

DESCRIPTION

Title of the Invention: METHOD FOR PRODUCING PURIFIED
ISOPROPYL ALCOHOL

TECHNICAL FIELD

[0001]

The present invention relates to a method for producing purified isopropyl alcohol.

BACKGROUND ART

[0002]

Isopropyl alcohol (also referred to as 2-propanol) is an organic solvent used in various applications, and especially used as a cleaning liquid or a drying liquid in semiconductor manufacturing equipment.

[0003]

In the semiconductor manufacturing equipment, isopropyl alcohol is used in a cleaning unit or a drying unit (see Nonpatent Document 1). Chemicals applied to a wafer as a substrate of a semiconductor device are rinsed with ultra pure water, and isopropyl alcohol is introduced to the surface of the cleaned wafer, substituting ultra pure water with isopropyl alcohol, followed by drying, to give a clean surface of the wafer without residual water droplets. In this cleaning, it is known that if isopropyl alcohol contains an impurity, then a residue derived from the impurity may remain

on the surface of the wafer of the semiconductor device, causing a defect of the semiconductor device. Thus, as microfabrication of semiconductor elements and wiring as well as high integration advance, the impact of the residue can no longer be overlooked, and an improvement of the purity of isopropyl alcohol is strongly demanded. Specifically, the isopropyl alcohol used in the semiconductor manufacturing equipment is required to have a purity of 99.99% or more, and a low content of impurities such as metals.

[0004]

As a method for producing isopropyl alcohol, a direct hydration process using a solution catalyst method is known (see Nonpatent Document 2). After the hydration, isopropyl alcohol formed is purified by distillation, and then passed through a filter, whereby impurities such as particles and metals are removed. Consequently, purified isopropyl alcohol to be used in the semiconductor manufacturing equipment, which has a low content of impurities, is obtained.

[0005]

On the other hand, the semiconductor manufacturing equipment is becoming diverse and complex with the increasing sophistication of semiconductor devices, leading to a trend toward an increase in the number of cleaning units and drying units. Along with this, an isopropyl alcohol waste liquid is also increasing. At present, the isopropyl alcohol waste liquid is subjected to a waste liquid treatment and then discarded, but it is required to collect and recycle the

isopropyl alcohol waste liquid discharged from the semiconductor manufacturing equipment from the viewpoint of a reduction of the cost of the waste liquid treatment associated with the increase of the isopropyl alcohol waste liquid and a reduction of environmental impact.

[0006]

However, the isopropyl alcohol waste liquid contains impurities derived from the semiconductor manufacturing equipment. In particular, a large amount of boron, which is used in doping in the semiconductor manufacturing equipment, is contained as an impurity, and thus it is necessary to remove a boron-containing impurity for the recycling of the isopropyl alcohol waste liquid.

[0007]

Patent Document 1 proposes, as a method for purifying crude isopropyl alcohol containing at least one impurity element selected from As, B, Se, and Ge, a method that involves adding water in an amount exceeding the azeotropic composition with isopropyl alcohol, followed by distillation.

Citation List

Patent Documents

[0008]

Patent Document 1: Japanese Unexamined Patent Application, Publication No. H10-109948

Non-Patent Documents

[0009]

Non-Patent Document 1: Cozy Ban, "Drying Technology for

Silicon Wafer in Semiconductor Manufacturing", Hyoumen Gijutsu (Journal of the Surface Finishing Society of Japan), vol. 49 (1998) No. 3, p. 253-259

Non-Patent Document 2: Yukio Mizutani, "Advances in the Technology for Isopropanol Production", Yuuki Gouseikagaku Kyoukai Shi (Journal of Synthetic Organic Chemistry, Japan), vol. 35 (1977), No. 9, p. 761-766

DISCLOSURE OF THE INVENTION

Problems to be Solved by the Invention

[0010]

According to the method for purifying crude isopropyl alcohol described in Patent Document 1, boron can be removed from the crude isopropyl alcohol to a higher degree, but it has been found that when a large amount of boron is contained in the crude isopropyl alcohol, boron cannot be removed to a higher degree by distillation even with the addition of a minor amount of water. Therefore, the distillation must be accompanied by the addition of a large amount of water, or the distillation must be repeated with the addition of a minor amount of water. However, dehydration is necessary in a subsequent step, and the dehydration requires a large amount of energy.

