

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization  
International Bureau



(43) International Publication Date  
1 November 2001 (01.11.2001)

PCT

(10) International Publication Number  
WO 01/80660 A1

(51) International Patent Classification<sup>7</sup>: A23G 1/00, 3/00

(81) Designated States (national): AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EE, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, TZ, UA, UG, US, UZ, VN, YU, ZA, ZW.

(21) International Application Number: PCT/AU01/00452

(84) Designated States (regional): ARIPO patent (GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE, TR), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).

(22) International Filing Date: 19 April 2001 (19.04.2001)

Published:

- with international search report
- with amended claims

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
30088/00 20 April 2000 (20.04.2000) AU

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

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WO 01/80660 A1

(54) Title: SHELF STABLE CONFECTIONERY

(57) Abstract: A confectionery product comprising low density chocolate surrounded by a sugar-based coating, and a process for producing the confectionery product. The confectionery product is shelf stable, even at elevated ambient temperatures.

## SHELF STABLE CONFECTIONERY

### Field of the Invention

This invention relates to a novel confectionery and a process for preparing  
5 said novel confectionery. The confectionery comprises a chocolate core  
surrounded by a sugar-based coating.

### Background of the Invention

Various confectionery products are known which incorporate chocolate  
within an outer sugar-based coating or shell. Such products include M&M's® (of  
10 Effem Foods) and SMARTIES® (of Nestle) and other similar confectionery  
products. These products have enjoyed wide consumer appeal and vast  
quantities of these products have been sold throughout the world. One problem  
of such confectionery products is that they are typically not shelf stable at  
elevated ambient temperatures, in that the internal chocolate melts and expands,  
15 causing the coating, or shell, to crack. The internal, molten, chocolate then oozes  
out through the cracks which disfigures the confectionery product. This  
significantly reduces the consumer appeal and, therefore, the value of the  
products. This poor shelf stability at elevated ambient temperatures has limited  
the commercial success of such products in countries having warmer climates  
20 and/or where refrigeration is not widespread. This lack of shelf stability at  
elevated ambient temperatures can limit the market appeal of such confectionery  
products as, in hot weather or when exposed to direct sunlight, there is a  
tendency for the coating to crack and the inner chocolate to ooze out.

A variety of means have been attempted to produce a commercially  
25 acceptable confectionery, having a chocolate centre and a sugar shell, for hotter  
regions of the world. Some of the methods involve altering the ingredients of the  
chocolate centre, others involve treatment of the shell and others, treatment of  
both the chocolate centre and the sugar shell.

For instance, attempts have been made to make the chocolate centre  
30 more robust by adding water to the centre, which establishes a sugar rather than  
fat matrix as the backbone of the chocolate structure. Such attempts have  
resulted in a chocolate centre that melts at much higher temperatures. However,  
turning this concept into a commercial reality has proven to be difficult due to the

rheological change of the chocolate that takes place (One such change is the dramatic increase in the yield stress of the water added chocolate). Higher melting point fats have also been added to the chocolate formulation in the past in an attempt to increase the melting point of the chocolate centre. However, this

5 can result in chocolate having an undesirable taste or texture.

Over the last five decades, numerous patents have been granted for inventions directed to making chocolate stable at temperatures above the typical melting points of the fats in milk chocolate. Many of the patents seek heat stability by adding water to chocolate, causing amorphous sugars to crystallise, or

10 using noncrystallising amorphous sugars.

US 5149560 involves creating a stable water-in-oil emulsion, for example, a hydrated lecithin, and then adding the emulsion to tempered chocolate to form a heat-stable chocolate.

US 5004623 involves mixing a foam into the tempered paste, and

15 stabilising the foam with either emulsifiers or with a protein to form a heat stable chocolate.

Swiss Patent No. 662041 concerns spraying water directly into mixing chocolate. The chocolate necessarily contains milk powder. The chocolate is said to be heat-stable.

20 Japanese Patent No. 60-27339 involves imparting heat resistance to chocolate by adding a water-in-oil emulsion just prior to enrobing or moulding.

US 4446166 involves creating heat-resistant chocolate by mixing into chocolate a water-in-fat emulsion.

US 2480935 concerns adding water to chocolate directly, just prior to

25 moulding or enrobing. An emulsifier is recommended to assist in the addition of water to the chocolate. It is considered that heat resistance requires a maximum of 35% fat.

US 2863772 discloses coating sucrose and milk protein with invertase and some water. Heat resistance is obtained after final shaping.

