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(54) Title: HONEY PRODUCT HAVING A LOW WATER CONTENT

(57) Abstract: The present application relates to a honey product having a low water content. The honey product retains the physical and palatable properties of untreated honey while having a prolonged shelf-life. It can be advantageously used to sweeten beverages (such as hot beverages) and in the manufacture of throat lozenges and/or confectionery.

## HONEY PRODUCT HAVING A LOW WATER CONTENT

### CROSS-REFERENCE TO RELATED APPLICATION

This application claims priority from U.S. provisional patent application 61/144,824 filed on January 15, 2009 and from Canadian patent application  
5 2 649 936 filed on January 15, 2009. Both of which are herewith incorporated by reference in their entirety.

### FIELD OF THE INVENTION

This application relates to a honey product having a low water content. This honey product possesses an increased shelf-life with respect to the original  
10 liquid honey. Further, its taste and color are very similar to those of the original liquid honey. In addition, the sugars in the honey product are not crystallized. The honey product can optionally be wrapped in a water-impermeable package that limits the reabsorption of water by the honey product. The honey product could be directly added to beverages to sweeten them. It can also be further  
15 processed to be used in upper respiratory care product as well as a confectionery.

### BACKGROUND OF THE INVENTION

Honey is an excellent source of easily digestible sugars. It is largely composed of glucose and fructose, monosaccharides that are rapidly absorbed and  
20 metabolized by the organism. It also contains volatile components which makes it a very palatable ingredient. Honey may contain enzymes, pollen and propolis which have been recognized as having excellent health benefits.

However, the shelf-life of honey is rather limited since it will eventually (within days, weeks or months) crystallize. The crystallization of honey is not  
25 necessarily harmful, but it modifies the texture of the product to a more granulated one, which is less appealing for the consumer. In addition, during the crystallization process, water activity is increased, thereby facilitating microbial growth (such as yeast growth and/or fermentation). Further, since honey is

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usually packaged and stored as a liquid, it limits its application in the food industry.

Therefore, several attempts have been made to manufacture a honey product having a lower moisture content than original liquid honey. For example, 5 unprocessed honey has been submitted to vacuum drying (refer, for example, to the abstract of JP2003304819A2, the abstract of JP02207762 as well as U.S. patent 5,356,650, U.S. 7,101,582), lyophilization (U.S. patent 4,885,035), extrusion drying (U.S. patent 4,919,956), thin film drying (U.S. patent 4,919,956, U.S. patent 4,536,973, U.S. 7,101,582) or even spray-drying (U.S. 7,101,582). 10 However, because of the hygroscopic nature of honey, the removal of water is rather difficult and the resulting product still contains a high moisture content. For example, when untreated honey is submitted to freeze drying, it has a tendency to foam thereby limiting the amount of water that can be removed.

Because honey is supersaturated in sugars, its boiling point is much lower than 15 a solution saturated in sugar, corn syrup or maple syrup. As such, the chemical structure changes that are induced by the exposure to heat occur more rapidly in honey than in any other sweetener or sugar-based solution. Consequently, honey has to be submitted to high temperatures for a prolonged amount of time in order to remove the water it contains. This badly affects the chemically- 20 physical and palatable characteristics of honey. When abused by heat, the honey turns bitter and loses its typical honey flavor and physical characteristics. In order to circumvent this problem, additives have sometimes been added to the honey prior to the removal of the water.

It would be highly desirable to be provided with a honey product having a low 25 water content. The honey product would have a more prolonged shelf-life than the original liquid honey. It is preferred that the honey product possesses the distinctive taste and color of the original liquid honey. Preferably, the honey product would not contain any additive(s).

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## SUMMARY OF THE INVENTION

The present application relates to a honey product having a low water content. The honey product is a pure honey product.