[0011]

Therefore, an object of the present invention is to provide a method for removing boron to a higher degree from crude isopropyl alcohol containing boron as an impurity and

thereby producing purified isopropyl alcohol with high purity, even with a reduced amount of water added.

Means for Solving the Problems

[0012]

The present inventors thoroughly investigated for solving the aforementioned problems. A wide variety of metals in large amounts are contained in the isopropyl alcohol waste liquid discharged from semiconductor manufacturing equipment. First, as an initial study, the feasibility of the separation of the metals by passing the isopropyl alcohol waste liquid through a filter with a pore size of 10 nm was examined. It was consequently found that the above procedure was effective for the metals such as iron, sodium, and copper, but not for boron.

[0013]

In addition, the purification of an isopropyl alcohol waste liquid containing boron as an impurity using a distillation column was examined, and it was found that a distillate containing isopropyl alcohol, which was withdrawn from the top of the distillation column, entrained boron. Then, distillation was carried out with the addition of a compound capable of forming a complex with boron or a boron compound, or a compound capable of reacting with boron or a boron compound to form a salt, i.e., a boron scavenger, and it was found that the entrainment of boron with a distillate containing isopropyl alcohol could be suppressed. Then, as a result of further examination, the present inventors found

that when the isopropyl alcohol waste liquid was distilled in the presence of a predetermined amount of the added boron scavenger, boron could be removed to a higher degree and purified isopropyl alcohol with high purity could be obtained, to accomplish the present invention.

[0014]

More specifically, an aspect of the present invention relates to a method for producing purified isopropyl alcohol from crude isopropyl alcohol containing boron as an impurity, the method comprising: adding a boron scavenger to the crude isopropyl alcohol to obtain a liquid; and vaporizing the liquid, wherein the liquid comprises substantially no water, and has a proportion of the boron scavenger to isopropyl alcohol of 1 ppm by mass or more and 5000 ppm by mass or less.

[0015]

In the above aspect of the present invention, the following aspects are preferable.

- 1) The boron scavenger is a sugar alcohol and/or an inorganic alkali compound.
- 2) The liquid has a proportion of the boron scavenger to isopropyl alcohol of 500 ppm by mass or more and 1000 ppm by mass or less.
- 3) The crude isopropyl alcohol has a boron content of 50 ppt by mass or more and 300 ppb by mass or less.

[0016]

Further, another aspect of the present invention relates to a method for producing purified isopropyl alcohol from

crude isopropyl alcohol containing boron as an impurity, the method comprising: adding a boron scavenger to the crude isopropyl alcohol to obtain a liquid; and vaporizing the liquid, wherein the liquid comprises water, and has a proportion of the boron scavenger to the total amount of isopropyl alcohol and water of 500 ppm by mass or more and 5000 ppm by mass or less, and a proportion of water to the total amount of isopropyl alcohol and water of 1% by mass or more and 50% by mass or less.

[0017]

In another aspect described above of the present invention, the following aspects are preferable.

- 1) The boron scavenger is a sugar alcohol and/or an inorganic alkali compound.
- 2) The liquid has a proportion of boron to the total amount of isopropyl alcohol and water of 50 ppt by mass or more and 300 ppb by mass or less.

[0018]

In the present invention described above, the following aspect are preferable.

- 1) The crude isopropyl alcohol is a waste liquid discharged from semiconductor manufacturing equipment.

Effects of the Invention

[0019]

According to the present invention, boron can be removed to a higher degree from crude isopropyl alcohol containing boron as an impurity, and purified isopropyl alcohol with high

purity can be industrially stably produced with simple operation, even with a reduced amount of water added.

[0020]

Crude isopropyl alcohol as a waste liquid discharged from semiconductor manufacturing equipment may contain boron at a high concentration, but the present invention can be especially effective in removing boron from such crude isopropyl alcohol. In addition, the addition of a large amount of water is unnecessary in the distillation, and a reduction in dehydration time can be expected. Furthermore, the purified isopropyl alcohol obtained thus has high-purity so that it can be suitably used as a cleaning liquid or drying liquid for semiconductor devices, leading to high industrial applicability.

