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(54) Titre : ASSEMBLAGE COMPRENANT UN CONTENANT ET UN PRET-A-BOIRE
(54) Title: ASSEMBLY COMPRISING A CONTAINER AND A READY-TO-DRINK BEVERAGE

(57) Abrégé/Abstract:
The present invention relates to an assembly comprising a container and, placed inside the said container, a long-life beverage and under pressure, in which the beverage is a milk-based beverage containing between 0.5 and 5 g/l of nitrous oxide or of carbon dioxide and in which the container has a head space of from 9 to 15%, relative to the total volume of the said container, the said space being saturated with nitrogen so as to have a relative pressure of between 1.5 and 4 bar.

**Abstract**

**Assembly comprising a container and a ready-to-drink beverage**

The present invention relates to an assembly comprising a container and, placed inside the said container, a long-life beverage and under pressure, in which the beverage is a milk-based beverage containing between 0.5 and 5 g/l of nitrous oxide or of carbon dioxide and in which the container has a head space of from 9 to 15%, relative to the total volume of the said container, the said space being saturated with nitrogen so as to have a relative pressure of between 1.5 and 4 bar.

# Assembly comprising a container and a ready-to-drink beverage

The present invention relates to an assembly comprising a container and, placed inside the said container, a long-life beverage which is ready to drink and under pressure.

GB patent 2 299 978 already relates to a ready-to-drink beverage which is under pressure, packaged in a container. This beverage is milk-based and contains nitrous oxide or carbon dioxide. The drawbacks associated with this packaging system are as follows: firstly, at the time of use, i.e. at the moment the consumer opens the container, the amount of foam obtained is minimal; moreover, this beverage is only pasteurized and should be placed on sale in refrigeration units, and no head space has been provided to prevent the foam formed from overflowing from the container, and finally this beverage is only designed to be drunk cold. US patents 4 996 823 and 5 009 901 relate to a process for wrapping a beverage, as well as to the wrapping thus obtained, in which the beverage is packaged in two separate chambers. The main chamber contains the beverage and the secondary chamber, which is smaller in volume, is pierced with an orifice and contains a gas which, when the container is opened, escapes through the said orifice and creates a foam at the surface of the beverage. The drawback of this solution is that it is a complicated and thus expensive system.

The aim of the present invention is to provide consumers with a ready-to-drink beverage, which develops a thick, long-lasting foam when the container in which it is packaged is opened, a beverage which can be stored at room temperature for one year and a beverage which does not overflow when the consumer opens the container, and finally a beverage which can be consumed either hot or cold. The invention also

provides a solution with standard wrapping, without a secondary chamber.

The present invention relates to an assembly comprising a container and, placed inside the said container, a long-life beverage and under pressure, in which the beverage is a milk-based beverage containing between 0.5 and 5 g/l of nitrous oxide or of carbon dioxide and in which the container has a head space of from 9 to 15%, relative to the total volume of the said container, the said space being saturated with nitrogen so as to have a relative pressure of between 1.5 and 4 bar.

It has been found that, according to the invention, the presence of nitrogen in the head space makes it possible to maintain the pressure in the container and the nitrous oxide or carbon dioxide remains in solution instead of escaping into the head space. A large amount of foam is obtained only under the conditions defined above of amount of dissolved nitrous oxide or carbon dioxide and of amount of nitrogen in the head space. If the amount of nitrous oxide or carbon dioxide falls below 0.5 g/l, the amount of foam is insufficient, and if 5 g/l is exceeded, the pressure is too high to permit sterilization without deforming the container. At the time of pouring, the ready-to-drink product has a foam volume which is between 1 and 5 cm thick.

The container used according to the invention is not critical. It is equally possible to use metallic wrapping or a bottle. In the case of metallic wrapping, the system preferably envisaged is an aluminium can with an easy-open system known in the prior art. In the case of a bottle, a plastic bottle is preferably taken, for example, a polyester or polyethylene terephthalate (PET) bottle.