30 US 2480935 and US2760867 relates to imparting heat stability to chocolate by enveloping the confection in a sugar-crystal mat. This sugar-crystal mat is induced from sugar bloom and is created by dissolving sugar crystals on the surface of the confection. The sugar syrup is then dried, producing a surface

mat of intertwined crystals encasing the confection. By doing so, the confection does not "oil off" when held at temperatures above the melting point of fat.

US 2487931 involves dissolving sugars at elevated temperatures and crystallisation of the sugars when the chocolate mass is cooled to room 5 temperature. The resultant confectionery does not deform at any temperature below the charring point of sugar.

Treatments of the sugar shell have involved varying shell configurations and formulations aimed at making the shell more pliable and resistant to increased internal pressure.

10 Objects of the Invention

It is an object of the invention to provide a confectionery product having a chocolate centre and sugar-based coating, which has improved shelf stability even at elevated ambient temperatures compared to existing such confectionery products.

15 It is a further object of the invention to provide a method for manufacturing such a shelf stable confectionery product having a chocolate centre and a sugar-based coating.

Summary of the Invention

The present invention is based on the discovery that a confectionery 20 product which is stable even at elevated ambient temperatures can be made by using a low density chocolate as the chocolate core of the confectionery product within a sugar-based outer coating, without having to modify the chemical composition of the chocolate core or the coating. The low density chocolate is a chocolate comprising voids within the chocolate. The invention involves the 25 recognition that, during a phase change from the solid polymorphic state to the liquid chocolate state, and when the chocolate is located within an outer coating (or shell), the expansion in volume of the chocolate compresses pockets of gaseous fluid within the confectionery product core rather than expanding beyond the volume defined by the coating.

30 According to a first embodiment of the invention there is provided a confectionery product comprising low density chocolate surrounded by a sugar-based coating.

According to a second embodiment of the invention there is provided a confectionery product comprising a chocolate core and a sugar coating, characterised in that the chocolate core comprises voids.

According to third embodiment of the invention there is provided a process 5 for preparing a confectionery product comprising:

- a) reducing the density of a chocolate mix to form a low density chocolate;
- b) moulding said low density chocolate into a desired shape;
- c) coating said moulded low density chocolate with a sugar-based 10 coating.

According to a fourth embodiment of the invention there is provided a process of preparing a confectionery product comprising a chocolate core and a sugar-based coating, characterised in that the process comprises the steps of:

- a) incorporating voids into a chocolate mix to form a low density chocolate;
- b) moulding said low density chocolate into a desired shape;
- c) coating said moulded low density chocolate with a sugar-based coating to form said confectionery product.

It is preferred that the density of the low density chocolate be in the range 20 of from about 0.6 to about 1.25g/ml. A density of about 1.20g/ml is particularly desirable. This is lower than the density of the chocolate core of similar types of prior confectionery products, such as SMARTIES® and earlier types of M&M's®, discussed above, which typically had a density of about 1.29 – 1.31g/ml.

#### Definitions

25 When used in this specification, the following terms have the meanings given below:

The term "shelf-stable" means that the confectionery is stable even at elevated ambient temperatures. That is, the sugar based coating does not show, or shows limited, disfiguring changes, such as cracking or oozing of the chocolate 30 centre out of the confectionery coating.

The term "comprises/comprising" is taken to specify the presence of stated features, integers, steps or components but does not preclude the presence or

addition of one or more other features, integers, steps, components or groups thereof.

The term "chocolate" as used herein is intended to mean not only conventional chocolates, that is those which contain cocoa, a fat such as cocoa

5 butter, sugar and optionally milk and flavourings, but also the so-called "white" chocolates which do not contain cocoa. The term is also intended to include products containing cocoa and a fat other than cocoa butter. For example, the chocolate may be "white" chocolate, "dark" chocolate, "milk" chocolate, compound mixture and/or mixtures thereof.

10 The term "chocolate mix" as used herein refers to the mixture of ingredients which make up the chocolate before further treatment, for example, tempering.

#### Brief Description of the Drawings

15 Figure 1 is a schematic diagram showing a preferred embodiment of the process according to the invention.

#### Detailed description of the Invention

20 The chocolate mix used in the present invention generally comprises standard chocolate-making ingredients known in the art. Typically, the chocolate mix would be made up of cocoa fat in the range of about 20-50% by weight, milk and sugar powders, liquid fats and flavours.