PREFERRED MODE FOR CARRYING OUT THE INVENTION

[0021]

The method for producing purified isopropyl alcohol according to the present embodiment is characterized in that the method includes: adding a boron scavenger to crude isopropyl alcohol (hereinafter, isopropyl alcohol may be abbreviated as "IPA") containing boron as an impurity to obtain a liquid; and vaporizing the liquid. Although the details of the reasons for the achievement of the removing boron to a higher degree by the method for producing purified IPA according to the present embodiment are unclear, the present inventors presume as follows. Specifically, boron is

presumed to be present in the form of boric acid in crude IPA. The sugar alcohol as the boron scavenger can form a complex with boric acid, and consequently, scavenge boron. On the other hand, the inorganic alkali compound as the boron scavenger can form a salt through neutralization reaction with boric acid, and consequently, scavenge boron. It is presumed that the scavenging of boron in this manner suppresses boron from volatilizing and moving toward the top of the column in vaporizing the liquid, and as a result, the entrainment of boron with vaporized IPA is suppressed.

[0022]

In this specification, the expression "A to B" in regard to numerical values A and B is intended to mean "A or more and B or less", unless otherwise specified. In such an expression, when only the numerical value B is accompanied by a unit, the unit shall also apply to the numerical value A. In the following description, "%", "ppm", "ppb", and "ppt" are each on mass basis, including in Examples, unless otherwise specified. Hereinafter, the method for producing purified isopropyl alcohol according to the present embodiment will be described in detail.

[0023]

<Crude Isopropyl Alcohol Containing Boron as Impurity>

The crude IPA containing boron as an impurity, which is subjected to the method for producing purified isopropyl alcohol according to the present embodiment, is not limited, and examples thereof include IPA produced by a direct

hydration method, and a waste liquid discharged from semiconductor manufacturing equipment. The content of boron in the IPA produced by the direct hydration method is about 0.1 to 1 ppt. In addition, the content of boron in the waste liquid discharged from the semiconductor manufacturing equipment depends on a cleaning unit or drying unit where IPA is used, and is typically in the range of 50 ppt to 300 ppb. When the liquid contains substantially no water, boron can be removed to a higher degree, and therefore the content of boron in the crude isopropyl alcohol is preferably 50 ppt to 300 ppb, more preferably 50 ppt to 30 ppb, and particularly preferably 50 ppt to 3 ppb. In this case, the proportion of water to the total amount of isopropyl alcohol and water in the liquid is, for example, less than 1%.

[0024]

Further, the crude IPA may contain an even larger amount of water. For example, the content of water in IPA produced by a direct hydration method is in the range of 20 to 200 ppm. In addition, the content of water in the waste liquid discharged from the semiconductor manufacturing equipment depends on a cleaning unit or drying unit where IPA is used, and is in the range of 1 to 90%. In the present embodiment, the liquid may contain water, but when the liquid contains a large amount of water, subsequent dehydration tends to require a significant amount of energy. Therefore, the proportion of water to the total amount of IPA and water of the water-containing liquid is in the range of 1 to 50%, preferably in the range of 1 to

35%, and more preferably in the range of 1 to 12%. In this case, since boron can be removed to a higher degree, the proportion of boron to the total amount of isopropyl alcohol and water in the liquid is preferably 50 ppt to 300 ppb, more preferably 50 ppt to 30 ppb, and particularly preferably 50 ppt to 3 ppb.

[0025]

When the proportion of water to the total amount of IPA and water in the crude IPA is 1 to 50%, the crude IPA can be directly subjected to the method for producing purified isopropyl alcohol according to the present embodiment. On the other hand, when the proportion of water to the total amount of IPA and water in the crude IPA is less than 1%, the crude IPA can be subjected to the method for producing purified isopropyl alcohol according to the present embodiment after water is added such that the proportion of water to the total amount of IPA and water falls within 1 to 50%. Further, when the proportion of water to the total amount of IPA and water in the crude IPA exceeds 50%, the crude IPA can also be subjected to the method for producing purified isopropyl alcohol according to the present embodiment after the crude IPA is concentrated such that the proportion of water to the total amount of IPA and water falls within 1 to 50%.

[0026]

<Boron Scavenger>

The method for producing purified isopropyl alcohol according to the present embodiment employs a boron scavenger.

The boron scavenger means a compound capable of forming a complex with boron or a boron compound, or a compound capable of reacting with boron or a boron compound to form a salt.

When the boron scavenger is added to crude IPA and the crude IPA is vaporized, volatilization of boron is suppressed.

Specific examples of the boron scavenger include, for example, a sugar alcohol and an inorganic alkali compound.

