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(54) **MILK PRODUCT AND PROCESS**

MILCHPRODUKT SOWIE VERFAHREN

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- **PATENT ABSTRACTS OF JAPAN vol. 0124, no. 67 (C-550), 7 December 1988 (1988-12-07) & JP 63 188346 A (SNOW BRAND MILK PROD CO LTD), 3 August 1988 (1988-08-03)**
- **ECKLES ET AL.: 'Milk and milk products', 1951, MCGRAW HILL BOOK CO.,INC., NEW YORK, USA pages 22, 68 - 72, XP002903062**

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Description

TECHNICAL FIELD

[0001] This invention relates to novel milk products.

BACKGROUND ART

[0002] Milk and flavoured milks have received wide acceptance among consumers for centuries. Much of this acceptance has related to recognition of the valuable nutrient content of the drinks.

[0003] Soft drinks and particularly carbonated soft drinks have also received wide acceptance based primarily on flavour, appearance and carbonation, despite a poor nutrient content.

[0004] US Patent 4,676,988 discloses a process in which milk in contacted with a strong cation-exchange in resin in acid form for a time sufficient to lower the pH in the milk to between 1.5 and 3.2. In this process the milk cations are exchanged with hydrogen ions. The decationised milk is contacted with a strong anion-exchange in resin in base form for a time sufficient to raise the pH of the milk to the value of about 3.5 - 4.5. This material is mixed with decationised, deanionised fruit juice to form a drink. This process has disadvantages in that it consists of numerous steps and involves adjusting the pH of a milk to a pH at which denaturation of proteins occurs.

[0005] Japanese patent application 1988-188346 discloses a method for the production of calcium depleted skim milk. In this method, skim milk is treated with a modified chelate resin in which the chelate group comprises both H type and Na type.

[0006] It is an object of the present invention to provide an improved milk drink base suitable for making milk drinks more like soft drinks; and/or, milk drinks like soft drinks derived from the base; and/or processes for the preparation of the base and the milk drinks like soft drinks and/or provide the public with a useful and nutritious choice.

DISCLOSURE OF THE INVENTION

[0007] In one aspect the invention provides a method of preparing a translucent milk drink comprising:

(a) providing an opaque milk starting material having a pH in the range 5.7-6.5;
(b) contacting at least a portion of the starting material with a cation exchanger charged with exchangeable sodium or potassium cations or both to remove calcium until the percentage transmission of the material (when separated from the exchanger) rises to at least 5%, preferably at least 25%, more preferably at least 40% when measured using a 1cm layer of sample being illuminated at a wavelength of 850nm; and
(c) optionally mixing the translucent milk sample with another milk sample while retaining the percentage transmission at least 5%, preferably at least 25%, more preferably at least 40%

[0008] Translucency of milk was measured with a Turbiscan MA 2000 Macroscopic Analyser (Formulaction, Toulouse, France) using transmission of a pulsed near infrared (NIR) light source (λ = 850 nm). The sample is contained in a special sample cell and NIR is passed through the sample and a transmission detector receives the light, which goes through the sample. The transmission detector acquires the transmitted light flux (in %) as a function of the sample height (65 mm). For the definition of translucency, we have taken an average value of transmission from 20 mm to 50 mm height of the sample cell. The pathlength is 1 cm.

[0009] In a second aspect the invention provides a method of preparing a translucent m ilk drink comprising:

(a) providing a opaque milk starting material having a pH in the range 5.7-6.5;
(b) removing at least 50-100%, preferably 60-100% more preferably 80-100% of calcium therein by cation exchange on a cation exchanger charged with either exchangeable sodium or potassium cations or both;
(c) optionally mixing the calcium-depleted milk sample with another milk sample while retaining the percentage calcium depletion in the range 50-100%, preferably 60-100%, more preferably 80-100%.

[0010] In preferred forms of the invention the opaque milk starting material is chosen from skim milk, milk protein concentrate (MPC) or milk protein isolate (MPI).

[0011] The preferred cation exchangers are based on resins bearing strongly acidic groups, preferably sulphonate groups.