The low density chocolate may be formed by incorporation of gas pockets into the chocolate mix. The gas may be selected from air, N<sub>2</sub> or CO<sub>2</sub>, although for the purposes of the present invention, air has been found to be the most appropriate. Typically, the air is provided in the form of compressed air.

25 The chocolate mix is usually tempered before incorporation of the gas pockets therein. The tempering of the chocolate can be achieved by traditional means, typically, by heating the chocolate mix to about 45°C, cooling to about 27°C and then reheating to about 30°C-32°C. For example, the chocolate mix (which typically has a temperature of about 45°C after mixing of the basic ingredients) can then be passed through a heat exchanger, such as a scraped surface heat exchanger, having a low temperature region, and, can be then reheated in a temper kettle to the desired polymorphic state. Chocolate tempered to a desired level typically has a majority of the  $\beta$  form of crystals. It is preferable

that the temper values have a slope in the range of about -2.0 to about 0.01 (at the point of inflection), and a chocolate temper unit value in the range of about 6.7 to about 10.0.

The chocolate mix, which may be tempered, and the gas which is to be incorporated into the chocolate mix, is led to a mixing chamber via pipes. The pipes are usually jacketed at a predetermined temperature. In addition, the mixing chamber itself is usually jacketed at a given temperature. Preferred jacketing is by means of water or glycol/water, in particular food-grade glycol, so that if there were leakage of the jacketing fluid into the production line, the batch may not have to be destroyed. The chocolate mix is cooled usually to about 25°C-33°C before entering the mixing chamber. This cooling may be achieved by means of a scraped surface heat exchanger.

The gas is typically incorporated into the chocolate mix by pumping of the gas and chocolate mix into the mixing chamber together with rapid mixing of the chocolate mix and gas. It is preferred to add the gas at a rate of about under, or half, the rate at which the chocolate mix is added to the mixing chamber. If the mixing action is not sufficiently rapid, the gas will leave the resulting chocolate/gas mixture when it is exposed to the ambient environment. A preferred type of mixer is a rotor-stator type of mixing head, although other mixers known in the art such as a planetary whipper or b-votator would also adequately incorporate the gas into the chocolate.

When a rotor-stator mixing head is used, the rotor preferably moves at a approximately 40-300 revolutions per minute. During mixing, the chocolate/gas mixture usually heats up and a cooling jacket is required to ensure that the outlet temperature of the chocolate/gas mixture is approximately equal to the inlet temperature. The mixing chamber is cooled such that the chocolate, with gas pockets incorporated therein, leaving the mixing chamber is no more than about 31°C, with temper values in the same range as the inlet temper values. The outlet temperature of the chocolate, which has gas pockets incorporated therein, is usually about the same as the inlet temperature of the chocolate mix.

The chocolate, which has small pockets of gas incorporated therein, is referred to herein as "low density chocolate", and has a density preferably in the

range of about 0.6 to about 1.25g/ml. Typically, chocolate which is not reduced in density has a density in the range of about 1.29-1.31g/ml.

The low density chocolate is then moulded to the desired shape and size. A preferred shape is bi-convex, lens-shaped. A preferred size is "bite-size", that 5 is, a piece (or several pieces) which may be put whole into a consumer's mouth. Clearly, however, any desired shape or size would fall within the scope of the invention.

Moulding may be by any process known in the art used to mould confectioneries. In a preferred method, a slab of the low density chocolate is 10 deposited onto chilled moulding rolls. The deposited slab is preferably of approximately constant thickness. The moulding rolls are at a temperature low enough to ensure that the final moulded shapes, after sifting (to remove flashing) and rolling (to smooth edges) are hard enough to withstand the sugar-coating process. Typically, the sifting and rolling occur simultaneously in a rotating sieve, 15 although these procedures could be carried out separately.

The moulded shapes are then coated with a sugar-based coating by conventional means. The sugar-based coating may comprise one or more sugar-based layers. Preferably, more than one sugar-based layer is applied using a lamination process. Most preferably, at least one layer comprising sugar and 20 water is applied, followed by layers comprising sugar, water and colours. It is usual in such a process to allow each layer to dry before adding the next layer. This layering process is repeated as many times as is required, depending on the final desired shell thickness. The final shell thickness is typically about 10-50% by weight of the confectionery and is desirably of even thickness throughout. It is 25 usual to polish the finished confectionery before packaging. Printing may be added to the polished surface, and different coloured confectionery pieces blended together.