5 According to a first embodiment, the present application refers to a honey product consisting essentially of honey and having a moisture content lower than about 1% (w/w). As used herein, the term "consisting essentially of" indicates that the honey product is composed of honey and its usual constituents (refer to the definition of honey below) and that no further additives are required to produce the product or to store it. In embodiment, additional  
10 elements can be added to the honey product but they should not materially affect the characteristics of the product (such as its moisture content and the absence of crystallized sugars). The present application also refers to a honey product consisting of honey and having a moisture content lower than about 1% (w/w), lower than about 0.9%, lower than about 0.8%, lower than about 0.7%,  
15 lower than about 0.6%, lower than about 0.5%, lower than about 0.4%, lower than about 0.3% or lower than about 0.2%. In a further embodiment, the moisture content of the honey product is lower than about 0.1%, lower than about 0.09%, lower than about 0.08%, lower than about 0.07%, lower than about 0.06%, lower than about 0.05%, lower than about 0.04%, lower than  
20 about 0.03% or lower than about 0.02%. In still another embodiment, the moisture content of the honey product is equal to about 0.01%.

According to yet another embodiment, the honey product can also contain a flavor, such as, for example, a lemon flavor (e.g. from a lemon oil). In still a further embodiment, the sugars of the honey product are in an uncrystallized  
25 form, e.g. the sugars that are contained in the honey do not crystalize. In yet a further embodiment, the honey product is solid. In still another embodiment, the honey product is wrapped in a water-impermeable package. In this particular embodiment, the honey product can have a storage time of a year (or more) without substantially reabsorbing water.

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According to another aspect, the present application provides a throat lozenge or an upper respiratory care and treatment product comprising the honey product described herein.

5 According to still another aspect, the present application provides a confectionery comprising the honey product described herein. In an embodiment, the honey product has further been processed prior to the incorporation into the confectionery.

10 According to yet a further aspect, the present application provides a honey product that is obtained by submitting a liquid honey to vacuum drying. In an embodiment, the temperature of the liquid honey is first raised from ambient temperature to at least 98°C under a pressure of at least 27 inHg. In a further embodiment, the temperature of the liquid honey is maintained at 98°C under a pressure of at least 27 inHg until the moisture content of the honey product reaches less than about 1% w/w.

## 15 DETAILED DESCRIPTION OF VARIOUS EMBODIMENTS

In accordance with the present invention, there is provided a honey product having a moisture content of less than 1%. The honey product is not sticky or tacky and can be used as a sweetener in beverages as well as in the manufacture of a upper respiratory care and treatment product (such as a throat  
20 lozenge) or a confectionery.

The honey product described herein consists essentially of a liquid honey to which water has been removed. In an embodiment, it is pure honey to which no additive has been added. The honey product is not limited to any specific manufacturing technique. Since the honey product retains the color,  
25 characteristics and the taste of untreated honey, care must be taken in selecting an appropriate manufacturing technique that will preserve the original honey color, characteristics and taste.

According to a first aspect, the present application provides a honey product consisting essentially of honey. In a further embodiment, the honey product

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consists of honey. As used herein, the term "honey" is referred to as a product prepared by bees from plant nectars, from plant secretions and from excretions of plant sucking insects ("honeydew"). Honey can also be referred to as the nectar and saccharine exudations of plants gathered, modified and stored by the honey bee. The chemical composition of honey varies depending on nectar source, season and production methods. Storage conditions may also influence final composition, with the proportion of disaccharides increasing over time. Fructose and glucose are present in relatively equal amounts and are the two major sugars present in honey (approximately 70% w/w). Honey also contains lesser amounts of sucrose (approximately 1%), other disaccharides and oligosaccharides. Gluconic acid, other acids and small amounts of proteins, enzymes (including glucose oxidase), amino acids and minerals may also be present. Potassium is the major mineral present. Honey is usually mildly acidic with a pH around 3.9. Moisture content is low (between 13% to 26% w/w), as is water activity (0.562 – 0.62).

Any liquid honey can be used in the manufacture of the honey product. The liquid honey can be raw (e.g. untreated), semi-processed (such as strained or filtered honey) or processed (e.g. pasteurized). The honey product can be made with liquid honey originating from any nectar source. Nectar sources include, but are not limited to, Acacia, Alfalfa, Apple, Blueberry, Buckwheat, Canola, Clover, Cotton, Cranberry, Dandelion, Gall berry, Goldenrod, Grape, Mesquite, Mexican, Clover, Milkweed, Palmetto, Prune, Rape, Raspberry, Sage, Sourwood, Sunflower, and/or Tupelo. The liquid honey used to manufacture the honey product can be derived from a single nectar source or from a combination of nectar sources depending on the desired properties of the final product.