[0012] Preferably the translucent milk product contains greater than 0.8% (w/v), preferably greater than 2% (w/v) milk protein.

[0013] By the term "opaque milk st arting material" is meant milk, skim milk or a milk derived product containing casein

and whey proteins with 5-60% of the protein being whey proteins. Preferably the starting material has substantially the same proportions of casein and whey proteins as milk. Preferably the fat content is less than 10% (w/w) of the protein content. If whole milk is used a fat removal step is also required (e.g. by centrifugation) before measurement of translucency.

[0014] The term "skim milk" means skim milk separated from whole milk of mammals which optionally has been pasteurised and includes diluted, ultrafiltered or concentrated partly demineralised skim milk in which the carbohydrate level has been adjusted provided always that the original percentages of casein to whey proteins have remained substantially unaltered.

[0015] The term "milk protein concentrate" (MPC) refers to a milk protein product in which greater than 55%, preferably greater than 70%, more preferably greater than 75% of the dry matter is milk protein. The ratio of casein to whey proteins is approximately that of milk.

[0016] The term "milk protein isolate" (MPI) refers to a milk protein composition comprising substantially unaltered proportion of casein to whey proteins wherein the dry matter consists of greater than 85% milk protein.

MPC and MPI may be prepared by ultrafiltration of skim milk where the ultrafiltration membrane has a molecular weight cut off of 10,000 or lower. Diafiltration may also be used.

[0017] If MPC or MPI is used it is possible to generate a solution with 10-12% (w/v) protein which is still translucent.

[0018] The pH range chosen brings considerable advantages. Below pH 5.6 the solutions tend to coagulate. Above pH 8.0 the taste is inferior and the solution is not suitable for carbonation. The invention uses pH values below pH 7.0. If the cation exchange process results in the product having a pH greater than 7.0 it is preferred to reduce the pH, for example by addition of citric acid solution.

[0019] A preferred strong acid cation exchange resin for use in the invention is IMAC HP 111 E manufactured by Rohm & Haas. This resin has a styrene divinylbenzene copolymer matrix. The functional groups are sulphonic acid groups that can be obtained in the Na^+ form or alternatively converted to the K^+ form. It is preferred that the ion exchange resin be in the Na^+ and/or K^+ form.

[0020] By manipulating the pH, and the choice of cation it is possible to vary the flavour of the translucent milk produced. For some circumstances it will be useful to provide micronutrient cations in addition to sodium or potassium. One preferred cation for use with sodium and or potassium is magnesium.

[0021] The use of strong acid cation exchangers is preferred because with weak acid cation exchangers, phosphate is also removed which results in lower nutritional value and a non-translucent product.

[0022] The process is preferably carried out in a cool temperature in the range 4°C to 12°C but may be carried out at temperatures as high as 50°C.

[0023] The translucent milks can be converted into a soft drink like milk drink by addition of small amounts of other components, especially colour and flavour. Typically 0.1 to 3% each of vitamins, flavour, preservatives, thickeners, flavour enhancers and the like are added. Materials suitable for carrying out these functions in drinks are well known.

[0024] For convenience, a dried product can be prepared from the translucent milk. The drying may be by standard techniques. The product may be reconstituted in water to prepare a translucent milk. It has good suspendability even in cold water at 4°C to 12°C. Colourings and flavourings may be present in the dried product or may be added subsequently.

[0025] In addition to drinks, the translucent milk products may be used to form nutritious gels and jellies. These may be prepared using conventional gelling agents.

[0026] Especially preferred are carbonated drinks. Carbonation can be carried out by means known to those skilled in the art. Example 5 herein illustrates carbonation using dry ice. Other options include using commercial carbonation systems.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027]

Figure 1 shows % transmission of skim milk with varying % calcium depletion and comparison with ginger beer and freshup orange juice.

Figure 2 is a schematic drawing of a process for preparing a calcium depleted MPC powder.

EXAMPLES

[0028] The following examples further illustrate practice of the invention.