Figure 1 shows a schematic diagram of a preferred embodiment of the process of this invention. The basic chocolate ingredients are mixed to form a 30 chocolate mix (1), followed by tempering (2) of the chocolate mix. The tempered chocolate (3) and food grade, filtered, compressed air (4) are fed into a mixing chamber (5). The compressed air is delivered at a pressure higher than that in the mixing chamber. The pipework to the mixing chamber and the mixing

chamber itself is cooled (6) with jacketing water to ensure that the outlet temperature of the aerated chocolate leaving the mixing chamber is equal to, or slightly above, the inlet temperature of the chocolate mix/air. In this preferred embodiment the mixing chamber comprises a rotor-stator mixing head which

5 mixes the compressed air into the tempered chocolate by a whipping-type of action. This whipping action incorporates small pockets of air into the tempered chocolate to form aerated, tempered chocolate (7). The aerated, tempered chocolate is then pumped into an adjustable high-pressure manifold (8), from which it is deposited onto chilled moulding rolls (9). The chilled moulding rolls

10 have a heated wedge in the rolls to overcome the increased yield stress of the aerated, tempered chocolate. A cooled slab of the aerated, tempered chocolate is formed (10), which is then moulded into shapes (11). The moulded shapes are then sifted and rolled (12), followed by coating with several coats of sugar-based coating (13), thereby forming the confectionery according to the invention. The

15 pieces of confectionery may then be polished (14). Different colours of the confectionery pieces can then be mixed together (15).

In an even more preferred embodiment to the process described in Figure 1 above, the tempered chocolate mix is cooled to about 27-28°C before being fed into mixing chamber (5). By cooling the tempered chocolate mix, the mixing head

20 speed can be increased, which results in more, smaller pockets of air.

The finished confectionery is shelf stable, even up to about 50°C. In typical warmer climates, for example at about 35°C, the degree of cracking, disfigurement, oozing out of the chocolate centre and/or fat bleed is limited, and might not occur at all. Even if the finished product is dropped and the shell cracks

25 as a result of this, limited, if any, oozing from the chocolate centre occurs. Furthermore, even at temperatures up to about 50°C, the majority of the confectionery products show no cracking, disfigurement, oozing or fat bleed. The confectionery has the desired taste, texture and mouthfeel.

The invention will now be described with reference to the following

30 example, which is not intended to limit the scope of the invention.

ExampleManufacture of Chocolate

5 Firstly, mixtures of milk and sugar powders are refined. Powdered flavours are then added to this mixture. The powders are then added to controlled amounts of liquid fats with a pin mixer. Typically, a fat content of between 20% - 50% is used, with a hard to soft fat ratio between 2 - 5. After the refining of powders and the mixing of the powders and liquids, the majority of particle sizes occur between about 20 - 75 microns.

10 The chocolate mix is then tempered as follows: after the chocolate mix has been heated to above 45°C, it is cooled to about 27°C and then re-heated to about 30°C - 32°C. An ideal set of temper values is with a slope in the range of -2.0 to about 0.01 (at the point of inflection) and a chocolate temper unit value in the range of about 6.7 to about 10.0. The tempered chocolate is then passed 15 through a scraped surface heat exchanger, reducing the temperature to about 25°C to about 33°C.

The final viscosity of the tempered chocolate, before it enters the mixing chamber is generally between 6 - 12Pa.s.

20 An air stream is added to the chocolate mix stream at an ideal rate of under, or around half, that of the rate of addition of the chocolate mix. The combined air and chocolate mix are then mixed vigorously with a rotor-stator, the rotor moving at between about 40 - 300 revolutions per minute. The pressure in the mixing chamber should be less than the pressure of the chocolate line to the mixing chamber and less than the pressure of the air stream to the mixing 25 chamber.

The rotor-stator is cooled with 15°C – 25°C jacketing water such that the temperature of the aerated chocolate leaving the mixing chamber is no more than about 33°C, with temper values in the same range as those stated for the inlet chocolate mix.

30 Following the mixing chamber, the aerated chocolate passes through jacketed pipework (jacketed at about 33°C) to a manifold, that can be manually altered to change the back-pressure to the mixing head.

From the manifold, the chocolate is deposited onto chilled moulding rolls and formed into a web of bi-convex, lens-shaped cores. The rolls are cooled with either water or a glycol-water mix, ideally in the range of -22°C - -11°C, ideally about -6°C such that the ideal temperature of the chocolate leaving the rolls is 5 between 5 - 16°C.

