

FORM 1

623729

REGULATION 9

COMMONWEALTH OF AUSTRALIA

PATENTS ACT 1952

APPLICATION FOR A STANDARD PATENT

We, SOCIETE DES PRODUITS NESTLE S.A., a Swiss body corporate of Vevey, Switzerland, hereby apply for the grant of a Standard Patent for an invention entitled:-

"A PROCESS FOR THE PREPARATION OF A POWDER FOR MILK CHOCOLATE" which is described in the accompanying Complete Specification.

Details of basic application:-

Number: 512/89-7

Country: Switzerland

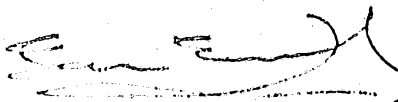
Date: 14th February, 1989

Our address for service is:

SHELSTON WATERS
55 Clarence Street
SYDNEY, N.S.W. 2000.

DATED this 24th Day of January, 1990

SOCIETE DES PRODUITS NESTLE S.A.

by 

For the State of Patent Attorney of Australia
OF SHELSTON WATERS

To: The Commissioner of Patents
WODEN A.C.T. 2606

File: D.B. S-139

Fee: \$171.00

6012686 24/01/90

CONVENTION APPLICATION BY A COMPANY

FORM 8 - REGULATION 12 (2)

AUSTRALIA
PATENTS ACT 1952

DECLARATION IN SUPPORT OF A CONVENTION APPLICATION FOR A PATENT

(a) Here Insert (in full)
Name of Company.

In support of the Convention Application made by.....
(a) SOCIETE DES PRODUITS NESTLE S.A.

(b) Here Insert Title of
Invention.

(hereinafter referred to as "Applicant") for a patent for an invention entitled:
(b) "A process for the preparation of a powder for
milk chocolate"

(c) and (d) Here Insert
Full Name and Address
of Company Official
authorised to make
declaration.

I, (c) Andrzej Ledzion
of (d) En la Priauraz, 1807 BLONAY, Switzerland

do solemnly and sincerely declare as follows:

1. I am authorised by Applicant to make this declaration on its behalf.

(e) Here Insert Basic
Country followed by date
of Basic Application.

2. The basic Application(s) as defined by section 141 of the Act was / were made
in (e) Switzerland on the 14th day of February 1989
by (f) Société des Produits Nestlé S.A.

(f) Here Insert Full
Name(s) of Applicant(s)
in Basic Country.

In on the day of 19
by
In on the day of 19
by
In on the day of 19
by

(g) Here Insert (in full)
Name and Address of
actual inventor or
inventors.

3. (g) Niklaus MEISTER of Moeschbergweg 20,
506 GROSSHOECHSTETTEN, Switzerland and
Hans-Joseph PIEK of La Raveyre, 1728 ROSSENS, Switzerland

..... is/are
the actual inventor(s) of the invention and the facts upon which Applicant is entitled to make the
Application are as follows:

The applicant is the assignee of the actual inventors.

(12) PATENT ABRIDGMENT (11) Document No. AU-B-48772/90
(19) AUSTRALIAN PATENT OFFICE (10) Acceptance No. 623729

(54) Title
CHOCOLATE MILK POWDER

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(56) Prior Art Documents
US 4871573
GB 578078

(57) Claim

1. A process for the production of a powder for milk chocolate in which a cocoa mass, milk and sugar are mixed, a fatty phase, an aqueous phase and a residue are separated from the mixture by centrifugation, the residue is dispersed in the aqueous phase which is then paste rized and concentrated, the dispersion obtained is cooled and inoculated with crystals of lactose and the lactose in the dispersion is allowed to crystallize, the suspension containing the crystallized lactose is mixed with the separately pasteurized fatty phase and the mixture is dried by spray drying.

9. A process for the production of milk chocolate, characterized in that crystallized sucrose and cocoa butter are added to the powder claimed in claim 8 and, after fine grinding, the mixture is conched, lecithin and, optionally, vanillin are added, the mass obtained is conditioned and then poured into moulds and in that the chocolate is demoulded.