Example 1 - Determination of Translucency

Determination of Translucency

[0029] Translucency of milk is measured using transmission of a pulsed near infrared (NIR) light source (λ = 850 nm) using **Turbiscan.** The sample is contained in a special sample cell and NIR is passed through the sample and a transmission detector receives the light, which goes through the sample. The transmission detector acquires the transmitted light flux (in %) as a function of the sample height (65 mm). For the definition of translucency, we have taken an average value of transmission from 20 mm to 50 mm height of the sample cell. The pathlength is 1cm.

[0030] Figure 1 shows the translucency of various calcium-depleted skim milks and two commercial products. The ginger beer is the "Bunderburg" ginger beer and the freshup is the "Freshup" orange juice. Freshup has a transmission value of 7%, whereas ginger beer has a transmission value of 40%. The transmission values given Figure 1 indicates that for "Ginger beer" type of translucency, about 60% depletion of calcium is required and for the "Fresh-up" type translucency about 40% of calcium removal is required.

Example 2 - Preparation of Translucent Milk From Skim Milk

[0031] Skim milk of composition given in Table 1 was adjusted to pH of 5.8 using 3.3% citric acid. After 15 min, the pH of skim milk was measured. Due to buffering of milk, the pH of the acidified milk increases by 0.1 to 0.15 units. The pH was again adjusted to 5.8 with some more 3.3% citric acid.

[0032] To remove 80% of calcium from skim milk having a calcium content of about 33 mM/kg, a skim milk to resin ratio of about 12 is used. For example 200 ml of skim milk at a pH of 5.83 was contacted with 17 g of resin, in 500 ml beaker and stirred constantly with a magnetic stirrer. The resin was an IMAC HP 111 E, a strong cation exchange resin with a total exchange resin with a total exchange capacity of 2 req/L of sodium. The resin is manufactured by Rohm & Haas and has sulphonic acid functional groups.

[0033] The stirrer speed is such that all the resin is suspended in the skim milk and its pH is monitored. The pH of the mixture increases with time- such as 6.15 at 5 min, 6.32 in 15 mins and after 25 minutes the pH reached a final value of 6.47. At this time the resin was separated from mixture and its calcium content is measured. Table 2 gives typical pHs and calciums of skim milk at different skim milk to resin ratios, as well as their translucency transmission values.

Table 1 - Milk Composition

Component	Skim Milk (%)
Ash	0.76
Lactose	5.17
Fat	0.06
Casein Protein	2.88
Whey Protein	0.58
Total Protein	3.67

Table 2 Compositions of calcium depleted skim milks

Skim milk (ml)	200	200	200	200
Skim milk pH	5.83	5.83	5.83	5.83
Resin weight (g)	0	10	14	17
Final calcium	32.7	16.9	12.4	6.7
Final pH	5.83	6.24	6.4	6.5
Percentage calcium depletion	0	48	62	80
Transmission value (%)	0	17.8	45.2	55.7

Example 3 Manufacture of calcium depleted milk powder

[0034] 1000 L of skim milk was adjusted to a pH of 5.8 using dilute citric acid (eg. 3.3%). 100 L of the strong cation-exchange resin described in Example 2 was filled in a stainless steel vessel of about 40 cm diameter and a height of 100 cm or a total volume of 140 L. One hundred litres of resin bed had a height of 80 cm. The 1000 L of skim was then passed through the resin at 4 bed volumes an hour or 400 L of skim milk per hour. The resulting skim milk had about 10% of the original calcium. This skim milk was evaporated and dried to produce calcium depleted skim milk powder of composition, on a moisture free basis, given in Table 3.

Table 3 Composition of ca-depleted milk powder

Component	Protein	Lactose	Ash	Calcium
%	37.5	51	10	0.1

[0035] This calcium depleted milk powder was reconstituted to 6% solids and its translucency was measured, to be about 60%.

Example 4 UHT treatment of reconstituted milk powder

[0036] The reconstituted sample from example 2 was UHT treated in indirect UHT equipment with conditions of 140°C for 4 s. The resulting UHT sample was more translucent than the reconstituted sample. Its transmission value was about 64%.