The aerated moulded chocolate is then cooled in a cooling tunnel. The cooling tunnel ideally has a residence time of 8 - 15 minutes and a dry bulb temperature of less than about 7°C.

10 The moulded chocolate then enters a rotating sieve, which removes the flash from the bi-convex, lens-shaped chocolate cores.

#### Coating the Product

15 The smooth, correctly shaped product is then coated with a layer comprising sugar and water. The coating is done using any process equipment that can achieve a desired, even thickness of shell with an appropriate finished water activity (ideally around 0.25) in a commercially feasible time.

20 After this layer has dried, further layers comprising sugar and water may be applied, and dried, followed by layers comprising sugar, water and colours. After each layer has dried, further syrup is added, which completely covers the coated pieces, and then is dried. The desired finished shell percentage to chocolate percentage is achieved by repeating this step as many times as is required.

The shell percentage will generally fall between 10% - 50% by weight.

25 The finished product is then polished and different coloured finished pieces are blended together. Pieces may then have printed symbols added to their polished surface, before the product is packed out.

The finished product typically has a chocolate centre with a density between about 0.60 - 1.25g/ml, preferably about 1.20kg/litre. The sugar shell completely covers the finished piece.

30 The finished bite size confection exhibits shelf stability even at elevated ambient temperatures, compared to non-aerated product. Tests show the product to be shelf stable from 16°C - 50°C.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A confectionery product comprising low density chocolate surrounded by a sugar-based coating.  
5
2. A confectionery product according to claim 1, wherein the density of the low density chocolate is in the range of about 0.6 to about 1.25g/ml.
3. A confectionery product according to claim 2, wherein the density is about  
10 1.20g/ml.
4. A confectionery product according to any one of claims 1 to 3, wherein said low density chocolate is tempered.
- 15 5. A confectionery product according has to any one of claims 1 to 4, wherein said low-density chocolate has gas incorporated therein.
6. A confectionery product according to claim 5, wherein said gas is air.
- 20 7. A confectionery product according to any one of claims 1 to 6, wherein the low density chocolate comprises about 20-50% by weight cocoa fat, milk powder, sugar powder, liquid fat and flavour.
- 25 8. A confectionery product according to any one of claims 1 to 7, wherein the sugar-based coating comprises at least one layer comprising sugar and water, coated with at least one layer comprising sugar, water and colour.
9. A confectionery product comprising a chocolate core and a sugar-based coating, characterised in that the chocolate core comprises voids.  
30
10. A confectionery product according to claim 9, characterised in that the voids are pockets of gas.

11. A confectionery product according to claim 10, characterised in that the gas is air.

12. A confectionery product according to any one of claims 9 to 11,  
5 characterised in that the chocolate core comprises about 20-50% by weight cocoa  
fat, milk powder, sugar powder, liquid fat and flavour.

13. A confectionery product according to any one of claims 9 to 12,  
characterised in that the sugar-based coating comprises at least one layer  
10 comprising sugar and water, coated with at least one layer comprising sugar,  
water and colour.

14. A confectionery product according to any one of claims 1 to 13, which is  
bite-sized.

15

15. A confectionery product according to any one of claims 1 to 14, which is  
shelf stable, as herein defined.

20

16. A confectionery product substantially as herein described with reference to  
the Example.

17. A process for preparing a confectionery product, comprising:

25

a) reducing the density of a chocolate mix to form a low density  
chocolate;  
b) moulding said low density chocolate into a desired shape;  
c) coating said moulded low density chocolate with a sugar-based  
coating to form said confectionery product.

30

18. A process of preparing a confectionery product comprising a chocolate  
core and a sugar-based coating, characterised in that the process comprises the  
steps of:

a) incorporating voids into a chocolate mix to form a low density  
chocolate;

- b) moulding said low density chocolate into a desired shape;
- c) coating said moulded low density chocolate with a sugar-based coating to form said confectionery product.

5 19. A process according to claim 17 or claim 18, wherein step (a) comprises incorporating gas into said chocolate mix.

20. A process according to claim 19, wherein the gas is air.

10 21. A process according to claim 19 or claim 20, wherein said gas is incorporated into said chocolate mix by rapid mixing of said chocolate mix together with said gas.

22. A process according to claim 21, wherein said rapid mixing is carried out  
15 by means of a rotor moving at between 40-300 revolutions per minute.