The milk-based beverage is chosen from the group consisting of a diluted milk, a normal milk, a whole milk, a fully skimmed or partially skimmed milk, a concentrated milk, a milk with added coffee

flavouring, a milk with added coffee powder or coffee extract, a milk with added flavourings, an acidified or fermented milk, or a milk with added cola. The milk-based beverage can contain lactic fat or another exogenous fat, for example palm oil, rapeseed oil, soybean oil or a mixture of oils and lactic fat.

In the present description, the expression "diluted milk" means a milk containing more than 0.5% of non-fat solids, preferably between 0.5 and 8.5% of non-fat solids. The expression "normal milk" means a standard commercial milk, for example one with a non-fat solids content of between 8.5 and 9%. The expression "concentrated milk" means a milk with a non-fat solids content of more than 14%, preferably a non-fat solids content of between 14 and 20%. The expression "milk with added coffee powder" means a milk base to which is added instant coffee powder, for example between 0.2 and 4 g of powder per litre of milk. The expression "milk with added flavourings" means a milk base with a fruit flavouring, such as strawberry or raspberry flavouring or any other type of flavouring. The expression "acidified milk" means a milk base acidified to a pH of between 4.4 and 3.5 by addition of citric acid, lactic acid, malic acid or other acids commonly used in the agrifood industry. The expression "fermented milk" means a milk base such as yoghurt, keffiyeh or any other milk base fermented by one or more strains of lactobacillus or bifido-bacterium.

The milk base also contains sugar, stabilizers (phosphate, citrate) and/or thickeners if necessary (hydrocolloids), for example pectins in the case of an acidified or fermented milk, and flavourings such as those known in the food industry.

The present invention also relates to the process for manufacturing the assembly comprising the container and the ready-to-drink beverage, this process being performed according to the following steps:

- the milk base is prepared by mixing together all the ingredients,
- this milk base is pasteurized,
- nitrous oxide or carbon dioxide is injected into the milk base,
- the container is filled with the milk base to a filling level of between 85 and 91%,
- liquid nitrogen is injected into the head space,
- the container is closed and sterilized.

The milk base is prepared by mixing together all the constituents, i.e. the milk, the coffee if the beverage is coffee-flavoured, the flavourings, the sugar and the stabilizers. This mixture is then pasteurized by the means usually used in the milk industry, such as, for example, a tubular or plate exchanger. The gas is then injected into the milk base, i.e. preferably nitrous oxide for a product of neutral pH or carbon dioxide for an acidic product. The injection can be carried out by injection on line or in a saturation tank. The largest amounts of foam are obtained with pressures in the saturation tank of about from 0.4 to 0.6 bar, which corresponds to a concentration of nitrous oxide or of carbon dioxide of between 0.5 and 5 g/l. In certain cases, it is possible to obtain a larger amount of foam with even higher pressures, but the product does not offer an optimum quality since the foam spurts out of the container and since the pressure in the container is so high that the container becomes deformed during the sterilization.

The containers, i.e. metal cans, polyester bottle or any other container which can withstand pressure, is filled using the filling machines generally used for filling gassy drinks. The container is filled to between 85 and 91% in order to leave a head space for the development of the foam. An amount of between 0.1 and 0.3 g of liquid nitrogen (corresponding to a head space of about 40 ml) is then injected into the head space in order to prevent all the gas dissolved from escaping into the head space and

thus causing the beverage to lose its foaming property. The amount of liquid nitrogen makes it possible to obtain a relative pressure in the container of between 1.5 and 4 bar. The container is then closed, for example by crimping. The ready-to-drink product is finally sterilized, for example in a sterilizer at 116°C for 12 minutes. The sterilization requires counter-pressures that are relatively high compared with those used during the sterilization of milk products which do not contain any gas. The maximum pressure recorded in the cans is 9 bar.

The rest of the description is now given in relation with the examples.

