

Fast rehydrating pulses

Field of the invention

- 5 The present invention relates to a process for preparing fast rehydrating pulses.

Background of the Invention

- 10 Various processes for preparing fast cooking or instant pulses, comprising a precooking and a drying of the pulses, are known. One of the problems encountered when carrying out these processes is the bursting and/or partial disintegration of the pulses. During
15 this bursting, due to differences in surface tensions between the skin and the cotyledon, the pulse may split into two halves which separate and cause it to resemble wings of an insect. This phenomenon is known to a person skilled in the art by the term butterflying.

- 20 To avoid this disintegration, the suggestion has been made to carry out a controlled drying of the cooked pulses.

- In the case where cooking takes place under pressure, a person skilled in the art may also
25 contemplate a controlled relaxation of the steam pressure, followed by a controlled cooling of the pulses, in other words contemplate carrying out the steps of relaxing the steam pressure and cooling the pulses carefully and above all slowly, for example.

- 30 US 4,273,796 describes a process for preparing fast rehydrating pulses which do not burst during the drying which follows cooking, in which the pulses are cooked, at atmospheric pressure or under pressure, in a 5-7% sugar solution, and dried using any known drying
35 process such as lyophilization or drying under vacuum, with hot air, using infrared or using microwaves, for example.

Summary of the Invention

The object of the present invention is to propose a process for preparing fast rehydrating pulses which comprises a step of cooking under pressure but which avoids the bursting of the pulses, without it being necessary to cook them in a sugar solution or to provide for a controlled relaxation of the pressure and/or a controlled cooling of the pulses.

To this end, in the process according to the present invention, the pulses are cooked with steam under pressure, cooled by placing them under vacuum and dried.

It was found, in effect, surprisingly, that, in order to avoid the bursting of pulses cooked with steam in a vessel under pressure, the pulses can be cooled directly by placing them under vacuum, that is to say by drawing off steam and/or condensed vapour (flash cooling), without taking special precautions, to a residual pressure in the vessel which is significantly below atmospheric pressure.

In other words, the present process makes it possible not only to preserve the integrity of the pulses, which hardly burst at all, but also to cool the pulses significantly more quickly than if, for comparison, the steam pressure is relaxed carefully in order to reestablish atmospheric pressure in the vessel, and the pulses, which are still at a temperature of 100°C after this pressure relaxation, are then cooled slowly.

Detailed description of the Invention

To carry out the present process, the starting material can be commercial fresh or dry pulses, in particular dry soya, bean, pea or lentil seeds, for example.

It is preferable for the starting material to be pulses having a water content of 40-80%, this water

content being that of the fresh pulses or that of the dry pulses rehydrated by soaking.

In the latter case, namely in order to rehydrate dry pulses, they may be soaked beforehand for
5 3-30 h at 15-30°C in pure water or in water with the addition of 0-0.5% of NaHSO_3 and/or of 0-1% of $\text{C}_6\text{H}_5\text{Na}_3\text{O}_7$ as agent for stabilizing the colour, for example.

The pulses may be cooked at 105-140°C for 3-40 min in a vessel in which a pressure equal to the
10 saturation vapour pressure at the chosen temperature can be established, for example. The steam atmosphere may be created in the vessel either by vaporization of an appropriate amount of water, or by direct injection of steam, the air initially present in the vessel being
15 driven out of the latter at the beginning of the process, for example.

The pulses may be cooled to a temperature of 20-80°C while placing them under vacuum by drawing off steam and/or condensed vapour to a residual pressure
20 below 300 mbar and maintaining this vacuum for 2-10 min, for example.

It is important, and can be most especially recommended, not to allow the pulses to come into contact with cold air before the end of this cooling
25 step.

After the cooking and cooling, the pulses may be dried to a residual water content of 3-10%, for example. This drying may be carried out under vacuum at 40-60°C, at a pressure of 20-40 mbar and for 5-20 h,
30 for example.

