

DEVICE FOR AGEING A FERMENTED PRODUCT

This invention relates to a device for ageing a fermented product, more particularly to a device for ageing a fermented product quickly.

5 To make a conventional distilled liquor includes fermenting a cereal product by the addition of enzymes, distilling the fermented cereal product and then continuing the ageing process. The distilled fermented cereal product to be aged is not completely purified and may have some
10 undesired particles therein. The distilled fermented cereal product is generally aged for several years. Although hydrogen peroxide or vitamin C is sometimes added during ageing, the ageing time can not be reduced very much. The distilling of liquor is not economical and is
15 difficult to mass produce due to the long time it takes to age.

Therefore, the objective of this invention is to provide a quick-ageing device for a fermented product.

Accordingly, the present invention provides an ageing
20 device for a fermented product, which device includes:

an ageing tank for containing the fermented product, the ageing tank having an inlet and an outlet for the fermented product; an ozone supplying unit having an inlet pipe and an outlet pipe which are connected to the ageing tank; a
5 cooling unit mounted to the ageing tank; an ultrasonic vibration unit mounted to the ageing tank; and a thermometer mounted in the ageing tank to detect the temperature of the fermented product.

Other features and advantages of the present
10 invention will become apparent in the following detailed description of the preferred embodiments with reference to the accompanying drawings, of which:

Figure 1 is a flow chart of ageing a fermented product of this invention;

15 Figure 2 is a schematic sectional view of an ageing device of this invention for a fermented product;

Figure 3 is a flow chart of preparing a distilled liquor having a step of chilling;

Figure 4(A) is a NMR (nuclear magnetic resonance)
20 spectrum of a Taiwan kaoliang wine;

Figure 4(B) is a NMR spectrum of an Taiwan kaoliang old wine which has been stored for 8 years;

Figure 4(C) is a NMR spectrum of a Taiwan kaoliang old wine which has been aged for 15 hours by the ageing
5 method of this invention;

Figure 5(A) is a NMR spectrum of a rice wine which has an alcohol content of 53.5%;

Figure 5(B) is a NMR spectrum of a rice wine which has an alcohol content of 53.5% and has been aged for 15
10 hours by the ageing method of this invention;

Figure 6(A) is a NMR spectrum of a rice wine which has an alcohol content of 44.9%;

Figure 6(B) is a NMR spectrum of a rice wine which has an alcohol content of 44.9% and has been aged for 23
15 hours by the ageing method of this invention.

Figure 1 shows a flow chart for a method of ageing a fermented product. The method

includes the steps of: (a) cooling a fermented product in a container; (b) introducing ozone into the cooled
5 fermented product for oxidation; and (c) applying an ultrasonic vibration to the container to vibrate and heat the fermented product in step (b) for oxidizing the fermented product.

Referring to Figure 2, an aging device of this
10 invention for a fermented product includes: an aging tank (20) having an inlet (21) and an outlet (23) respectively with two controlling valves (A) and (B); an ozone supplying unit (30) having an inlet pipe (31) and an outlet pipe (33) which are connected to the
15 aging tank (20) and respectively have two controlling valves (C) and (D); a cooling unit (40) including a compressor (41) and a condensing tube (43) which is mounted to the upper portion of the aging tank (20) and is provided with a heat-insulating member (45); an
20 ultrasonic vibration unit (50) mounted at the lower portion of the ageing tank (20); and a thermometer (60) mounted on the aging tank (20) to detect the temperature of the fermented product.

A liquid fermented product (70), such as a Taiwan
25 kaoliang wine or a rice wine, is contained in the aging tank (20). Ozone is introduced to the aging tank (20) through the inlet pipe (31) of the ozone supplying unit

(30). The cooling unit is controlled to keep the liquid fermented product (70) at about -10°C to $+10^{\circ}\text{C}$, and to effect the dissolving of ozone in the liquid fermented product (70). The excess ozone which is not dissolved in the liquid fermented product (70) is sent out through the outlet pipe (33). The ultrasonic vibration unit (50) is operated at a frequency of 15000 to 150000Hz to vibrate and heat the liquid fermented product (70) in order to oxidize the liquid fermented product (70) until the liquid fermented product (70) reaches a temperature of 35°C . Thereby, an aged product is obtained. The time of aging, from applying the liquid fermented product (70) to the aging tank (20) to obtaining the aged product, is about 3 to 24 hours. The aging time is much shorter than that of the conventional aging method. When making soybean sauce, vinegar, and brew wine, the temperature of the aging tank is kept at about 4°C , -10°C , and -5°C , respectively.