Example 5 Carbonation of UHT treated reconstituted skim milk powder

[0037] The UHT treated reconstituted skim milk powder from the previous example was carbonated by adding dry ice (frozen carbon dioxide) in powdered form. Typical carbonation levels in translucent milks are about 3.5 volumes bunsen. This level of carbonation compares well with commercial carbonated products, i.e soda water - 4.5 volumes of bunsen, cola - 4.2 volumes bunsen, lightly sparkling - 3.0 volumes bunsen.

[0038] In addition to carbonation, flavours such as lemon/lime, grape and orange as well as appropriate colours were added to make the product resemble commercial soft or sports drinks.

Example 6 Translucent milks from MPCs

[0039] As illustrated in Figure 2, skim milk is subjected to concentration on an ultrafiltration (or a microfiltration) membrane (Koch S4 HFK 131 type membranes having a nominal molecular weight cut-off of 10,000 daltons) to produce an MPC retentate. Depending on the concentration factor used, the MPC retentate will have a protein content in the range of 42-85% of the dry matter is milk protein.

[0040] For example when a skim milk of 1000 kg of concentration given in Table 1, is concentrated by 2.5 times, 400 kgs of MPC56 retentate and 600 kgs of permeate will be obtained.

[0041] Part of 267 kg of MPC56 retentate, which had a pH of 6.8 was reduced to 5.9, using 3.3% citric acid. The acid was added to the retentate at 10°C, while continuously agitating the retentate. For example, to produce 75% Ca-depleted MPC56, 200 Kg of the retentate was pH-adjusted to 5.9. After fifteen minutes, the pH of the retentate was measured again. Depending on the buffering capacity of the retentate, the pH of pH-adjusted retentate increases by 0.1 to 0.15 units. The pH was adjusted again to 5.9 with some more 3.3% citric acid.

[0042] The 200 kg of MPC56 retentate contains 0.26% of calcium or a total calcium content of 530 g of calcium. To remove all this calcium approximately 70 L of strong cation-exchange resin in the sodium form was used. The resin was an IMAC HP 111E, a strong acid cation exchange resin with a total exchange capacity of 2 eq/L of sodium.

[0043] The resin is manufactured by Rohm & Haas and has sulphonic acid functional groups.

[0044] The resin was loaded into a stainless steel vessel of about 40 cm in diameter and a height of 110 cm or a total volume of 140 L. Seventy litres of the resin bed had a height of 55 cm. The 200 kg of the retentate was then passed through the resin at 2 bed volume an hour or 140 L/h. To process 200 kg of the retentate takes about one-and-a-half hours. The resulting retentate had about 0.005% of calcium and a pH of about 7.1. The calcium-depleted MPC56 was mixed with untreated MPC56 the remaining 67 Kg of MPC56 to produce a retentate containing 0.4% calcium. This retentate was then evaporated and dried to produce an MPC56 powder containing 0.4% calcium. The composition of the powder is shown in column A of Table 2.

[0045] If an MPC70 or an MPC85 retentate is used as a feed stream instead of MPC56 retentate, then Ca-depleted

MPC70 and MPC85 of the compositions given in columns B and C respectively Table 2 below can be produced. MPC70 and MPC85 retentates are diluted prior to passage through the ion-exchange column.

Table 4 - Compositions of Milk Protein Concentrates

MPC	A	B	C
Total protein	56	70	85
Ash	7-9	7-9	6-8
Lactose	28-30	14-16	<5
Fat	0.9-1.1	1.5-1.6	>1.7
Calcium	0.4	0.45	0.55
Sodium (%)	2.4	2.6	3.0

[0046] These MPCs can be reconstituted at various protein concentrations to produce translucent milks. For example, for a translucent milk containing 2% protein, dissolve 2.5 g of Ca-depleted MPC85 in 100 ml of water. This reconstituted MPC85 solution looks translucent, which can be UHTed, carbonated and flavour added to produce the sample translucent product described in examples 3, 4 and 5.