23. A process according to any one of claims 17 to 22, wherein the chocolate mix is tempered before step (a).

20 24. A process according to claim 23, further comprising cooling the tempered chocolate mix to about 25°C-33°C before step (a).

25. A process according to any one of claims 17 to 24, wherein the density of said low density chocolate is in the range of about 0.6 to about 1.25g/ml.

26. A process according to claim 25 wherein the density is about 1.20g/ml.

27. A process according to any one of claims 17 to 26, wherein the low density chocolate is formed into a slab of approximate constant thickness before said  
30 moulding step.

28. A process according to any one of claims 17 to 27, wherein the low density chocolate is extruded onto one or more chilled moulding rolls which effect said moulding.

5 29. A process for preparing a confectionery product, which process is substantially as herein described with reference to the Example.

30. A process for preparing a confectionery product, which process is substantially as herein described with reference to Figure 1.

10

31. A confectionery product prepared by a process of any one of claims 17 to 30.

15

## AMENDED CLAIMS

[received by the International Bureau on 16 July 2001 (16.07.01)]

- Claim replacement sheets 1, 2, 3 and 4

Claims 1 to 31 are replaced by new claims 1 to 27 ie. all of the claims have been replaced.

In all of the claims, the confectionery product has been further defined as a "shelf-stable confectionery product", in other words, the features of original claim 15 has been included in all of the product claims. New claim 1 incorporates the features of original claim 4. New claim 8 combines the features of previous claims 9 and 10. New claims 10 and 11 have been included which mirror the features of original claims 2 and 3. New claim 16 incorporates the features of previous claims 17, 19, 23 and 28. New claim 17 includes the features of original claims 18, 23 and 28. New claim 20 has been included which defines in more detail the tempering steps. This new claim 20 is fairly based on the specification at page 9, second paragraph.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A shelf-stable confectionery product comprising low density, tempered chocolate surrounded by a sugar-based coating.  
5
2. A shelf-stable confectionery product according to claim 1, wherein the density of the low density, tempered chocolate is in the range of about 0.6 to about 1.25g/ml.
- 10 3. A shelf-stable confectionery product according to claim 2, wherein the density is about 1.20g/ml.
4. A shelf-stable confectionery product according to any one of claims 1 to 3, wherein said low-density, tempered chocolate has gas incorporated therein.  
15
5. A shelf-stable confectionery product according to claim 4, wherein said gas is air.
- 20 6. A shelf-stable confectionery product according to any one of claims 1 to 5, wherein the low density, tempered chocolate comprises about 20-50% by weight cocoa fat, milk powder, sugar powder, liquid fat and flavour.
7. A shelf-stable confectionery product according to any one of claims 1 to 6, wherein the sugar-based coating comprises at least one layer comprising sugar and water, coated with at least one layer comprising sugar, water and colour.  
25
8. A shelf stable confectionery product comprising a chocolate core and a sugar-based coating, characterised in that the chocolate core is tempered chocolate comprising voids, in the form of a gas.  
30
9. A shelf-stable confectionery product according to claim 8, characterised in that the gas is air.

10. A shelf-stable confectionery product according to claim 8 or claim 9, wherein the density of the low density, tempered chocolate is in the range of about 0.6 to about 1.25g/ml.
- 5 11. A shelf-stable confectionery product according to claim 10, wherein the density is about 1.20g/ml.
12. A shelf-stable confectionery product according to any one of claims 8 to 10, characterised in that the chocolate core comprises about 20-50% by weight cocoa fat, milk powder, sugar powder, liquid fat and flavour.
13. A shelf-stable confectionery product according to any one of claims 8 to 15, characterised in that the sugar-based coating comprises at least one layer comprising sugar and water, coated with at least one layer comprising sugar, water and colour.
14. A shelf-stable confectionery product according to any one of claims 1 to 13, which is bite-sized.
- 20 15. A shelf-stable confectionery product substantially as herein described with reference to the Example.
16. A process for preparing a shelf-stable confectionery product, comprising:
  - 25 a) tempering a chocolate mix to form tempered chocolate
  - b) reducing the density of the tempered chocolate, by incorporating gas into said tempered chocolate to form a low density, tempered chocolate;
  - c) moulding said low density, tempered chocolate into a desired shape by 30 extruding the low density, tempered chocolate onto one or more chilled moulding rolls;
  - d) coating said moulded, low density, tempered chocolate with a sugar-based coating to form said shelf-stable confectionery product.