COMMONWEALTH OF AUSTRALIA

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FORM 10

PATENTS ACT 1952

C O M P L E T E S P E C I F I C A T I O N

FOR OFFICE USE:

	Class	Int.Class
Application Number:		
Lodged:		
Complete Specification Lodged:		
Accepted:		
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Priority:

Related Art:

Name of Applicant: SOCIETE DES PRODUITS NESTLE S.A.

Address of Applicant: Vevey, Switzerland

Actual Inventor: Niklaus Meister and Hans-Joseph Piek

Address for Service: SHELSTON WATERS, 55 Clarence Street, Sydney

Complete Specification for the Invention entitled:

"A PROCESS FOR THE PREPARATION OF A POWDER FOR MILK CHOCOLATE"

The following statement is a full description of this invention,
including the best method of performing it known to us:-

This invention relates to a process for the production of a powder for use in the manufacture of milk chocolate.

In one traditional process known as dry mixing, the milk chocolate is produced from a mixture of milk powder, sugar, cocoa mass and cocoa butter which forms the crude chocolate mixture. This mixture is finely ground and the resulting powder is refined and liquefied by kneading in conches. The chocolate mass is then conditioned and moulded. The crude chocolate mixture has to have the lowest possible residual moisture content so that it can be satisfactorily worked in the conches and to ensure that the paste has the appropriate rheological properties for moulding and demoulding. To achieve this result, the milk is dried in a thin layer on heated rollers which damages its proteins and causes a loss of the milk flavour.

In another known process, the crude chocolate consists of so-called crumb, sugar and cocoa butter. The crumb is the product obtained by drying in vacuo and then grinding a mixture of cocoa mass and sweetened condensed milk. This product gives the chocolate a caramelized, fruity, non-milk flavour.

The processes mentioned above involve prolonged conching over a period of 24 to 48 hours.

Another known process, illustrated for example by GB-PS 783,861, is distinguished from the preceding processes by the fact that the cocoa mass and the sugar are mixed with fresh milk in the presence of lecithin, after which the emulsified liquid mixture is dried in the form of a film on heated rollers. The intimate mixture of the principal components of the chocolate in liquid form should enable the organoleptic qualities of the chocolate to be improved while preserving the milk flavour.

It has been found that the roller drying process causes a loss of the volatile cocoa aromas; a loss of the nutritional value of the milk proteins by Maillard reaction

and gelatinization of the cocoa starch which has adverse effects on the rheology of the chocolate. The chocolate obtained is insipid.

5 The object of the present invention is to obviate the disadvantages of the known processes by providing a crude chocolate powder which has a pure cocoa aroma and a milk note and of which the rheological properties facilitate its processing to chocolate.

10 The invention relates to a process for the production of a powder for milk chocolate in which a cocoa mass, milk and sugar are mixed, a fatty phase, an aqueous phase and a residue are separated from the mixture by centrifugation, the residue is dispersed in the aqueous phase which is then pasteurized and
15 concentrated, the dispersion obtained is cooled and inoculated with crystals of lactose and the lactose in the dispersion is allowed to crystallize, the suspension containing the crystallized lactose is mixed with the separately pasteurized fatty phase and the mixture is
20 dried by spray drying.

To carry out this process, milk, preferably fresh whole milk, is pasteurized under controlled conditions, for example for a few seconds to 30 seconds at 70 to 80°C. Under conditions such as these, there is no
25 significant inactivation of lysine. The milk is then cooled to 30-60°C, for example to approximately 50°C.

A cocoa mass emanating from the grinding of roasted, decorticated and deskinced cocoa beans is then melted at 40-80°C, for example at approximately 50°C.
30 This mass may be meal containing all the cocoa butter present in the beans, i.e. approximately 54% by weight. It may be the cake obtained from the meal by grinding of the press cake after partial separation of the cocoa butter and may contain 28 to 32% by weight cocoa butter.
35 Sugar is added to the molten cocoa mass in the form of crystallized sugar_____



or in the form of a concentrated aqueous syrup, after which the mixture of sugar and cocoa is incorporated with stirring in the pasteurized milk. The respective ratios by weight of cocoa mass to sugar to milk are 3-9:2-8:84-95, for example 4:3:93. The mixture is preferably cooled rapidly to 5-10°C to prevent the growth of microorganisms and to avoid losses of volatile aromas.