The honey product defined herein has a moisture content lower than about 1% (w/w). A pure dried honey product containing more than 1% w/w of water has a tendency to become tacky. When the water content of a pure dried honey product is elevated around 2 to 3% w/w, the product is sticky to the touch. As such, because the honey product described herein has a moisture content lower than about 1% w/w, it is not tacky or sticky and can be easily be handled

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without substantially transferring to the surface manipulating the product (such as the skin or the package). In a further embodiment, the honey product has a moisture content lower than about 0.1% and in yet another embodiment, equal to about 0.01%.

- 5 The person skilled in the art can easily assess the percentage of moisture in a honey product using methods readily known in the art. The moisture content of a food product is usually defined through the following formula:

$$\% \text{ Moisture} = (m_w/m_{\text{sample}}) \times 100$$

- where  $m_w$  is the mass of the water and  $m_{\text{sample}}$  is the mass of the sample. The  
10 mass of water is related to the number of water molecules ( $n_w$ ) by the following expression:

$$M_w = n_w M_w / N_A,$$

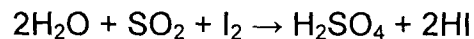
- where  $M_w$  is the molecular weight of water (18.0 g per mole) and  $N_A$  is Avogadro's number ( $6.02 \times 10^{23}$  molecules per mole). In principle, the moisture  
15 content of a honey product can therefore be determined accurately by measuring the number or mass of water molecules present in a known mass of sample. When determining the moisture content of a food it is important to prevent any loss or gain of water. For this reason, exposure of a sample to the atmosphere, and excessive temperature fluctuations, should be minimized.

- 20 In one embodiment, a spectroscopic method can be used to determine the moisture content of the honey product. Spectroscopic methods utilize the interaction of electromagnetic radiation with materials to obtain information about their composition, e.g., X-rays, UV-visible, NMR, microwaves and IR. The spectroscopic methods developed to measure the moisture content of foods are  
25 based on the fact that water absorbs electromagnetic radiation at characteristic wavelengths that are different from the other components in the food matrix. Microwave and infrared radiation are absorbed by materials due to their ability to promote the vibration and/or rotation of molecules. The analysis is carried out at a wavelength where the water molecules absorb radiation, but none of the

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other components in the food matrix do. A measurement of the absorption of radiation at this wavelength can then be used to determine the moisture content: the higher the moisture content, the greater the absorption. Instruments based on this principle are commercially available and can be used to  
5 determine the moisture content in a few minutes or less.

In another embodiment, a chemical reaction, such as a colometric reaction, can be used for the determination of moisture in the honey product. The Karl Fischer titration is often used for determining the moisture content of foods that have low water contents (e.g. dried fruits and vegetables, confectionery, coffee,  
10 oils and fats). It is based on the following reaction:



This reaction was originally used because HI is colorless, whereas I<sub>2</sub> is a dark reddish brown color, hence there is a measurable change in color when water reacts with the added chemical reagents. Sulfur dioxide and iodine are  
15 gaseous and would normally be lost from solution. For this reason, the above reaction has been modified by adding solvents (e.g., C<sub>5</sub>H<sub>5</sub>N) that keep the S<sub>2</sub>O and I<sub>2</sub> in solution, although the basic principles of the method are the same. The food to be analyzed is usually placed in a beaker containing solvent and is then titrated with Karl Fischer reagent (a solution that contains iodine). While any  
20 water remains in the sample the iodine reacts with it and the solution remains colorless (HI), but once all the water has been used up any additional iodine is observed as a dark red brown color (I<sub>2</sub>). The volume of iodine solution required to titrate the water is measured and can be related to the moisture content using a pre-prepared calibration curve. The precision of the technique can be  
25 improved by using electrical methods to follow the end-point of the reaction, rather than observing a color change.