EXAMPLE 7 - Flavoured Drink

[0047] In an agitated mixing vessel, combine water (55°C) (92.23 parts), sucrose (6 parts) and milk solids from dried translucent milk prepared according to Example 3 or Example 6 (1.5 parts). Hydrate for 10 minutes. Gradually add 20% citric acid solution (0.15 parts) with agitation. Add honeydew flavour (Givaudan Roure 55482AA, 0.05 parts), rock melon flavour (Givaudan Roure 55480AA, 0.05 parts) and a green colour (1:100, Bush Boake Allen, 0.02 parts), and mix well.
[0048] Preheat product to 75°C. Process product at 137°C for 3 seconds. Bottle aseptically.

Claims

1. A method of preparing a translucent milk drink having a pH in the range 5.6-7.0 comprising:

   (a) providing an opaque milk starting material having a pH in the range 5.7-6.5;
   (b) contacting at least a portion of the starting material with a cation exchanger charged with exchangeable sodium or potassium cations or both to remove calcium until the percentage transmission of the material (when separated from the exchanger) rises to at least 5%, preferably at least 25%, more preferably at least 40% when measured using a 1cm layer of sample being illuminated at a wavelength of 850nm; and
   (c) optionally mixing the translucent milk sample with another milk sample while retaining the percentage transmission at least 5%, preferably at least 25%, more preferably at least 40%

2. A method as claimed in claim 1 comprising:

   (a) providing a opaque milk starting material having a pH in the range 5.7-6.5;
   (b) removing at least 50-100%, preferably 60-100% more preferably 80-100% of calcium therein by cation exchange on a cation exchanger charged with either exchangeable sodium or potassium cations or both;
   (c) optionally mixing the calcium-depleted milk sample with another milk sample while retaining the percentage calcium depletion in the range 50-100%, preferably 60-100%, more preferably 80-100%.

3. A method as claimed in claim 1 or claim 2 wherein the final percentage calciumdepletion is 60%-100%.

4. A method as claimed in claim 1 or claim 2 wherein the final percentage calciumdepletion is in the range 80-100%.

5. A method as claimed in any one of claims 1 to 4 wherein the opaque milk starting material is a low fat milk sample chosen from skim milk, milk protein concentrate or milk protein isolate.

6. A method as claimed in claim 1 or claim 2 where the cation exchanger is a resin bearing strongly acidic groups.

7. A method as claimed in any one of claims 1-6 wherein a translucent milk drink is incorporated into a nutritional drink.

8. A method as claimed in any one of claims 1 to 7 wherein the translucent milk drink contains greater than 0.8% (w/v) milk protein, preferably greater than 2% (w/v) milk protein.

9. A method as claimed in any one of claims 1 to 8 wherein calcium ions are replaced by sodium ions.

10. A method as claimed in any one of claims 1 to 9 further comprising addition of colouring and flavouring.

11. A method as claimed in claim 10 further comprising carbonation of said drink.

12. A method as claimed in any one of claims 1 to 6 and 11 further comprising the step of drying the translucent milk.

Patentansprüche

1. Verfahren zum Herstellen eines lichtdurchlässigen Milchgetränks mit einem pH-Wert im Bereich von 5,6-7,0, welches umfaßt:

   (a) Bereitstellen eines opaken Milchausgangsmaterials mit einem pH-Wert im Bereich von 5,7-6,5;
   (b) Kontaktieren wenigstens eines Teils des Ausgangsmaterials mit einem Kationenaustauscher beladen mit austauschbaren Natrium- oder Kaliumkationen oder beiden, um Calcium zu entfernen, bis die prozentuale Transmission des Materials (wenn es von dem Austauscher getrennt ist) auf wenigstens 5%, bevorzugt wenigstens 25%, bevorzugter wenigstens 40% ansteigt, wenn sie gemessen wird unter Verwendung einer Probenschicht von 1 cm, die bei einer Wellenlänge von 850 nm bestrahlt wird; und
   (c) optional Mischen der lichtdurchlässigen Milchprobe mit einer weiteren Milchprobe, während die prozentuale Transmission bei wenigstens 5%, bevorzugt wenigstens 25%, bevorzugter wenigstens 40% gehalten werden.