**Example 1**

A banana-flavoured milk base is composed of 8.5% non-fat lactic solids, 1.6% lactic fat, 4% sugar and banana flavourings. Nitrous oxide is injected into the milk base placed in a saturation tank, so as to reach a pressure of 0.6 bar in the said tank. An aluminium can is then filled with the beverage, leaving a head space of 12%. An amount of liquid nitrogen such that a pressure of 2.4 bar develops in the can is injected into the head space. The crimped can is then sterilized.

At the time of consumption, the ready-to-drink beverage generates a foam height of 1.5 cm after it has been poured into a glass.

**Example 2**

The conditions of Example 1 are repeated exactly, but in this case the head space is not filled with liquid nitrogen. The ready-to-drink beverage does not develop a foam.

**Example 3**

The conditions of Example 1 are repeated again, but in this case a smaller amount of liquid nitrogen is injected, so as to give a total pressure in the can of 1.3 bar. The ready-to-drink beverage generates a foam height of only 0.5 cm, which is insufficient.

**Example 4**

A coffee-flavoured milk base is prepared containing 4% non-fat solids, 1% caseinate, 1% fat, 0.5% coffee powder and 4% sugar. This base is stabilized with phosphates. Nitrous oxide is injected in the same way as in Example 1. A can made of aluminium metal is then filled with the milk-based beverage, leaving a head space of 12%. An amount of liquid nitrogen is injected into the head space such that the final pressure is 2.5 bar. The final product is sterilized in an autoclave. At the time of consumption, the said product generates a foam with a height of 3.5 cm. This is a ready-to-drink cappuccino which foams when the can is opened.

**Example 5**

Example 4 is repeated, injecting an amount of liquid nitrogen into the head space to give a final pressure of 1 bar in the can. The ready-to-drink product generates a foam height of only 0.5 cm.

**Example 6**

A milk base is prepared containing 1.8% non-fat solids, 9% sugar and 0.001% alginate, and is chemically acidified or is fermented. The pH of the beverage is 3.8. The beverage is pasteurized and carbon dioxide is injected therein according to the same process as in Example 1. The pressure in the tank is 0.4 bar. Metal cans are filled with the beverage. Liquid nitrogen is injected into a head space forming 12% of the total volume, such that the pressure in the can reaches 3.5 bar. The cans are finally sterilized in an autoclave at 85°C for 15 minutes. The final product generates a foam height of 2 cm after opening.

**Example 7**

The same conditions as in Example 6 are repeated with a pressure of 1 bar in the storage tank. The ready-to-drink beverage spurts out of the container when it is opened.

**Claims**

1. Assembly comprising a container and, placed inside the said container, a long-life beverage which is ready to drink and under pressure, characterized in that the beverage is a milk-based beverage containing between 0.5 and 5 g/l of nitrous oxide or of carbon dioxide and in that the container has a head space of from 9 to 15%, relative to the total volume of the said container, the said space being saturated with nitrogen so as to have a relative pressure of between 1.5 and 4 bar.

2. Assembly according to Claim 1, characterized in that the container is chosen from the group consisting of metallic wrapping and a bottle.

3. Assembly according to either of Claims 1 and 2, characterized in that the milk-based beverage is chosen from the group consisting of a diluted milk, a normal milk, a concentrated milk, a milk with added coffee flavouring, a milk with added coffee powder or coffee extract, a milk with added flavourings or an acidified or fermented milk.

4. Assembly according to Claim 3, characterized in that the milk-based beverage also contains sugar, stabilizers, thickeners and flavourings.

5. Process for manufacturing the assembly according to any one of Claims 1 to 4, this process being performed according to the following steps:
- the milk base is prepared by mixing together all the ingredients,
- this milk base is pasteurized,
- nitrous oxide or carbon dioxide is injected into the milk base,
- the container is filled with the milk base to a filling level of between 85 and 91%,
- liquid nitrogen is injected into the head space,
- the container is closed and sterilized.

6. Process according to Claim 5, characterized in that nitrous oxide or carbon dioxide is injected so as

to have an amount of gas of between 0.5 and 5 g/l in the milk base.

7. Process according to either of Claims 5 and 6, characterized in that between 0.1 and 3 g of liquid nitrogen is injected for a head space of about 40 ml.