[0027]

The sugar alcohol means an alcohol derived from a carbohydrate such as an aldose or a ketose by the reduction of the carbonyl group thereof. The sugar alcohol has several hydroxyl groups, and hence can form a complex with boron or a boron compound (for example, boric acid). The sugar alcohol is not limited so long as it can form a complex with boron or the boron compound, and examples thereof include glycerin, erythritol, arabinitol, xylitol, galactitol, and mannitol. Of these, mannitol can be suitably used in light of boron-scavenging capacity thereof.

[0028]

The inorganic alkali compound is not limited so long as it can react with boron or the boron compound (for example, boric acid) to form a salt, and examples thereof include sodium hydroxide, calcium hydroxide, calcium carbonate, and sodium carbonate.

[0029]

In the present embodiment, a single boron scavenger may be used, and multiple boron scavengers may be used in

combination. When the multiple boron scavengers are combined, boron scavengers exhibiting a similar action are preferably combined.

[0030]

<Amount of Boron Scavenger Used>

In the present embodiment, when the liquid contains substantially no water, the proportion of the boron scavenger to IPA in the liquid is in the range of 1 to 5000 ppm. When the proportion of the boron scavenger to IPA in the liquid is 1 ppm or more, boron is removed to a higher degree, while even when the proportion exceeds 5000 ppm, the effect of removing boron is leveled off, and additionally there is a concern about a decrease in solubility of the boron scavenger. The proportion of the boron scavenger to IPA in the liquid may be determined as appropriate considering the content of boron in the crude IPA, and is preferably in the range of 500 to 4000 ppm, and more preferably in the range of 1000 to 4000 ppm. Incidentally, when multiple boron scavengers are combined, the total amount of the multiple boron scavengers preferably falls within the above range.

[0031]

On the other hand, when the liquid contains water, the proportion of the boron scavenger to the total amount of IPA and water in the liquid is 500 to 5000 ppm. When the proportion of the boron scavenger to the total amount of IPA and water in the liquid is 500 ppm or more, boron is removed to a higher degree, while even when the proportion exceeds

5000 ppm, the effect of removing boron is leveled off, and additionally there is a concern about a decrease in solubility of the boron scavenger. The proportion of the boron scavenger to the total amount of IPA and water in the liquid may be determined as appropriate considering the proportion of boron to isopropyl alcohol and the proportion of water to isopropyl alcohol in the liquid, and is preferably in the range of 500 to 1000 ppm, and more preferably in the range of 800 to 1000 ppm.

[0032]

<Vaporization>

In the present embodiment, the vaporization refers to the boiling or evaporation of the liquid to become a gas. Any known method of vaporizing the liquid may be employed so long as the method allows IPA to evaporate, and examples thereof include a distillation method, a flash distillation method, a pervaporation method. Of these, the distillation method is preferable in light of the potential for removing boron for the liquid containing a large amount of boron. Any known distillation method may be employed as the above-mentioned distillation method without particular limitations, and for example, a simple distillation method or a multistage distillation method is commonly employed. In addition, structured packings or random packings may be used for the distillation of the liquid. In the following, the method of distilling the liquid will be described in detail.

[0033]

<Distillation>

The method of distilling the liquid is not limited, and examples thereof include a method that involves distilling the liquid near the boiling point of IPA under atmospheric pressure, reduced pressure or increased pressure. In addition, when the liquid contains water, the liquid may be distilled at the azeotropic temperature of IPA and water under atmospheric pressure, reduced pressure or increased pressure. Furthermore, when the multistage distillation method is employed, the number of theoretical plates of a distillation column is not limited, and is preferably set within the range of 20 to 60 as appropriate.

[0034]

<Subsequent Treatment>

In the present embodiment, when the liquid contains water, an azeotropic mixture of IPA and water is obtained after the vaporization of the liquid, and water should be separated by any known method for purification. Examples of a method for purification of the azeotropic mixture includes a method that involves addition of an azeotropic agent such as benzene and azeotropic distillation.

[0035]

In addition, the crude IPA may contain metallic impurities other than boron. Examples of the metallic impurities include sodium, magnesium, aluminum, potassium, phosphorus, calcium, chromium, manganese, silicon, iron, nickel, cobalt, copper, zinc, arsenic, molybdenum, silver,

barium, and lead. When the content of the metallic impurities exceeds the range required in semiconductor applications, the metallic impurities should be removed. Examples of a method for removing the metallic impurities include a distillation method, an ion exchange resin method, and a filter method. By combining methods for removing the metallic impurities in crude IPA depending on the types of the metallic impurities, the metallic impurities may be removed.