2. Verfahren nach Anspruch 1, welches umfaßt:

   (a) Bereitstellen eines opaken Milchausgangsmaterials mit einem pH-Wert im Bereich von 5,7-6,5;
   (b) Entfernen von wenigstens 50-100%, bevorzugt 60-100%, bevorzugter 80-100% des Calciums darin durch Kationenaustausch an einem Kationenaustauscher beladen mit entweder austauschbaren Natrium- oder Kaliumkationen oder beiden;
   (c) optional Mischen der an Calcium-verarmten Milchprobe mit einer weiteren Milchprobe, während die prozentuale Calciumverarmung im Bereich von 50-100%, bevorzugt 60-100%, bevorzugter 80-100% gehalten wird.

3. Verfahren nach Anspruch 1 oder Anspruch 2, wobei die endgültige prozentuale Calciumverarmung 60%-100% ist.

4. Verfahren nach Anspruch 1 oder Anspruch 2, wobei die endgültige prozentuale Calciumverarmung im Bereich von 80-100% ist,

5. Verfahren nach einem der Ansprüche 1 bis 4, wobei das opake Milchausgangsmaterial eine Milchprobe mit wenig Fett ist, die ausgewählt wird aus Magermilch, Milchproteinkonzentrat oder Milchproteinisolat.

6. Verfahren nach Anspruch 1 oder Anspruch 2, wobei der Kationenaustauscher ein Harz ist, das stark saure Gruppen trägt.

7. Verfahren nach einem der Ansprüche 1 bis 6, wobei ein lichtdurchlässiges Milchgetränk in ein Ernährungsgetränk integriert wird.

8. Verfahren nach einem der Ansprüche 1 bis 7, wobei das lichtdurchlässige Milchgetränk mehr als 0,8% (w/v) Milchprotein, bevorzugt mehr als 2% (w/v) Milchprotein enthält.

9. Verfahren nach einem der Ansprüche 1 bis 8, wobei Calciumionen durch Natriumionen ersetzt werden.

10. Verfahren nach einem der Ansprüche 1 bis 9, weiter umfassend eine Zugabe von Farbstoff und Aromastoff.

11. Verfahren nach Anspruch 10, weiter umfassend eine Karbonatation des Getränks.

12. Verfahren nach einem der Ansprüche 1 bis 6 und 11, weiter umfassend den Schritt eines Trocknens der lichtdurchlässigen Milch.

Revendications

1. Procédé pour préparer une boisson lactée translucide ayant un pH dans la plage de 5,6-7,0 consistant à :

   a) fournir une matière de départ lactée opaque ayant un pH dans la plage de 5,7-6,5 ;
   b) mettre en contact au moins une partie de la matière de départ avec un échangeur de cations chargé avec des cations sodium ou potassium échangeables ou les deux pour retirer le calcium jusqu'à ce que la transmission en pourcentage de la matière (quand elle est séparée de l'échangeur) s'élève jusqu'à au moins 5%, de préférence au moins 25%, plus préférablement au moins 40% quand elle est mesurée en utilisant une couche de 1 cm d'échantillon qui est éclairée à une longueur d'onde de 850 nm ; et
   c) mélanger éventuellement l'échantillon lacté translucide avec un autre échantillon lacté tout en maintenant la transmission en pourcentage au moins à 5%, de préférence au moins à 25%, plus préférablement au moins à 40%.

2. Procédé tel que revendiqué dans la revendication consistant à :

   a) fournir une matière de départ lactée opaque ayant un pH dans la plage de 5,7-6,5 ;
   b) retirer au moins 50-100%, de préférence 60-100%, plus préférablement 80-100% du calcium dans celle-ci par échange de cations sur un échangeur de cations chargé avec des cations sodium ou potassium échangeables ou les deux ;
   c) mélanger éventuellement l'échantillon lacté appauvri en cal-cium avec un autre échantillon lacté tout en maintenant le pourcentage d'appauvrissement en calcium dans la plage de 50-100%, de préférence 60-100%, plus préférablement 80-100%.

3. Procédé tel que revendiqué dans la revendication 1 ou la revendication 2, dans lequel le pourcentage final d'appauvrissement en calcium est de 60%-100%.