One particular advantage of the product described herein is that, during its production, no additives are being added to facilitate water removal or to limit the adhesion of the product to its packaging membrane. However, in an  
30 embodiment, it is contemplated that a flavor is added to the honey product



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described after it has been evaporated. The added flavor may be, for example, a sweet or a savory flavor. Sweet flavors include, but are not limited to fruits (peach, pear, apple), citrus (orange, lemon, lime), berry (raspberry, strawberry, blueberry), spice (vanilla, cinnamon, clove, lavender), caramel, butterscotch, maple. Savory flavors include, but are not limited to, ginger, pepper (black, white, pink, green, hot), etc. Other flavors, such as coffee, tea, herbal tea and/or alcohol, can also be added. In an embodiment, the flavor can be derived from an oil. If a flavor is added to the honey product, care must be taken that the added flavor does not substantially augments the moisture content of the final honey product higher than about 1% w/w.

Another advantage of the honey product described herein is that the majority of the sugars present are in an uncrystallized form. As used herein the term "uncrystallized" refer to the absence of sugar crystals that can be felt in the mouth and/or visible to the naked eye. The honey product has a smooth texture and does not contain granulated honey crystals which can be seen by the naked eye or felt in the mouth.

During storage, liquid honey has a tendency to take on a semi-solid state known as "crystallized" or "granulated honey". This natural phenomenon happens when the glucose present in honey spontaneously precipitates out of the supersaturated honey solution. By becoming a glucose monohydrate, glucose loses water and takes the form of a crystal. As used herein, a "crystal" or a "honey crystal" is referred to as a solid body with a precise and orderly structure that can be felt in the mouth or be visible to the human eye. Once formed, the honey crystals organize into a lattice which immobilizes other components of honey in a suspension thus creating the semi-solid state. The water that was previously associated with the glucose becomes available for other purposes, thus increasing the moisture content in some parts of the container of honey. Because of the increased moisture, the liquid honey becomes more susceptible to microbial growth (such as yeast growth).

In still a further embodiment, the honey product is a solid honey product. It is contemplated that the honey product will be solid at ambient temperature and at

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normal atmospheric pressure. As used herein "solid honey product" refers to a substance derived from honey that is not liquid and that can be used as a source of nourishment. The honey product can be easily handled because it is not tacky or soft.

- 5 In yet another embodiment, the honey product is a pure and/or dried honey product. As used herein, the term "pure" honey product refers to a product that is free or substantially free from exogenous additives with respect to the original liquid honey. On the other hand, a "dried" honey product refers to the fact that the moisture content is limited to no more than 1% w/w.
- 10 Because of the hygroscopic nature of honey, the honey product will tend to reabsorb water if it is not placed in a water impermeable package. For example, if the product is left at ambient temperature, within a couple of days, it will tend to become tacky and, within a couple of weeks, it will tend to become sticky or soft. As such, in order to prolong the shelf life of the product, it has to be
- 15 packaged in a water-impermeable membrane. As used herein, a "water-impermeable package" or "water-impermeable membrane" refers to a material that limits the transmission of water vapor. In an embodiment, the water vapor transmission rate (WVTR) of the "water-impermeable" package or membrane is below 0.1 gm/100 in<sup>2</sup> or below about 0.01 gm/100 in<sup>2</sup>. Because the honey
- 20 product is mainly used as a food or as a food additive, the package must be of food or pharmaceutical grade. Further, since the package can optionally be submitted to heat to seal it around the honey product, the package or membrane must also be resistant to heat.

- When the honey product is wrapped in a water-impermeable package, its
- 25 storage time is of about a year or even more (depending on the WVTR of the package). During storage, the product does not substantially reabsorb water and as such its water content is substantially constant. As used herein, a honey product that does not "substantially" reabsorb water is a honey product that possesses a water content of less than about 1% w/w during its storage. As
- 30 indicated above, when the water content of the honey product exceeds 1% w/w, the honey product becomes tacky.