The pulses thereby obtained have a very similar appearance to that of corresponding dry but uncooked pulses. The proportion of burst pulses is, in particular, exceptionally low.

35 These pulses may be rehydrated generally in 5-10 min in boiling water, or even in 3-4 min in water at 70-80°C for small-sized pulses such as lentils, for example. They may be used as they are or as an

ingredient in a dehydrated mixture for fast cooking soup, for example.

The examples below illustrate various embodiments of the process for preparing fast rehydrating pulses according to the present invention. The percentages are expressed therein by weight.

Example 1

10 Commercial dry navy beans are soaked for 6 h in water at room temperature containing 0.25% of NaHSO_3 and 0.5% of $\text{C}_5\text{H}_5\text{Na}_3\text{O}_7$, after which they have a water content of 54.0%. The soaked pulses are rinsed for 5 min in running water.

15 The pulses are placed in an autoclave. Steam is injected directly into the autoclave while first driving out the air contained in the latter. The temperature of the pulses is brought to 120°C in 2 min. The temperature is maintained at 120°C for 12 min. The pulses are then placed under vacuum by drawing off the steam to a residual pressure of 250 mbar. This vacuum is maintained for 3 min, after which the autoclave is opened.

25 The cooked pulses have a water content of 50.6%. Burst pulses amount to only a few per cent.

The pulses are dried at 50°C at 30 mbar for 14 h.

30 The pulses thereby obtained have a residual water content of 6.2%. They have the appearance of the original dry navy beans and rehydrate in 6 min in boiling water.

Examples 2-4

35 Dehydrated dwarf kidney bean, red kidney bean and Borlotti bean seeds are prepared in a manner similar to that described in Example 1 for navy beans.

The values of the different working parameters during the different steps, as well as the water

contents of the pulses, are collated in Table 1 below, in which the corresponding values presented in Example 1 have also been recorded.

5 Table 1

Steps and respective conditions	Ex. 1 navy beans	Ex. 2 dwarf kidney beans	Ex. 3 red kidney beans	Ex. 4 Borlotti beans
Soaking at room temperature				
time (h)	6	16	16	16
additive	0.25% NaHSO ₃	0.25% NaHSO ₃	-	-
additive	0.5% C ₆ H ₅ Na ₃ O ₇	-	-	-
water content (%)	54.0	58.2	55.9	54.7
Rinsing in running water				
time (min)	5	5	5	5
Steam cooking				
temperature (°C)	120	125	125	130
time (min)	12	30	30	35
Cooling				
pressure (mbar)	250	250	250	250
time (min)	3	3	3	3
temperature (°C)	70	70	70	70
water content (%)	49.4	50.8	50.0	51.4
Drying				
temperature (°C)	50	50	50	50
pressure (mbar)	30	30	30	30
time (h)	14	15	15	15
water content (%)	6.2	5.5	7.0	5.3

The pulses thereby obtained have the appearance of the respective original pulses. Very few have burst. Their colour has remained excellent. They rehydrate in
5 5-10 min in boiling water.

Claims

1. A process for preparing fast rehydrating pulses, in which the pulses are cooked with steam under pressure, cooled by placing them under vacuum and dried.
5
2. A process according to Claim 1, in which the starting material is pulses having a water content of 40-80%, which are cooked at a temperature of 105-140°C for 3-40 min and cooled to a temperature of 20-80°C while placing them under vacuum by drawing off steam and/or condensed vapour to a residual pressure below 300 mbar and maintaining this vacuum for 2-10 min.
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3. A process according to Claim 1, in which the pulses are dried to a residual water content of 3-10%.
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4. A process according to Claim 3, in which the pulses are dried under vacuum at 40-60°C, at a pressure of 20-40 mbar for 5-20 h.
5. Fast rehydrating pulses obtained by the process
20 according to one of Claims 1 to 4.