The mixture is then heated to 40-80°C, preferably to around 50°C, and is then treated without delay in a centrifugal separator. The separation is preferably intensive, preferably being carried out for 0.2 to 1 s at 1500-2000 r.p.m. A light brown coloured fatty phase consisting of milk fats, cocoa butter and fat-soluble cocoa aromas and containing 20 to 50% by weight fats; an aqueous phase consisting essentially of skimmed milk and a residue comprising cocoa solids are collected.

The aqueous phase is then cooled, preferably immediately after its separation, to 5-10°C, after which the residue is incorporated therein in a colloid mill. The dispersion obtained is pasteurized under controlled conditions, for example for a few seconds to 30 seconds at 70-80°C, to minimize the inactivation of lysine by Maillard reaction and gelatinization of the cocoa starch.

After pasteurization, the dispersion is concentrated, for example by evaporation in a falling-film evaporator, to a dry matter content of 30-60% by weight and preferably to approximately 45% by weight, after which the concentrate is cooled to a temperature of 5-15°C and preferably to approximately 10°C pending its subsequent treatment. Alternatively, the concentrate may be cooled to approximately 35°C and crystallization of the lactose directly initiated as described hereinafter.

The following step comprises seeding the cooled concentrate with lactose crystals and promoting crystallization of the lactose in the form of fine crystals. The

lactose used for seeding should be in the form of fine crystals preferably 2 μ m or smaller in size. The quantity of lactose added should be sufficient to initiate crystallization, for example approximately 0.05% by weight, based on dry matter. The crystallization may be carried out in double-jacketed tanks at a temperature not exceeding 35°C. Seeding is preferably carried out at approximately 35°C, the concentrate being cooled to approximately 10°C during crystallization.

Crystallization lasts 3 to 30 h and preferably about 5 h. It is advantageously carried out with slow and continuous stirring.

The dispersion obtained is then cooled to a temperature not exceeding 10°C and preferably to around 5°C. The fatty phase previously separated is added to the cooled dispersion, the fatty phase itself advantageously being cooled to a temperature not exceeding 10°C and preferably to around 5°C. The fatty phase will advantageously have been heated beforehand to 40-80°C and then pasteurized under controlled conditions for a few seconds to 30 mins. at 63-140°C, for example for approximately 5 seconds at around 120°C, and then homogenized at 5-80°C and preferably at around 50°C under a pressure of 20 to 100 bar and preferably around 50 bar. The mixture contains 40-50% by weight dry matter.

The mixture is then sprayed under a pressure of 60-100 bar at the nozzle and at a temperature not exceeding 10°C into a spray drying tower through which is passed a stream of very hot air under pressure so that the temperature of the exit air is 80°C or higher.