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Additional uses of the honey product are also contemplated. Once produced, the honey product can be further processed for use in other food applications such as confectionary, dessert topping, sweet ingredient. The solid honey product can be further powdered, crushed, ground and/or granulated for these  
5 additional applications.

Particles can thus be made from the solid honey product and used in various food applications. For example, when a coarser particle is required, the solid honey can be processed into a "granular" form particles having a size distribution that ranges between about 0.25 and 2 mm. On the other hand,  
10 when a finer particle is needed, the solid honey product can be processed into a "powder" form particles having a size distribution that ranges between 62.5 to 125  $\mu\text{m}$ . The size distribution of the particles can be assessed by the techniques known in the art, such as the Gates-Gaudin-Schuhmann method, the Rosin-Rammler method, the modified Gaudin-Meloy method, the Log-normal method and/or the modified beta method.  
15

When particles of the solid honey product are produced, it may be desirable to add a further agent to the particles to prevent or delay water absorption. Such further agent can be an emulsifier, an anti-sticking agent and/or a stabilizer, including, but not limited to bee wax, carnauba wax, maltodextrin, dextrose or  
20 other food processing aids.

Similar to what has been indicated above, the particles of the solid honey can also be packaged in a water-impermeable membrane to slow down, delay or prevent water reabsorption.

The honey product as described herein can be advantageously used to  
25 sweeten a beverage. When the honey product is placed in an aqueous-based beverage, it reabsorbs water and dissolves to sweeten the beverage. The application of the honey product is not limited to a specific type of beverage or to beverages having a specific temperature. However, the sweetening process will be accelerated in hot beverages. Hence, in an embodiment, the honey

product is advantageously used in hot beverages such as coffee, tea and herbal tea.

5 Since honey has been recognized as an antimicrobial product, the honey product described herein can be used in the manufacture of upper respiratory care and treatment products such as throat lozenges. The upper respiratory care and treatment product can either consist of the honey product described herein or can be combined with other additives used in the art for their manufacture.

10 Because of the excellent palatable properties of honey, the honey product described herein can be further processed into a confectionery. In order to introduce the honey product into a confectionery, and as indicated above, it can be physically processed (crushed, powdered, coated in a solution) and/or flavors can be added. Alternatively or concomitantly, the manufacturing process of the product can also be altered to introduce additional components of the  
15 confectionery.

As indicated above, the honey product is not limited to a specific manufacturing technique. In one advantageous embodiment and as shown below, the liquid honey is submitted to vacuum drying to lower its water content and generate the honey product. The time, temperature and pressure variables used should be  
20 designed to generate a honey product having similar characteristics (smell and taste) as the original liquid honey. However, upon water evaporation, it is assumed that the honey will have a decrease in flavor intensity and stickiness and that the sweetness level of product could be perceived as different than in the liquid honey.

25 In an embodiment, the liquid honey is first heated from ambient temperature to at least 98°C under a pressure of at least 27 inHg. As it is known in the art, the time to reach the desired temperature will depend on the amount of liquid honey that is being processed as well as the content of original the liquid honey (such as its moisture content). Once the temperature of the liquid honey reaches at  
30 least 98°C, the temperature is not further raised but the vacuum (e.g. pressure

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of at least 27 inHg) is maintained until the desired moisture is reached (less than about 1% w/w). As it is known in the art, the time required to reach the desired moisture content also depends on the amount of honey that is being processed and the content of the original liquid honey (such as its moisture  
5 content). Optionally, the honey product can be dispensed and packaged.

The present invention will be more readily understood by referring to the following examples which are given to illustrate the invention rather than to limit its scope.

#### EXAMPLE I – PRODUCTION OF HONEY PRODUCT

10

The following ingredients were used in the production of the honey product:

- Liquid honey containing a blend of white clover, red clover and/or dandelion that is extracted, liquefied, filtered and short time pasteurized; and
- 15 • Optionally, lemon oil.

The following material was also used in the production of the honey product:

- Water-impermeable food-grade packaging;
- Food grade PVC packaging trays; and
- High barrier to moisture food grade sealing film.