4. Procédé tel que revendiqué dans la revendication 1 ou la revendication 2, dans lequel le pourcentage final d'appauvrissement en calcium se trouve dans la plage de 80-100% ;

5. Procédé tel que revendiqué dans une quelconque des revendications 1 à 4, dans lequel la matière de départ lactée opaque est un échantillon lacté hypolipitique choisi à partir de lait écrémé, concentré protéique lacté ou isolat protéique lacté.

6. Procédé tel que revendiqué dans la revendication 1 ou la revendication 2, où l'échangeur de cations est une résine portant des groupes fortement acides.

7. Procédé tel que revendiqué dans une quelconque des revendications 1 à 6, dans lequel une boisson lactée translucide est incorporée dans une boisson nutritionnelle.

8. Procédé tel que revendiqué dans une quelconque des revendications 1 à 7, dans lequel la boisson lactée translucide contient plus de 0,8% (p/v) de protéine lactée, de préférence plus de 2% (p/v) de protéine lactée.

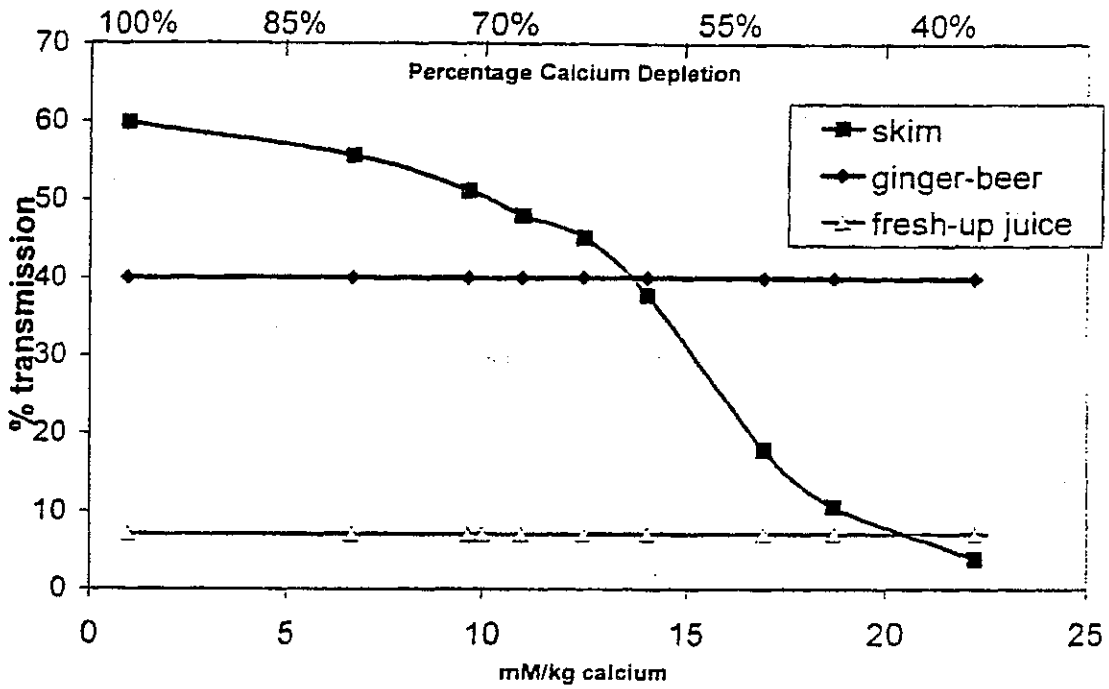
9. Procédé tel que revendiqué dans une quelconque des revendications 1 à 8, dans lequel des ions calcium sont remplacés par des ions sodium.

10. Procédé tel que revendiqué dans une quelconque des revendications 1 à 9, comprenant de plus l'addition de colorant et d'aromatisant.

11. Procédé tel que revendiqué dans la revendication 10, comprenant de plus la carbonatation de ladite boisson.

12. Procédé tel que revendiqué dans une quelconque des revendications 1 à 6 et 11, comprenant de plus l'étape de sécher le lait translucide.