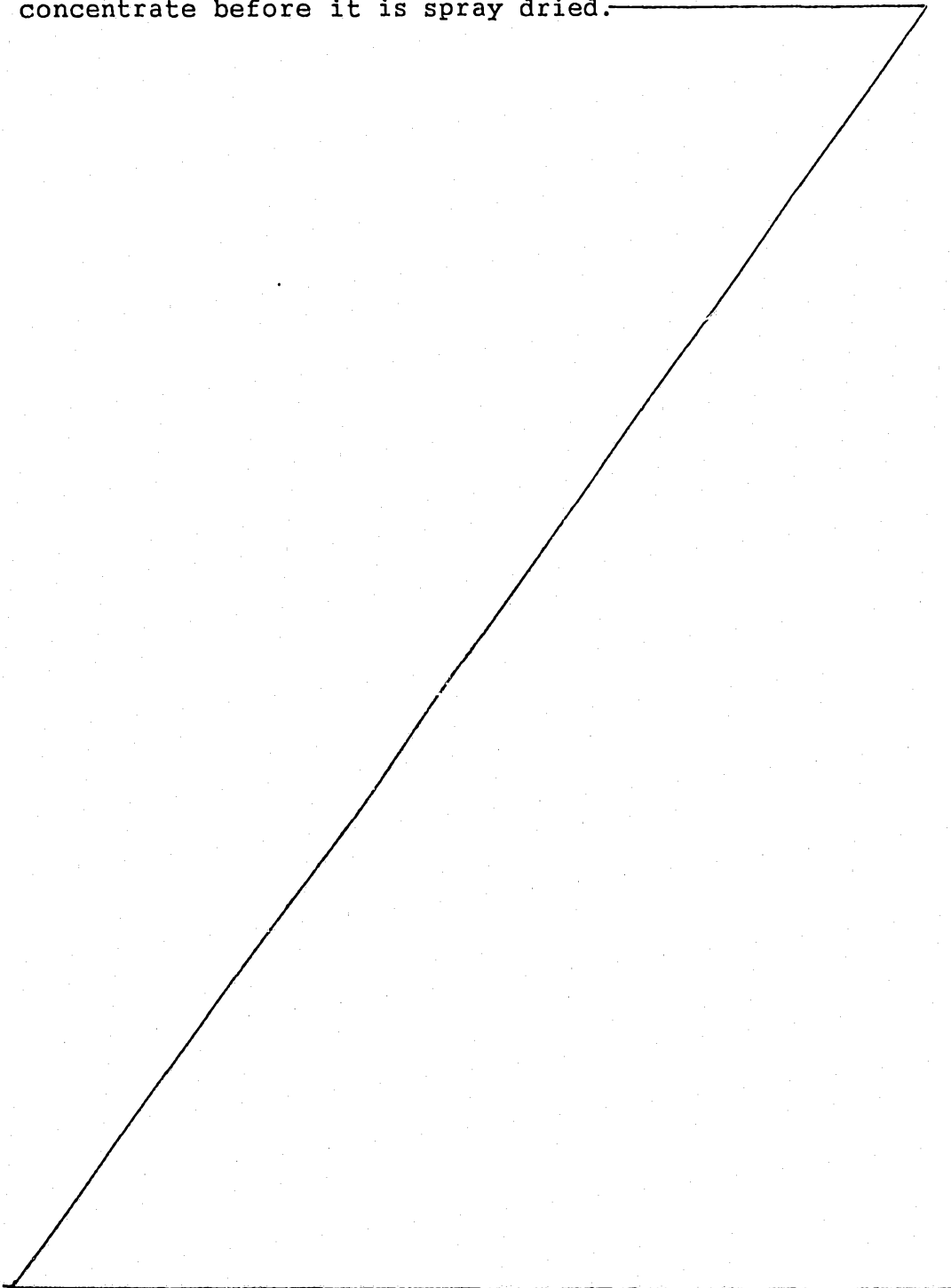
Preferably, the concentrate is sprayed into a drying tower at a temperature not exceeding 10°C under a pressure of 60-100 bar and dried in hot air under such conditions that air issuing from the tower is at a temperature above or equal to 80°C.

In one particular embodiment of the spray drying step, the concentrate and, in particular, the fats which



- 4a -

it contains may be protected against the oxidation which could occur during the drying process. To this end, an inert gas, preferably nitrogen, is injected into the concentrate before it is spray dried.



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Alternatively, a fat-soluble, preferably natural, anti-oxidant, for example a mixture of tocopherols, may be added to the concentrate in a quantity of 100 to 200 ppm (parts per million) by weight before spray drying.

Advantageously, all the measures of separation of the fatty and non-fat phases, crystallization of the lactose in the form of fine crystals, addition of the homogenized fatty phase, cooling of the concentrate and cold spraying thereof, preferably at a temperature of 5-10°C under high pressure in a stream of very hot air, combine to obtain a maximum of fats in the free state and lactose in the crystallized state and to keep them in those states.

The expression "fats in the free state" is understood to mean that the fats are not coated with protective materials, for example emulsifiers or proteins. In the description, the percentage of free fats is determined by gravimetric measurement of the quantity of fats extractable with petroleum ether based on the total quantity of fats.

After drying, the powder has a percentage moisture content of 1 to 5% and preferably 3% by weight. The lactose is in the form of crystals between 10 and 70 μm in size.

Instead of whole milk, it is also possible to use partially skimmed milk and to add the milk fats, for example in the form of anhydrous milk fats or a fraction of anhydrous milk fats, thereto at any stage of the process, but preferably just before spray drying, so that the powder contains the milk fats which would have been supplied by the whole milk.

Flavouring agents may of course be mixed with the powder before or after drying. The powder is preferably packed in bags in an inert atmosphere, for example of nitrogen, the bags are sealed and are stored, preferably at a temperature below 10°C.