20 The following equipment was used in the production of the honey product:

- Weighing scale;
- Electronic universal mixer;
- Thermocouple Thermometer;
- Infra-red (IR) moisture meter; and
- 25 • Heat sealer.

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Lab and pilot plant trials were carried out to determine the evaporation, dispensing and packaging processes of the honey product. In addition, the lemon flavored honey product was developed following the sourcing of an appropriate lemon flavoring.

- 5 Untreated honey was first submitted to a gross evaporation step where liquid honey was gradually heated from ambient temperature to at least 98°C and at least at 27 inHg vacuum. Once at 98°C, the temperature of the honey was held, and the pressure was applied (at least at 27 inHg vacuum) until the desired moisture content of the product was reached (less than about 1% w/w as
- 10 measured by the IR moisture meter). Through this process, an evaporation could take place while maintaining the light brown appearance and flavor of natural untreated honey. The evaporated honey was then individually dispensed. The product was cooled and solidified at ambient temperature. The honey product was packaged and heat sealed. The honey product was further
- 15 packaged into cardboard boxes and stored prior to its characterization. Optionally, a lemon flavoring was added to the evaporated honey prior to the dispensing of the honey product. The honey product possessed a shelf life of one year.

#### EXAMPLE II – HONEY PRODUCT CHARACTERIZATION

- 20 Prior to dispensing the evaporated honey product in the molding trays, a 5 g. aliquot was removed to determine the moisture content using an IR moisture meter (as described in Example I) in order to rapidly assess the moisture content. The moisture content of the honey product was evaluated between 0.0 to 1.1% (w/w).
- 25 A single batch of the honey product was further characterized. Table 1 shows the various analyses performed and the method used.

Table 1. Analyses performed on the honey product.

| Analysis   | Method Reference     |
|--|----------------------|
| Total Metals Analysis in Food by inductively coupled plasma atomic emission spectrometry (ICP-AES) | EPA 6010             |
| Ash  | AOAC 923.03          |
| Beta-Carotene  | AOAC 922.04, 922.06  |
| Calories   | Calculation          |
| Carbohydrates  | Calculation          |
| Cholesterol  | AOAC 976.26/994.1    |
| Fatty Acid Profile by GC/FID   | AOAC 996.06          |
| KJ   | Calculation          |
| Moisture (Karl Fischer)  | AOAC 926.08 925.10   |
| Protein  | AOAC 992.15          |
| Retinol  | AOAC 992.04 992.06   |
| Sugar Profile  | AOAC 980.13          |
| Total Dietary Fibre  | AOAC 991.43          |
| Vitamin A IU/100g  | AOAC 992.04, 992.06  |
| Vitamin A RE/100g  | AOAC 992.04, 992.06  |
| Vitamin C (Ascorbic Acid)  | CFIA/QFCL-001-01 mod |

The results of these analyses are shown in Table 2.

Table 2. Results obtained from the analyses listed in Table 1.

| Analysis                            | Units    | Results |
|-------------------------------------|----------|---------|
| Energy                              | Cal/100g | 386     |
|                                     | kJ/100g  | 1615    |
| Protein                             | g/100g   | 0,21    |
| Fat: GC                             | g/100g   | 0,073   |
| Polyunsaturates                     | g/100g   | 0,004   |
| Monounsaturates                     | g/100g   | 0,023   |
| Saturates                           | g/100g   | 0,041   |
| Trans                               | g/100g   | 0,001   |
| Omega-3 Polyunsaturated Fatty Acids | g/100g   | 0,001   |
| Omega-6 Polyunsaturated Fatty Acids | g/100g   | 0,003   |
| Cholesterol                         | mg/100g  | <1.0    |
| Carbohydrates                       | g/100g   | 96,1    |
| Total Sugars                        | g/100g   | 80,9    |
| Fructose                            | g/100g   | 44,8    |
| Glucose                             | g/100g   | 35,4    |
| Sucrose                             | g/100g   | ND      |
| Maltose                             | g/100g   | 0,7     |
| Lactose                             | g/100g   | ND      |
| Total Dietary Fibre                 | g/100g   | <0.1    |