FIGURE 1


100%
85%
70%
55%
40%
Percentage Calcium Depletion
% transmission
70
60
50
40
30
20
10
0
0
5
10
15
20
25
mM/kg calcium
skim
ginger-beer
fresh-up juice

Preparation of Calcium Depleted MPCs

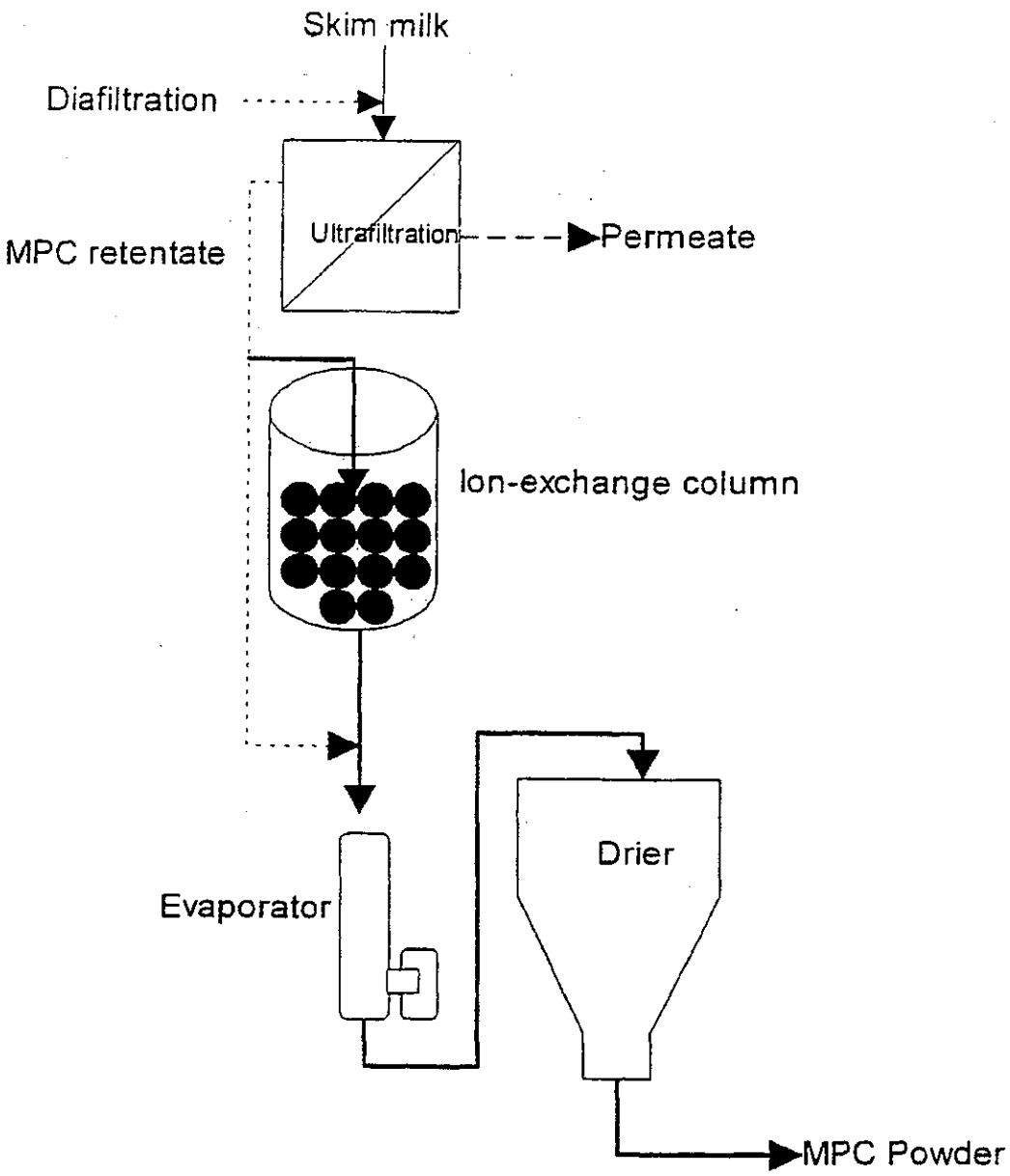


FIGURE 2