

1 This invention relates to a process for sterilizing an aqueous suspension of a water-insoluble salt or salts for subsequent use in aseptic filling. The invention also relates to the use of this sterilized suspension.

5 Aseptic filling is known and provides for the preparation of products which keep for six months or more. This is particularly the case with milk. To improve the nutritional qualities of aseptically packed products, it would be interesting to add mineral salts to them. Now, numerous
10 potentially usable mineral salts are insoluble in water. The solution which comprises directly adding these mineral salts to the product and then sterilizing the mixture obtained is not possible because it leads to a degraded end product as a result of secondary reactions during the steril-
15 ization process. Accordingly, separate sterilization should be considered for the basic product and the mineral salts to be added. Now, the continuous sterilization of an aqueous suspension of an insoluble salt is virtually impossible in view of the heavy sedimentation of the salt, the covering of
20 the heating and cooling surfaces and the abrasion of the pump components.

 The process according to the present invention enables an aqueous suspension of an insoluble salt to be sterilized without any of the disadvantages mentioned above. The inven-
25 tion relates to a process for sterilizing an aqueous suspension of a water-insoluble salt or salts for subsequent use in aseptic filling, in which a compound selected from the group comprising xanthan gum and carboxymethyl cellulose is added to the suspension which is then heated to a temper-
30 ature in the range from 120 to 150°C.

 Xanthan gum and carboxymethyl cellulose are thickeners which improve the homogeneity and stability of the suspension

1 during the heat treatment without affecting the sterilized
end product in any way.

The water-insoluble salt or salts is/are selected from
the group comprising calcium, magnesium, iron, zinc and
5 copper phosphate, citrate, sulfate and carbonate. One or
other of these salts is introduced according to the desired
objective. The content of salts in the suspension is from
0.1 to 10% by weight, based on the total weight of the sus-
pension.

10 So far as the xanthan gum and the carboxymethyl cellu-
lose are concerned, they are introduced in a quantity of 0.1
to 1% by weight, based on the total weight of the suspension.

The heat treatment of the suspension is carried out
either indirectly using a plate or tube heat exchanger or
15 directly using steam. After this treatment, the suspension
is left to cool to a temperature of 20 to 80°C. It is
thus ready for use either for making tofu or as an additive
for milk or sterilized liquid dietetic products.

The starting material for the preparation of tofu or
20 soya cheese is soya milk which is prepared in known manner
as follows: the whole soya beans are washed with water and
then immersed and soaked in water for a prolonged period.
The soaking of the soya beans in water causes them to swell.
The beans are then ground, crushed or pounded to form a puree
25 or smooth, thick and white paste. This paste or puree is
heated and then filtered to give the soya milk. This milk
is sterilized and then mixed with 1 to 20% by weight, based
on the final total weight, of the sterilized suspension
mentioned above and the mixture obtained is aseptically
30 filled hot or cold. The function of the insoluble salt is
to induce coagulation and precipitation of the tofu. The
salt used is preferably calcium sulfate with xanthan gum.
Other coagulating agents, such as CaCl_2 , phytic acid and
the like, may also be added to the sterilized suspension.

35 The sterilized suspension prepared in accordance with

1 the invention may also be used as a mineral salt additive
for milk or sterilized liquid dietetic products. In this
case, 1 to 5% by weight, based on the final total weight,
of this suspension is mixed with milk or sterilized liquid
5 dietetic products and the mixture obtained is aseptically
filled hot or cold. In the context of the invention, liquid
dietetic products are understood to be both oral and enteral
food compositions.

The type of salt used depends on the function which the
10 beverage thus prepared is intended to fulfill. It is of
course also possible to add soluble salts to the stabilized
suspension.

The invention is illustrated by the following Examples
relating to the preparation of tofu.

15 EXAMPLE 1

A soya milk having a total solids content of 13% is sub-
jected to an ultra-high temperature treatment on an aseptic
line. This heat treatment is applied for 2.4 seconds at a
temperature of 150°C. The soya milk is then aseptically
20 cooled. 5 kg $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ and 400 g xanthan gum (Keltrol F,
a product of Kelco Co.) in 95 l water are then added to the
suspension. The suspension is then heated to 135°C in a
plate-type heat exchanger and is kept at that temperature
for 30 seconds. The suspension is then aseptically cooled
25 to 30°C. The sterilized soya milk and the CaSO_4 suspension
are continuously mixed before the filling process to form
a mixture containing 92.5% soya milk and 7.5% CaSO_4 suspen-
sion. The mixture then passes to the aseptic filling line
and the final pack is heated to coagulate the tofu in the
30 aseptic container.

EXAMPLE 2

Soya milk is subjected to ultra-high temperature treat-
ment on an aseptic line (5 seconds at 148°C). The product
leaves the UHT installation at 85°C. 6 kg $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$ are
35 added to 94 l cold water and 300 g xanthan gum (Keltrol F)

1 are dissolved in the suspension. The stabilized suspension is heated at 140°C for 10 seconds and then cooled to 85°C.

16 ml of the CaSO_4 suspension and, immediately afterwards, 184 ml hot soya milk are introduced into 200 ml containers in the aseptic filling machine. The tofu coagulates immediately and the filled containers merely have to be cooled before storage.

The invention thus provides a process by which a "long-life" tofu can be prepared with traditional coagulating agents.



CLAIMS

1. A process for sterilizing an aqueous suspension of a water-insoluble salt or salts for subsequent use in aseptic filling, characterized in that a compound selected from the group comprising xanthan gum and carboxymethyl cellulose is added to the suspension which is then heated to a temperature in the range from 120 to 150°C.
2. A process as claimed in claim 1, characterized in that the water-insoluble salt is selected from the group comprising calcium, magnesium, iron, zinc and copper phosphate, citrate, sulfate and carbonate.
3. A process as claimed in claim 1 or 2, characterized in that the water-insoluble salt(s) is/are used in a quantity of from 0.1 to 10% by weight.
4. A process as claimed in any of claims 1 to 3, characterized in that the xanthan gum or the carboxymethyl cellulose is used in a quantity of from 0.1 to 1% by weight.
5. The use of the sterilized suspension obtained by the process claimed in any of claims 1 to 4 for the production of tofu, characterized in that 1 to 20% by weight of the suspension is mixed with sterilized soya milk and the mixture obtained is aseptically filled while hot.
6. The use of the sterilized suspension obtained by the process claimed in any of claims 1 to 4 for the addition of mineral salts to milk or sterilized liquid dietetic products, characterized in that 1 to 5% by weight of the suspension is mixed with milk or sterilized liquid dietetic products and the mixture obtained is aseptically filled while hot or cold.