| <b>Analysis</b>        | <b>Units</b> | <b>Results</b> |
|------------------------|--------------|----------------|
| Sodium                 | mg/100g      | ND             |
| Potassium              | mg/100g      | 80             |
| Vitamin A              | IU/100g      | ND             |
|                        | RE/100g      | ND             |
| Retinol                | ug/100g      | ND             |
| Beta Carotene          | ug/100g      | <10            |
| Vitamin C              | mg/100g      | 1,1            |
| Calcium                | mg/100g      | 11             |
| Iron                   | mg/100g      | ND             |
| Moisture: Karl Fischer | g/100g       | 0,349          |
| Ash                    | g/100g       | 0,1            |

Per serving of 20 g., the honey product contains 80 calories, 15 mg. of potassium and 19 g. of carbohydrate (16 g. of sugar).

5 While the invention has been described in connection with specific embodiments thereof, it will be understood that it is capable of further modifications and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within  
 10 as may be applied to the essential features hereinbefore set forth, and as follows in the scope of the appended claims.



**WHAT IS CLAIMED IS:**

1. A honey product consisting essentially of honey and having a moisture content lower than about 1% (w/w).
2. The honey product of claim 1, wherein the moisture content is lower than about 0,3 %.
3. The honey product of claim 1, wherein the moisture content is lower than about 0.1%.
4. The honey product of claim 1, wherein the moisture content is equal to about 0.01%.
5. The honey product of claim 1 further containing of a flavor.
6. The honey product of claim 5, wherein the flavor is a lemon flavor.
7. The honey product of claim 6, wherein the lemon flavor is from a lemon oil.
8. The honey product of any one of claims 1 to 7, wherein the sugars of the honey product are in an uncrystallized form.
9. The honey product of any one of claims 1 to 8, said honey product being solid.
10. The honey product of any one of claims 1 to 9 being packaged in a water-impermeable membrane.
11. The honey product of claim 10 having a storage time of at least a year without substantially reabsorbing water.

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12. A upper respiratory care and product comprising the honey product of any one of claims 1 to 11.
13. The upper respiratory care and product of claim 12 being a throat lozenge.
14. A confectionery comprising the honey product of any one of claims 1 to 11.
15. The confectionery of claim 14, wherein the honey product has further been processed prior to the incorporation into the confectionery.
16. A honey product that is obtained by submitting a liquid honey to vacuum drying at a temperature of at least 98°C and under a pressure of at least 27 inHg, wherein the honey product consists essentially of honey and has a moisture content lower than about 1% (w/w).
17. The honey product of claim 16, wherein the liquid honey is submitted to a first step wherein the temperature of the liquid honey is raised from ambient temperature to 98°C and the pressure of at least 27 inHg is maintained.
18. The honey product of claim 16, wherein the liquid honey is submitted to a second step wherein the temperature of the liquid honey is maintained at 98°C while the pressure of at least 27 inHg is maintained until the moisture content the honey product reaches less than about 1% w/w.
19. The honey product of any one of claims 16 to 18, wherein the moisture content is lower than about 0,3 %.
20. The honey product of any one of claims 16 to 18, wherein the moisture content is lower then about 0.1%.

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21. The honey product of any one of claims 16 to 18, wherein the moisture content is equal to about 0.01%.
22. The honey product of any one of claims 16 to 20 further containing of a flavor.
23. The honey product of claim 22, wherein the flavor is a lemon flavor.
24. The honey product of claim 23, wherein the lemon flavor is from a lemon oil.
25. The honey product of any one of claims 16 to 24, wherein the sugars of the honey product are in an uncrystallized form.
26. The honey product of any one of claims 16 to 25, said honey product being solid.
27. The honey product of any one of claims 16 to 26 being packaged in a water-impermeable membrane.
28. The honey product of claim 27 having a storage time of at least a year without substantially reabsorbing water.

