein the composition contains, in the gaseous phase, the trimethylamine in an amount of 95% by volume or more.

[0009]

In one example, there is provided a method for supplying a composition comprising: keeping a storage

container that encloses a composition therein at a constant temperature of 10°C or higher to supply a gas of the composition to a predetermined device, the composition containing in a gaseous phase, trimethylamine, dimethylethylamine, and at least one of dimethylamine or monomethylamine.

The method for supplying a composition of the present disclosure can supply the composition containing trimethylamine, dimethylethylamine, and at least one of dimethylamine or monomethylamine at a stable gas makeup regardless of the amount of trimethylamine used.

[0010]

The composition of the present disclosure is intended to be used in the aforementioned method for supplying a composition, and contains trimethylamine, dimethylethylamine, and at least one of dimethylamine or monomethylamine in a gaseous phase.

Since the composition of the present disclosure contains dimethylethylamine, trimethylamine can be supplied at a stable gas makeup even when trimethylamine contains dimethylamine and/or monomethylamine as impurities. Further, dimethylethylamine has a structure similar to that of trimethylamine. Thus, advantageously, the presence of dimethylethylamine exerts less influence when the composition is used as an etching gas.

[0010a]

In another aspect, there is provided a method for supplying a composition comprising:

keeping a storage container that encloses a composition therein at a constant temperature of 10°C or higher to supply a gas of the composition to a predetermined device,

the composition containing, in a gaseous phase, trimethylamine, dimethylethylamine, and at least one of dimethylamine or monomethylamine,

wherein amounts of the trimethylamine, the dimethylethylamine, the dimethylamine, and the monomethylamine contained in the gaseous phase after supplying the gas of the composition such that 90% by weight of the whole amount of the composition is supplied each show a variation of 10% or

smaller in comparison with the respective amounts before start of the supply.

[0010b]

In another aspect, there is provided a composition comprising trimethylamine, dimethylethylamine, and at least one of dimethylamine or monomethylamine in a gaseous phase for use in the method for supplying a composition as described above, wherein the composition contains, in the gaseous phase, the trimethylamine in an amount of 95% by volume or more.

[0010c]

In another aspect, there is provided a dry etching method comprising:

reacting a gaseous composition supplied by a method for supplying a composition and gaseous hydrogen fluoride with silicon oxide without a plasma state,

the method for supplying the composition comprising:

keeping a storage container that encloses a composition therein at a constant temperature of 10°C or higher to supply a gas of the composition to a predetermined device,

the composition containing, in a gaseous phase, trimethylamine, dimethylethylamine, and at least one of dimethylamine or monomethylamine.

[0011]

In another example, there is provided a dry etching method of the present disclosure comprising: reacting a gaseous composition supplied by the method for supplying a composition as described above and gaseous hydrogen fluoride with a silicon oxide without a plasma state.

Since the dry etching method of the present disclosure causes a gas of a composition having a stable makeup containing trimethylamine to react with a silicon oxide by the aforementioned method for supplying a

CLAIMS

Claim 1. A method for supplying a composition comprising:

keeping a storage container that encloses a composition therein at a constant temperature of 10°C or higher to supply a gas of the composition to a predetermined device,

the composition containing, in a gaseous phase, trimethylamine, dimethylethylamine, and at least one of dimethylamine or monomethylamine, wherein the composition contains, in the gaseous phase, the trimethylamine in an amount of 95% by volume or more.

Claim 2. The method for supplying a composition according to claim 1,

wherein the composition contains, in the gaseous phase, the dimethylethylamine in an amount of 1 to 100 ppm by volume, the dimethylamine in an amount of 0 to 1000 ppm by volume, and the monomethylamine in an amount of 0 to 100 ppm by volume.

Claim 3. The method for supplying a composition according to claim 1 or 2,

wherein the composition contains, in the gaseous phase, the dimethylethylamine in an amount of 1 to 50 ppm by volume, the dimethylamine in an amount of 0 to 400 ppm by volume, and the monomethylamine in an amount of 0 to 50 ppm by volume.

Claim 4. The method for supplying a composition according to any one of claims 1 to 3,

wherein the storage container is kept at a constant temperature of 10°C to 50°C.

Claim 5. The method for supplying a composition according to any one of claims 1 to 4,

wherein the storage container is kept at a constant temperature of 15°C to 40°C.

Claim 6. A method for supplying a composition comprising:

keeping a storage container that encloses a composition therein at a constant temperature of 10°C or higher to supply a gas of the composition to a predetermined device,

the composition containing, in a gaseous phase, trimethylamine, dimethylethylamine, and at least one of dimethylamine or monomethylamine,

wherein amounts of the trimethylamine, the dimethylethylamine, the dimethylamine, and the monomethylamine contained in the gaseous phase after supplying the gas of the composition such that 90% by weight of the whole amount of the composition is supplied each show a variation of 10% or smaller in comparison with the respective amounts before start of the supply.

Claim 7. The method for supplying a composition according to any one of claims 1 to 6,

wherein the gaseous phase further contains 1 to 1000 ppm by volume of moisture.

Claim 8. The method for supplying a composition according to any one of claims 1 to 7,

wherein the gaseous phase further contains inert gas.

Claim 9. A composition comprising trimethylamine, dimethylethylamine, and at least one of dimethylamine or monomethylamine in a gaseous phase for use in the method for supplying a composition according to any one of claims

1 to 8, wherein the composition contains, in the gaseous phase, the trimethylamine in an amount of 95% by volume or more.

Claim 10. A dry etching method comprising:

reacting a gaseous composition supplied by a method for supplying a composition and gaseous hydrogen fluoride with silicon oxide without a plasma state,

the method for supplying the composition comprising:

keeping a storage container that encloses a composition therein at a constant temperature of 10°C or higher to supply a gas of the composition to a predetermined device,

the composition containing, in a gaseous phase, trimethylamine, dimethylethylamine, and at least one of dimethylamine or monomethylamine.