

Method for the manufacture of a beverage composition

5 This invention relates to a method of making a composition for a beverage, more particularly in powder form. The composition is intended to be mixed with a liquid to prepare a beverage which may be frothy at its surface, for example with hot water and soluble coffee or with hot liquid coffee to obtain a kind of "cappuccino", or with a cocoa-flavoured beverage.

10 There are several powder-form products for whitening coffee, from powdered milk to products containing few, if any, fats and/or lactic proteins.

US Patent 4,438,147 in particular described a process for making a powder-form composition comprising a non-
15 lactic fat, a non-lactic carbohydrate and a foam stabilizer containing proteins, such as sodium caseinate.

The manufacture of products of this kind necessitates particular precautions to ensure thorough mixing with a liquid. They have to show good wettability, high
20 solubility and high stability to heat so that they do not flocculate, particularly in the presence of hot coffee which is slightly acidic.

The present invention provides a method of making a powder-form composition for a beverage, wherein the powder form
25 composition comprises fats, proteins, lactose, other carbohydrates and a stabilizing salt, which method comprises:

- preheating and heating the fats, proteins, lactose and other components in suspension or solution,
- 30 - concentrating the suspension or solution by evaporation to a solids content of 46 to 60% by weight,
- spray-drying and then post-drying the concentrate

wherein the ratio by weight of proteins to lactose in the final composition is from 1:3.5 to 1:5.

5 It is surprising that the requirements referred to above are satisfied particularly well in the case of a powder-form composition of which the principal constituents are 0.2 to 28% of fats, 5 to 16% of proteins, 16 to 62% of lactose and, optionally, up to 60% of other carbohydrates has a ratio by weight of proteins to lactose of from 1:3.5
10 to 1:5.

By way of comparison, this ratio is of the order to 1:1.4 for cow's milk.

Experience has shown that, from the point of view of heat stability, there is no advantage in deviating too
15 far from 1:4 for the protein:lactose ratio of lactic

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1 compositions whereas compositions containing some non-lactic ingredients are less sensitive to heat.

5 If necessary, the particles of the composition may have small cavities of which the gaseous contents are intended to be released during mixing with a liquid, producing a froth.

10 Providing the characteristic protein:lactose ratio of from 1:3.5 to 1:5 is obtained in the powder-form product, the process for making the composition according to the invention is no different in principle from the process used for making powdered milk, repeatedly described in the literature, or a coffee whitener of the type described in US Patent 4,438,147. To a solution of proteins (milk, caseinate) are added a stabilizing salt and, as required, 15 lactose, sweet whey (from the coagulation of casein with rennet), lactic and/or vegetable fats, a carbohydrate such as sucrose, starch syrup, and if necessary flavourings.

20 In aqueous solution, the stabilizing salt forms a buffer which neutralizes the mild acidity of the coffee during dissolution of the product in an aqueous medium, which contributes towards preventing flocculation of the proteins. The stabilizing salt may be, for example, a citrate or a phosphate, preferably sodium hydrogen phosphate (Na_2HPO_4), which is added in aqueous solution, for 25 example in a quantity of from 0.6 to 1% by weight, based on dry matter, in the case of a citrate or preferably in a quantity of from 0.3 to 0.5% by weight, based on dry matter, in the case of sodium hydrogen phosphate.

30 The aqueous composition thus obtained, which has a solids content of from 16 to 20% by weight, is preheated and then heated in a plate heat exchanger or by injection of steam with a dwell period and concentrated by evaporation to a solids content of from 46 to 60%. This concentration step may be followed by another heating step 35 with a dwell period.

1 Finally, the concentrate is dried by spraying in a tower and post-dried in a fluidized bed for example.

 In cases where it is desired to obtain a composition intended for the preparation of a frothy beverage, a
5 preferably inert, such as nitrogen, is injected into the concentrate before it is spray-dried which produces small cavities in the particles.

 The gas is preferably injected into the concentrate under a low pressure, for example of 3-4 bars, immediately
10 ahead of a mixing pump and the concentrate/gas mixture is taken up by a high-pressure pump situated near the mixing pump which delivers the gasified concentrate, preferably under a pressure of from 40 to 80 bars, to the nozzle of the spray-drying tower.

15 To avoid premature bursting of the small cavities produced in the particles during the initial phase of the drying process, it is important to ensure that the stream of hot air in the drying tower is not too vigorous.

 The hot air stream is preferably broken up in the manner
20 of a jet deflector by a suitable device, for example a screen or grille fixed to the end of the air feed pipe at the head of the drying tower so that the air pressure decreases by about half at the spray nozzle for the concentrate, the vigorous primary air stream thus being converted
25 into a plurality of small turbulent secondary air streams.