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/CA2010/000058

| <p>A. CLASSIFICATION OF SUBJECT MATTER<br/>         IPC: <b>A23L 1/08</b> (2006.01) , <b>A23G 3/42</b> (2006.01) , <b>A61K 36/18</b> (2006.01) , <b>A61K 9/20</b> (2006.01) ,<br/> <b>A61P 11/04</b> (2006.01)<br/>         According to International Patent Classification (IPC) or to both national classification and IPC</p> |  |  |
|---|--|--|
| <p>B. FIELDS SEARCHED</p>   |  |  |
| <p>Minimum documentation searched (classification system followed by classification symbols)<br/> <b>A23L 1/08</b> (2006.01) , <b>A23G 3/42</b> (2006.01) , <b>A61K 36/18</b> (2006.01) , <b>A61K 9/20</b> (2006.01) ,<br/> <b>A61P 11/04</b> (2006.01)</p>   |  |  |
| <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p>  |  |  |
| <p>Electronic database(s) consulted during the international search (name of database(s) and, where practicable, search terms used)<br/>         Canadian Patent Database, Delphion, EPOQUE + keywords: honey and vacuum</p>  |  |  |
| <p>C. DOCUMENTS CONSIDERED TO BE RELEVANT</p>   |  |  |
| Category*   | Citation of document, with indication, where appropriate, of the relevant passages   | Relevant to claim No.  |
| X<br>Y  | <b>US 2,021,450</b> (Hampton)<br>19 November 1935 (19-11-1935)<br>[col. 1, line 55 - col. 2, line 54 and col. 3, line 1 - col. 3, line 40]<br>[whole document]           | 1-4, 8-21 and 25-28<br>5-7 and 22-24   |
| X<br>Y  | <b>US 5,356,650</b> (Kanayama)<br>18 October 1994 (18-10-1994)<br>[abstract, col. 1, line 8 - col. 1, line 24 and col. 2, line 14 - col. 2, line 26]<br>[whole document] | 1-4, 8-11, 16-21 and 25-28<br>5-7, 12-15 and 22-24   |
| X<br>Y  | <b>CA 994,598</b> (Kanayama)<br>10 August 1976 (10-08-1976)<br>[whole document]  | 1-4, 8-11, 16-21 and 25-28<br>5-7, 12-15 and 22-24   |
| <p><input checked="" type="checkbox"/> Further documents are listed in the continuation of Box      <input checked="" type="checkbox"/> See patent family annex.</p>  |  |  |
| * Special categories of cited documents :   | "T"  | 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  |
| "A" document defining the general state of the art which is not considered to be of particular relevance  | "X"  | 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   |
| "E" earlier application or patent but published on or after the international filing date   | "Y"  | 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 |
| "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)   | "&"  | document member of the same patent family  |
| "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  |  |  |
| Date of the actual completion of the international search   | Date of mailing of the international search report   |  |
| 11 March 2010 (11-03-2010)  | 6 April 2010 (06-04-2010)  |  |
| Name and mailing address of the ISA/CA<br>Canadian Intellectual Property Office<br>Place du Portage I, C114 - 1st Floor, Box PCT<br>50 Victoria Street<br>Gatineau, Quebec K1A 0C9<br>Facsimile No.: 001-819-953-2476   | Authorized officer<br><br><b>Malcolm Downey (819) 934-2329</b>   |  |

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/CA2010/000058

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages    | Relevant to claim No.                              |
|-----------|---|--|
| X<br>Y    | <b>CN 1973667</b> (Tang)<br>6 June 2007 (06-06-2007)<br>[abstract]                    | 1-4, 8-11, 16-21 and 25-28<br>5-7, 12-15 and 22-24 |
| Y         | <b>JP 56-061965</b> (Shikiyama Youhouen:KK)<br>27 May 1981(27-05-1981)<br>[abstract]  | 5-7 and 22-24                                      |
| Y         | <b>JP 62-186750</b> (Idota)<br>15 August 1987 (15-08-1987)<br>[abstract]              | 14 and 15  |
| Y         | <b>EP 0 431 376</b> (Cola et al.)<br>27 October 1993 (27-10-1993)<br>[whole document] | 12 and 13  |

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Information on patent family members

International application No.  
**PCT/CA2010/000058**

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| JP56061965                             | 27-05-1981       | None   | None   |
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