17. A process of preparing a shelf-stable confectionery product comprising a chocolate core and a sugar-based coating, characterised in that the process comprises the steps of:

5        a) tempering a chocolate mix to form tempered chocolate  
b) incorporating voids in the form of gas into said tempered chocolate mix  
      to form a low density, tempered chocolate;  
c) moulding said low density, tempered chocolate into a desired shape by  
      extruding said low density, tempered chocolate onto chilled moulding  
10      rolls;  
d) coating said moulded, low density, tempered chocolate with a sugar-  
      based coating to form said shelf-stable confectionery product.

18. A process according to claim 16 or claim 17, wherein said gas is  
15      incorporated into said chocolate mix by rapid mixing of said chocolate mix  
      together with said gas.

19. A process according to claim 18, wherein said rapid mixing is carried out by  
      means of a rotor moving at between 40-300 revolutions per minute.

20      20. A process according to any one of claims 15 to 18 wherein the tempering  
      step includes the steps of (i) heating the chocolate mix to above 45°C, then (ii)  
      cooling the chocolate mix to about 27°C and then (iii) reheating the chocolate  
      mix to about 30°C to about 32°C, thereby forming said tempered chocolate.

25      21. A process according to claim 20, further comprising cooling the tempered  
      chocolate to about 25°C-33°C before step (b).

30      22. A process according to any one of claims 16 to 21, wherein the density of  
      said low density, tempered chocolate is in the range of about 0.6 to about  
      1.25g/ml.

23. A process according to claim 22 wherein the density is about 1.20g/ml.

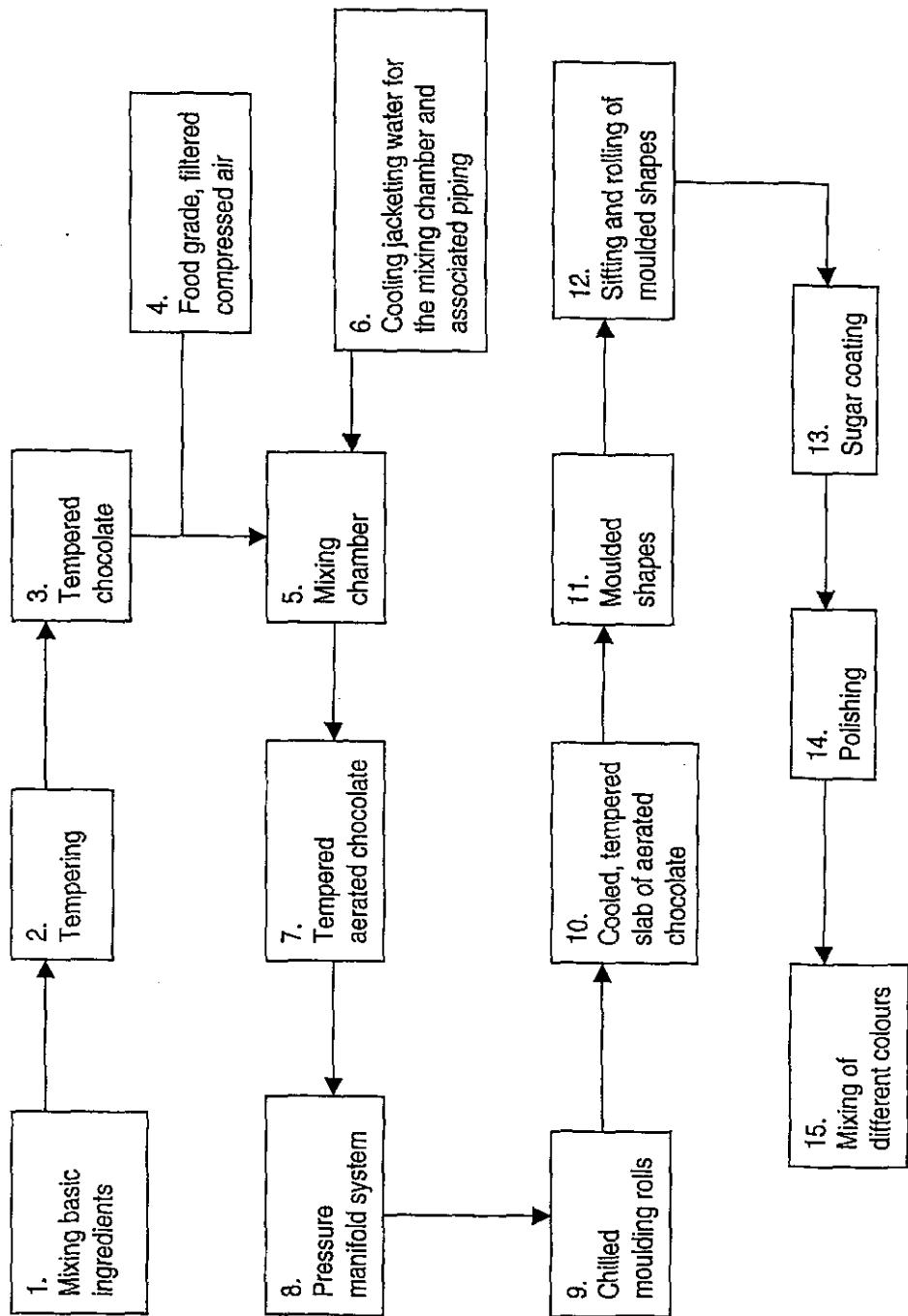
24. A process according to any one of claims 16 to 23, wherein the low density, tempered chocolate is formed into a slab of approximate constant thickness before said moulding step.