 Because of the risk of coagulation when obtaining a mixed composition including coffee, it is difficult to dry all the lactic proteins and the coffee by spraying. To obtain a mixture thereof in powder form, the acid in
30 the liquid coffee has to be neutralized before mixing with the milk and drying or alternatively the milk and the coffee both have to be mixed in powder form. The same precautions have to be taken with the composition according to the invention as with the milk. If it is desired to make
35 a mixed composition with coffee on an industrial scale,

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1 instant coffee in powder or agglomerate form is preferably
used for mixing with the powder-form composition according
to the invention by introduction into the spray-drying
tower. In one preferred process, the instant coffee is
5 introduced through the pipe which returns to the tower
the fine particles recovered by cyclones for example.
The proportion by weight of instant coffee is preferably
18 to 30% of the total. In cases where the components
are mixed in powder form, it may be of advantage to colour
10 the composition according to the invention with coffee
for example to give the powder-form mixture a more uniform
colour.

The powder-form composition produced according to the
invention preferably has a density of the order of 300 g per
15 litre so that three spoons of 3 g each are suitable for
preparing a 140 ml cup of beverage. One spoon of instant
coffee may then be added to obtain a cup of light coffee
of the type known as white coffee. If the powder-form
composition has small cavities, the addition of instant
20 coffee and, if required, a small quantity of cocoa will
give a beverage of the "cappuccino" type covered by an
8 to 15 mm thick layer of froth which retains the heat
and produces a creamy sensation in the mouth.

The following Examples, in which the percentages are
25 by weight, describe some suitable processes and possible
compositions.

EXAMPLE 1

(Lactic composition)

To obtain 100 kg of end product 460 kg of standardised
30 milk containing 17.3 kg of lactic fat and 40.28 kg of
non-fat solids are used. 0.4 kg of Na_2HPO_4 in the form
of a 10% aqueous solution is mixed therewith, followed
by the addition of 39.7 kg of lactose dissolved in 150 kg
of lukewarm water. The whole is preheated to 80°C in a
35 plate heat exchanger and then heated to 115°C by

1 injection of steam for 5 seconds and concentrated by
evaporation to a solids content of 51%. After a dwell
time of about 10 minutes at 43°C, the concentrate is
reheated to 75°C by injection of steam and left for
5 about 5 minutes. The throughput of the 50% solids
concentrate is 670 litres/hour. 4 litres/minute of
nitrogen under a pressure of about 3 bar are then
injected into the concentrate which is then pumped under
a pressure of 68 bar to the nozzle of a spray-drying tower
10 where it is dried by spraying with air at 330°C under a
pressure of 15.7 kPa (1600 mm of water) on entry, the
primary air stream being broken up into small secondary
turbulent streams under a pressure of about 7.9 kPa
(800 mm of water) by a screen at the spraying nozzle for
15 the concentrate.

112 kg/h of agglomerated soluble coffee are introduced
through the pipe which returns the fine particles re-
covered by cyclones to the tower, after which the product
issuing from the tower is dried in a fluidized-bed.

20 The analysis of the powder-form composition according
to the invention, excluding the soluble coffee, is as
follows:

	% by weight
Lactic fat	17.3
25 Proteins	15.3
Lactose	61.2
Minerals	3.7
Moisture	2.5

30 The proteins:lactose ratio is 1:4.

EXAMPLE 2

(Composition based on skimmed milk)

To obtain 100 kg of end product, 451.5 kg of skimmed
milk containing 0.4 kg of lactic fat and 40.2 kg of non-
35 fat solids are used. 0.4 kg of Na₂HPO₄ in the form of a

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- 1 10% aqueous solution and then 39.7 kg of lactose dissolved
in 150 kg of lukewarm water are mixed with the skimmed milk.
The mixture is then preheated to 80°C and 16.9 kg of
coconut fat are continuously injected therein. The
5 remaining procedure is as in Example 1 (heating to 115°C
by injection of steam for 5 seconds, concentration etc.).
The analytical composition is the same as in Example 1
except that the coconut fat replaces the lactic fat as to
16.9% of the mixture.

10 EXAMPLE 3

(Non-lactic composition)

- To obtain 100 kg of end product, 0.4 kg of Na_2HPO_4
in the form of a 10% aqueous solution and then 12.8 kg
of powder-form sodium caseinate, 47.1 kg of powder-form
15 lactose and 10.0 kg of sucrose are added to 50 kg of
water at 50°C. The mixture is then introduced into a
colloid mill in which another 30 kg of water at 60°C are
added. After preheating to 70°C, 27.5 kg of coconut
fat are continuously injected, after which the mixture
20 is heated to 115°C by injection of steam for 5 seconds,
flashed and then homogenized in two stages (200 and
then 50 bar). After cooling to 30°C with a dwell period,
the mixture is reheated to 75°C by injection of steam.
After another dwell period of 5 minutes, the remaining
25 procedure is as in Example 1 (injection of nitrogen,
spray-drying, etc.).