EXAMPLES

[0036]

In the following, Examples of the present invention will be described in detail, but the present invention is not limited to Examples.

[0037]

<Measuring Method of Content of Boron>

Instrument: ICP-MS Agilent 8800 (from Agilent Technologies)

First, standard liquids were prepared by adding 0 ppt, 500 ppt, 1000 ppt, 2000 ppt and 5000 ppt of boron to IPA, and measured sequentially by ICP-MS, to create a calibration curve. Subsequently, the inside of the ICP-MS was thoroughly cleaned with 5% nitric acid (the solvent being IPA), and then two samples were measured by ICP-MS, and the average thereof was taken as the content of boron.

[0038]

<Dissolution State>

After a boron scavenger was added to crude IPA, the dissolution state of the boron scavenger was visually evaluated.

[0039]

<Experimental Apparatus>

The experimental apparatus used in Examples and Comparative Examples consists of a flask, a condenser, a PFA tube, a receiving flask and a heater, and is an apparatus designed for simple distillation. The prepared sample is charged into the flask, and heated by the heater. The vapor generated by evaporation passes through the PFA tube connecting the flask to the condenser, and condensed in the condenser. The condensed distillate is to be collected in the receiving flask. In addition, to reduce contamination by elution from the apparatus itself, the flask, the condenser and the receiving flask each made of quartz were used.

[0040]

<Examples 1 to 5, and Comparative Example 1>

First, IPA was charged alone, simple distillation was carried out, and the resulting distillate was sampled as a blank and analyzed, to confirm no contamination by the elution from the apparatus itself.

[0041]

D(-)-mannitol (from MERCK) (hereinafter, referred to as mannitol) as a boron scavenger was added to 500 mL of crude IPA having a content of boron of 3.0 ppb, a content of each impurity other than boron of 0.1 to 100 ppt, and a purity of

99.99%, to obtain a liquid. In this preparation, the proportion of mannitol to IPA was as shown in Table 1. In addition, the crude IPA contained boric acid as a boron compound. The resulting liquid was charged into the flask, and heated by the heater. In this heating, the temperature of the heater was set within the range of 150 to 170°C, depending on the composition of the sample. The distillate generated for approximately 25 minutes from the start of the heating was discarded to flush the inside of the apparatus. After that, the distillate generated for approximately 50 minutes (purified IPA) was collected. At this time, 10 mL of the purified IPA was collected in each of two PFA bottles. Next, nitric acid was added to the purified IPA so as to achieve a concentration of 5%, whereby a sample was prepared, and the content of boron in the purified IPA was measured. The results of the measurements of the content of boron in the purified IPA are shown in Table 1.

[0042]

[Table 1]

	Content of boron in crude IPA	Proportion of mannitol to IPA	Dissolution state of mannitol	Content of boron in purified IPA
	ppb	ppm		ppt
Example 1	3.0	100	Dissolved	1676.7
Example 2	3.0	500	Dissolved	1013.4
Example 3	3.0	800	Dissolved	802.9
Example 4	3.0	1000	Dissolved	62.0
Example 5	3.0	3000	Partially undissolved	1.2
Comparative Example 1	3.0	0	-	2762.0

[0043]

From Table 1, it could be confirmed that in Examples 1 to 5, boron was removed to a higher degree even without the addition of water. On the other hand, in Comparative Example 1, the boron scavenger was not added, and the removal of boron to a higher degree failed.

[0044]

<Examples 6 and 7, and Comparative Examples 2 and 3>

The mannitol was added to 500 ml of crude IPA having the proportions of boron and water to the total amount of IPA and water as shown in Table 2, and a content of each impurity other than boron of 0.1 to 100 ppt, to obtain a liquid. In this preparation, the proportion of the mannitol to the total amount of IPA and water was as shown in Table 2. The resulting liquid was charged into the flask, and the temperature of the heater was set to 170°C. In the following, a distillate (purified IPA) was collected according to the same procedure as in Examples 1 to 5 and Comparative Example 1, and the

content of boron in the purified IPA was measured. The results of the measurements of the content of boron of purified IPA are shown in Table 2.