5

25. A process for preparing a confectionery product, which process is substantially as herein described with reference to the Example.

26. A process for preparing a confectionery product, which process is substantially as herein described with reference to Figure 1.

10 27. A confectionery product prepared by a process of any one of claims 16 to 26.

**Figure 1**

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU01/00452

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>		
Int. Cl. <sup>7</sup> : A23G 1/00, 3/00		
According to International Patent Classification (IPC) or to both national classification and IPC		
<b>B. FIELDS SEARCHED</b>		
Minimum documentation searched (classification system followed by classification symbols) DERWENT WORLD PATENTS INDEX (WPIDS), CHEMICAL ABSTRACTS (CA) KEYWORDS (KW) - See electronic database box below.		
Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched FOOD SCIENCE & TECHNOLOGY ABSTRACTS (FSTA): KW - See electronic database box below..		
Electronic data base consulted during the international search (name of data base and, where practicable, search terms used) CA and FSTA: KW (sugar or dextr? or sucrose) (3N) (coat? or shell or encapsul? or capsul?) and (chocolate) (3N) (core or center or centre or kernel); WPIDS: above keywords and A23G/IC.		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 91/09989-A (DANSK TYGGEGLUMMI FABRIK A/S) 11 July 1991.	
A	US 4511553-A (WERNER BOESIG & BERND PRITZWALD-STEGMANN) 16 April 1985.	
A	Derwent Abstract Accession No. 42669 Y/24 Class D13, JP 77-018779 (KANEBO KK) 28 May 1973.	
<input type="checkbox"/> Further documents are listed in the continuation of Box C <input type="checkbox"/> See patent family annex		
* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed		
"T" "X" "Y" "&"	later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art document member of the same patent family	
Date of the actual completion of the international search 25 May 2001	Date of mailing of the international search report 30 MAY 2001	
Name and mailing address of the ISA/AU AUSTRALIAN PATENT OFFICE PO BOX 200, WODEN ACT 2606, AUSTRALIA E-mail address: pct@ipaaustralia.gov.au Facsimile No. (02) 6285 3929	Authorized officer J.H. CHAN Telephone No.: (02) 62832340	

## INTERNATIONAL SEARCH REPORT

International application No.

PCT/AU01/00452

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	Derwent Abstract Accession No. 86-044906/07 Class D13, JP 60262553-A (KANEBO SHOKUHIN KK) 8 June 1984.	
A	Derwent Abstract Accession No. 97-081031/08 Class B07 D13, JP 08322504-A (NIKKEN KASEI KK) 30 May 1995.	

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

International application No.  
PCT/AU01/00452

This Annex lists the known "A" publication level patent family members relating to the patent documents cited in the above-mentioned international search report. The Australian Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

Patent Document Cited in Search Report				Patent Family Member			
WO	9109989	AU	70513/91	CA	2070288	DK	6544/89
		EP	506793	FI	922807	IE	904591
		NO	922408	PT	96356	ZW	189/90
US	4511553	DE	2936040	DK	3798/80	EP	25526
		JP	56039746				
JP	77018779		NONE				
JP	60262553		NONE				
JP	08322504		NONE				

END OF ANNEX

## 貨架穩定的糖果

### 撮 錄

一种糖果產品包含被糖基涂層涂覆的低密度巧克力，及制備糖果產品的方法。該糖果產品甚至處于高溫的環境下也具有貨架穩定性。