Therefore, the device of this invention for aging a fermented product is more economical and can be used for the mass production of a distilled liquor or other similar products where aging is required.

Figure 3 shows a flow chart of a method for preparing a distilled liquor by a device incorporating the present invention.

A cereal product, such as rice or corn, is steeped for about 15 days to 30 days, subsequently steamed at a temperature of 100°C, and then cooled to about 25°C to 30°C. The cooled cereal product is fermented by the addition of enzymes from certain fungi and subsequently distilled. The distillate is chilled to about -10°C in order to precipitate undesired solid particles. Because the distilled liquor contained in the distillate does not freeze and can be separated from the undesired solid particles at -10°C, there are no undesired solid particles in the distillate, as is the case in the conventional distillate. Then, the chilled and separated distillate is aged for about 3 hours to 24 hours by the aging method explained above. The aged product is kept at a temperature of about 25°C and stored in a storage cask such as an oak barrel. Then, it is blended with an old distilled liquor and filtered. Finally, the product is packaged.

Figure 4(A) shows a NMR spectrum of a Taiwan kaoliang wine. Figure 4(B) shows a NMR spectrum of an Taiwan kaoliang old wine which is stored for 8 years. Figure 4(C) shows a NMR spectrum of a Taiwan kaoliang old which is aged for 15 hours by the aging described herein. The resonance peaks of a methyl (CH_3) proton are at 3.565, 3.541, 3.517, and 3.949 in Figure 4(A); 3.567, 3.544, 3.520, and 3.496 in

Figure 4(B); and 3.569, 3.545, 3.522, and 3.498 in Figure 4(C).

Like Figures 4(A) to 4(C), Figure 5(A) shows a NMR spectrum of a rice wine which has an alcohol content of 53.5%. Figure 5(B) shows a NMR spectrum of a rice wine which has an alcohol content of 53.5% and is aged for 15 hours by the ageing method described herein. The resonance peaks of a methyl (CH_3) proton are at 3.572, 3.548, 3.525 and 3.501 in Figure 5(A), and 3.581, 3.557, 3.553, 3.534, 3.529 and 3.501 in Figure 5(B). Figure 6(A) shows a NMR spectrum of a rice wine which has an alcohol content of 44.9%. Figure 6(B) shows a NMR spectrum of a rice wine which has an alcohol content of 44.9% and is aged for 23 hours by the ageing method described herein.

Therefore, a product obtained with the ageing device of this invention has a good ageing effect.



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CLAIMS

1. An ageing device for a fermented product
comprising:

an ageing tank for containing said fermented product,
5 said ageing tank having an inlet and an outlet for said
fermented product;

an ozone supplying unit having an inlet pipe and an
outlet pipe which are connected to said ageing tank;

a cooling unit mounted at said ageing tank;

10 an ultrasonic vibration unit mounted at said ageing
tank; and

a thermometer mounted on said ageing tank to detect
the temperature of said fermented product.

2. An ageing device as claimed in claim 1, wherein
15 said cooling unit includes a compressor and a condensing
tube.

3. A device as claimed in claim 1 or 2, wherein said
cooling unit is effective to cool said ageing tank to a
temperature in the range from -10°C to $+10^{\circ}\text{C}$.

20 4. A device as claimed in any one of claims 1 to 3,



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wherein the ultrasonic vibration unit is operable in a frequency range of from 15000Hz to 150000Hz.

5. A device for ageing a fermented product substantially as described hereinbefore with reference to the accompanying drawings.