The analytical composition of the product, excluding
the coffee, is as follows:

	% by weight
30 Fats	27.6
Proteins	11.6
Lactose	46.9
Sucrose	10.0
Minerals	0.9
35 Moisture	3.0

1 The proteins:lactose ratio is 1:4.

EXAMPLE 4

(Flavoured lactic composition)

5 The procedure is as in Example 1, except that a small quantity of cinnamon powder and vanilla-flavoured sugar are added.

This addition may be made in three ways:

1. to the concentrate before drying
2. with the soluble coffee through the tube for
- 10 returning the fines
3. to the fluidized bed following the tower

EXAMPLE 5

(Lactic composition with whey powder)

15 For 100 kg of end product, 283 kg of standardized milk containing 17.3 kg of fats and 23.8 kg of non-fat solids are used. 0.4 kg of Na_2HPO_4 in the form of a 10% aqueous solution are added to the milk. 23.8 kg of powdered sweet whey (pH at least 6.2), 15.3 kg of lactose and 17.0 kg of sucrose are dissolved in 120 kg of hot water at 60°C.

20 When the mixture is free from clumps, it is added to the standardized milk. The remaining procedure is as described in Example 1. The analytical composition of the product less the coffee is as follows:

	% by weight
25 Fats	17.5
Proteins	11.9
Lactose	46.8
Sucrose	17.0
Minerals	4.3
30 Moisture	2.5

The proteins:lactose ratio is 1:3.9.

EXAMPLE 6

(Composition with vegetable fat and whey powder)

35 To obtain 100 kg of end product, 264 kg of skimmed milk containing 0.2 kg of fats and 23.8 kg of non-fat

- 1 solids are used. 0.4 kg of Na_2HPO_4 in the form of a 10 %
aqueous solution is added to the skimmed milk. 23.8 kg of
sweet whey powder (pH at least 6.2), 15.3 kg of lactose
and 17.0 kg of sucrose are dissolved in 120 kg of hot
5 water at 60°C and, when the mixture is free from clumps,
it is added to the standardized milk. 17.3 kg of coconut
fat preheated to 60°C are then continuously injected in
the mixture immediately before preheating the whole to
80°C. The remaining procedure is as in Example 1. The
10 analytical composition of the product less the coffee is
as follows :

	% by weight
15 Fats	17.5
Proteins	11.9
Lactose	46.8
Sucrose	17.0
Minerals	4.3
20 Moisture	2.5

The proteins:lactose ratio is 1:3.9.

Claims

1. A method of making a powder-form composition for a beverage, wherein the powder form composition essentially
5 comprises fats, proteins, lactose, other carbohydrates and a stabilizing salt, which method comprises:

- 10 - preheating and heating the fats, proteins, lactose and other components in suspension or solution,
- concentrating the suspension or solution by evaporation to a solids content of 46 to 60% by weight,
- 15 - spray-drying and then post-drying the concentrate

wherein the ratio by weight of proteins to lactose in the final composition is from 1:3.5 to 1:5.

20 2. A method as claimed in claim 1, which comprises mixing the components in such proportions that the final composition contains 0.2 to 28% fats, 5 to 16% proteins, 16 to 62% lactose and up to 60% other carbohydrates by weight of dry matter.

25 3. A method as claimed in claim 1 or 2, which comprises adding to the liquid mixture an aqueous solution of the stabilizing salt in an amount of 0.3 to 1% by weight of dry matter before preheating.

30 4. A method as claimed in any of claims 1 to 3, which comprises introducing an inert gas under low pressure into the concentrate, mixing the gas and the concentrate, highly compressing the gasified concentrate and then injecting it through a nozzle into a spray-drying tower where it is
35 dried by spraying into a stream of hot air consisting of a plurality of turbulent component streams.

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5. A method as claimed in claim 4, which comprises forming the stream of hot air from a vigorous primary stream by braking it up in the manner of a jet deflector into a plurality of small turbulent secondary streams at the nozzle for spraying the gasified concentrate.

6. A method as claimed in any of claims 1 to 5, which comprises mixing soluble coffee or soluble coffee substitute with fine particles recovered during drying of the composition and introducing that mixture into the spray drying tower.

7. A method of making a powder form composition for a beverage substantially as described with particular reference to any of the examples.

8. A powder-form composition when made by the method of any of claims 1 to 7.

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