[0045]

[Table 2]

	Proportion of water to total amount of IPA and water	Proportion of boron to total amount of IPA and water	Proportion of mannitol to total amount of IPA and water	Dissolution state of mannitol	Content of boron in purified IPA
	%	ppb	ppm		ppt
Example 6	12	3.0	500	Dissolved	43
Example 7	35	10	1000	Dissolved	34
Comparative Example 2	12	3.0	0	-	88
Comparative Example 3	35	10	0	-	43

[0046]

From Table 2, it could be confirmed that in Examples 6 and 7, boron was removed to a higher degree even in decreasing the amount of water added. On the other hand, in Comparative Example 2, the boron scavenger was not added, and boron was not removed compared with Example 6. In addition, in Comparative Example 3, the boron scavenger was not added, and boron was not removed compared with Example 7.

[0047]

<Comparative Example 4>

Boron was separated via a filter method as a comparison of the method of separating boron via distillation process. Specifically, crude IPA having a content of boron of 12.3 ppt, a content of each impurity other than boron of 0.1 to 100 ppt, and a purity of 99.99% was passed through a filter having a pore size of 10 nm and purified IPA was collected, and the content of boron in the purified IPA was measured. The result

of the measurement of the content of boron in the purified IPA is shown in Table 3.

[0048]

[Table 3]

	Content of boron in crude IPA	Content of boron in purified IPA
	ppt	ppt
Comparative Example 4	12.3	11.5

[0049]

From Table 3, in Comparative Example 4, the removal ratio of boron was 4%, and it could be confirmed that the removal of boron to a higher degree failed.

[0050]

<Examples 8 and 9>

A distillate (purified IPA) was collected in the same manner as in Examples 1 to 5 and Comparative Example 1, except that sodium hydroxide was added as a boron scavenger and the proportion of sodium hydroxide to IPA was as shown in Table 4, and the content of boron in the purified IPA was measured. The results of the measurements of the content of boron in the purified IPA are shown in Table 4.

[0051]

[Table 4]

	Content of boron in crude IPA	Proportion of NaOH to IPA	Dissolution state of NaOH	Content of boron in purified IPA
	ppb	ppm		ppt
Example 8	3.0	1.0	Dissolved	2052
Example 9	3.0	1000	Dissolved	179
Example 10	3.0	4000	Dissolved	18

[0052]

From Table 4, it could be confirmed that in Examples 8 to 10, boron was removed to a higher degree without the addition of water.

CLAIMS

[Claim 1]

A method for producing purified isopropyl alcohol from crude isopropyl alcohol containing boron as an impurity, the method comprising:

adding a boron scavenger to the crude isopropyl alcohol to obtain a liquid; and

vaporizing the liquid,

wherein the liquid comprises substantially no water, and has a proportion of the boron scavenger to isopropyl alcohol of 1 ppm by mass or more and 5000 ppm by mass or less.

[Claim 2]

The method for producing purified isopropyl alcohol according to claim 1, wherein the boron scavenger is a sugar alcohol and/or an inorganic alkali compound.

[Claim 3]

The method for producing purified isopropyl alcohol according to claim 1 or 2, wherein the liquid has a proportion of the boron scavenger to isopropyl alcohol of 500 ppm by mass or more and 1000 ppm by mass or less.

[Claim 4]

The method for producing purified isopropyl alcohol according to claim 1 or 2, wherein the crude isopropyl alcohol

has a content of boron of 50 ppt by mass or more and 300 ppb by mass or less.

[Claim 5]

A method for producing purified isopropyl alcohol from crude isopropyl alcohol containing boron as an impurity, the method comprising:

adding a boron scavenger to the crude isopropyl alcohol to obtain a liquid; and

vaporizing the liquid,

wherein the liquid comprises water, and has a proportion of the boron scavenger to a total amount of isopropyl alcohol and water of 500 ppm by mass or more and 5000 ppm by mass or less, and a proportion of water to the total amount of isopropyl alcohol and water of 1% by mass or more and 50% by mass or less.

[Claim 6]

The method for producing purified isopropyl alcohol according to claim 5, wherein the boron scavenger is a sugar alcohol and/or an inorganic alkali compound.

[Claim 7]

The method for producing purified isopropyl alcohol according to claim 5 or 6, wherein the liquid has a proportion of boron to the total amount of isopropyl alcohol and water of 50 ppt by mass or more and 300 ppb by mass or less.

[Claim 8]

The method for producing purified isopropyl alcohol according to claim 1 or 5, wherein the crude isopropyl alcohol is a waste liquid discharged from semiconductor manufacturing equipment.