The invention is illustrated by the following Example

in which the percentages and parts are by weight, unless otherwise indicated.

Example

5 Fresh whole milk is pasteurized for 15 s at 80°C in a tube-type heat exchanger and then cooled to 50°C.

A cocoa mass emanating from the grinding of roasted and decorticated beans and containing 54% fats is melted at 50°C.

10 4 Parts molten cocoa mass and 3 parts crystallized sugar are mixed with 93 parts pasteurized milk at 50°C, after which the mixture is rapidly cooled to 10°C. The mixture is reheated to 50°C and then treated in a separator/decanter for 0.5 s at 1800 r.p.m.

15 A light brown coloured fatty phase comprising 30% fats consisting of the milk fats and the cocoa butter and containing the fat-soluble cocoa aromas; an aqueous phase consisting essentially of skimmed milk and a residue mainly containing the non-fat and water-insoluble cocoa solids are obtained.

20 The aqueous phase is rapidly cooled to 10°C and the residue is incorporated therein with stirring in a colloid mill. The dispersion obtained is pasteurized for 30 s at 80°C in a tube-type heat exchanger and then concentrated to 45% dry matter in a triple-effect falling-film evaporator. The concentrate is cooled to 35°C in a tube-type heat exchanger and then seeded with 0.05 part lactose crystals 2 µm or smaller in size, cooling being continued for 5 h to 10°C with slow and continuous stirring. The concentrate containing the crystallized lactose is then cooled to 5°C in a tube-type heat exchanger.

30 The fatty phase, separated by centrifugation as indicated above, is heated to 75°C and then treated for 5 s at 130°C by direct injection of steam, followed by cooling to 50°C in a tube-type heat exchanger. It is then

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homogenized in a single-stage homogenizer under a pressure of 50 bar and cooled to 5°C in a tube-type heat exchanger.

The fatty phase mentioned above is incorporated with stirring in the concentrate containing the crystallized lactose.

The mixture containing 45% fats is then sprayed under a pressure of 75 bar by a high-pressure pump into a drying tower through which a stream of air under a pressure of 0.16 bar and at a temperature of 350°C is passed. At the tower exit, the air has a temperature of 85°C and a relative humidity of 15%.

The powder (A) collected at the bottom of the tower has the following physical characteristics:

water content	3%
specific gravity (kg/l)	0.58
fats content	30%, including 82% in the free state (the percentage of fats in the free state is determined as indicated above)

The lactose is in the form of crystals 10 to 70 μm in size.

Comparison Example

For comparison purposes, a powder (B) for milk chocolate is prepared as follows. 1.8 parts sucrose, 1.6 parts cocoa mass containing 31% fats and 0.03 part disodium phosphate are mixed at 25°C with 45 parts fresh milk containing 12.5% fats. After pasteurization for 1 minute at 90°C, the mixture is concentrated to 67% dry matter in a tubular evaporator and then cooled to 25°C.

The concentrate is then dried to 97% dry matter on an 18 m² roller dryer heated with steam under a pressure of 4 bar and rotating at 2 r.p.m. On leaving the dryer, the product is passed through a 3 mm mesh sieve. Its temperature is 40-50°C.

The organoleptic properties of powders A and B and aqueous solutions thereof, the nutritional properties of powders A and B and their suitability for processing to chocolate are compared.

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1. Organoleptic properties

Powder A is light in colour and has an odour and taste typical of cocoa and a fine structure. Powder B is dark with hardly any taste or odour of cocoa and has a granular structure.

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A 40% solution of A in water is fluid and slightly viscous and has a pleasant taste.

By contrast, a 40% solution of B in water is highly viscous and gelatinous and has hardly any taste.

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2. Nutritional properties

Powder A shows hardly any milk protein damage whereas the milk proteins are damaged in the case of powder B. Lysine inactivation is approximately 20% for powder B and less than 5% in the case of powder A.

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3. Suitability for processing to chocolate

Chocolate is made as follows from powders A and B:

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Chocolate A

39.5 parts powder A, 15.4 parts cocoa butter and 40 parts crystallized sugar are mixed in a kneader-mixer. The resulting mixture is then finely ground to a mean particle size of 13 μm and conched for 24 hours at a temperature of 53 to 58°C. The mixture is completed by addition of 5 parts cocoa butter during conching and by addition of 0.2 part lecithin and 0.01 part vanilla in solution in alcohol towards the end of conching. Finally, the chocolate mass is conditioned and moulded.

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Chocolate B

37 parts powder B, 18 parts cocoa butter, 39 parts crystallized sugar, 2 parts cocoa mass and 0.1 part lecithin are mixed in a kneader-mixer. The resulting mixture is finely ground to a particle fineness of 13 μm . The mixture is then conched with addition - per step - of 0.06 part lecithin, 3.6 parts cocoa butter and 0.5 part molten butter. Another 0.23 part lecithin and 0.01 part vanillin in solution in alcohol are added towards the end of conching. Finally, the chocolate mass is conditioned and moulded.

Conclusions

Despite the additional introduction of cocoa mass corresponding to a content of non-fat cocoa solids equivalent to that of chocolate A, chocolate B is insipid. In addition, the use of powder B complicates conching, making it necessary to add a larger amount of lecithin and to carry out conching with strict precautions to avoid creaming of the mass. Roller drying caused gelatinization of the cocoa starch.

By contrast, chocolate A has a pleasant creamy taste and a pure cocoa aroma, its texture is not sticky. It is easy to conch and demould.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A process for the production of a powder for milk chocolate in which a cocoa mass, milk and sugar are mixed, a fatty phase, an aqueous phase and a residue are separated from the mixture by centrifugation, the residue is dispersed in the aqueous phase which is then pasteurized and concentrated, the dispersion obtained is cooled and inoculated with crystals of lactose and the lactose in the dispersion is allowed to crystallize, the suspension containing the crystallized lactose is mixed with the separately pasteurized fatty phase and the mixture is dried by spray drying.

2. A process as claimed in claim 1, characterized in that whole milk pasteurized for a few seconds at 70-80°C and cooled to 30-60°C is used.

3. A process as claimed in claim 1 or 2, characterized in that a cocoa mass melted beforehand at 40-80°C and sugar are introduced into the milk with stirring and the mixture is rapidly cooled to 5-10°C.

4. A process as claimed in any one of claims 1 to 3, characterized in that the dispersion of the residue in the aqueous phase is concentrated to 30-60% by weight dry matter and the concentrate is cooled to a temperature of approximately 35°C, the cooled concentrate is directly seeded with lactose crystals or, if seeding is delayed, in that the concentrate is cooled to 5-15°C and then reheated to approximately 35°C at the moment of seeding, in that the lactose is crystallized in the form of fine crystals with slow and continuous stirring for 3 to 30 hours and in that the dispersion obtained is cooled to a temperature not exceeding 10°C.

5. A process as claimed in any one of claims 1 to 4, characterized in that the fatty phase is pasteurized, homogenized at elevated temperature and then cooled to a temperature not exceeding 10°C.

6. A process as claimed in any one of claims 1 to 5, characterized in that the fats are protected against



oxidation during drying by injecting an inert gas into the concentrate or by adding a fat-soluble anti-oxidant just before spray drying.

7. A process as claimed in any of claims 1 to 6, characterized in that the concentrate is sprayed into a drying tower at a temperature not exceeding 10°C under a pressure of 60-100 bar and in that it is dried in hot air under such conditions that the air issuing from the tower is at a temperature above or equal to 80°C.

8. A powder for milk chocolate obtained by the process claimed in any of claims 1 to 7.

9. A process for the production of milk chocolate, characterized in that crystallized sucrose and cocoa butter are added to the powder claimed in claim 8 and, after fine grinding, the mixture is conched, lecithin and, optionally, vanillin are added, the mass obtained is conditioned and then poured into moulds and in that the chocolate is demoulded.

10. Milk chocolate obtained by the process claimed in claim 9.

11. A process for the production of a powder for milk chocolate, substantially as herein described with reference to the Example or Chocolate A.

DATED this 4th day of MARCH, 1992

SOCIETE DES PRODUITS NESTLE S.A.

Attorney: IAN T. ERNST

Fellow Institute of Patent Attorneys of Australia
of SHELSTON WATERS

