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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
12 April 2007 (12.04.2007)

PCT

(10) International Publication Number
WO 2007/039452 A1

(51) International Patent Classification:
A23L 1/30 (2006.01) *A23L 1/275* (2006.01)
A23L 1/221 (2006.01)

(21) International Application Number:
PCT/EP2006/066511

(22) International Filing Date:
19 September 2006 (19.09.2006)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
05020453.6 20 September 2005 (20.09.2005) EP

(71) Applicant *(for all designated States except US)*: **NESTEC S.A.** [CH/CH]; Avenue Nestlé 55, CH-1800 Vevey (CH).

(72) Inventors; and
(75) Inventors/Applicants *(for US only)*: **WANG, Junkuan** [CH/CH]; Chemin des Abbesses 2B, CH-1027 Lonay (CH). **BERTHOLET, Raymond** [CH/CH]; Ch. Vers-chez-Cochard 11, CH-1807 Blonay (CH). **DUCRET, Pierre** [CH/CH]; Chemin de Cornu, CH-1113 St-Saphorin-sur-Morges (CH).

(74) Agent: **CHAUTARD, Cécile**; Avenue Nestlé 55, CH-1800 Vevey (CH).

(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*
— *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*
— *of inventorship (Rule 4.17(iv))*

Published:
— *with international search report*
— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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.

(54) **Title:** WATER DISPERSIBLE COMPOSITION AND METHOD FOR PREPARING SAME

(57) **Abstract:** The invention pertains a water dispersible, preferably a powder composition consisting of water extractible bioactive components of exclusively fruit or vegetable or plant origin obtainable by a process which comprises: a) subjecting a selected fruit or vegetable or plant material to homogenisation in weak alkaline conditions and at moderate temperature; b) separating the liquid extract from the homogenised mass and subsequently bringing it to neutrality; and c) eventually concentrating or drying, preferably freeze drying the neutralized liquid extract. The composition can be used as primary composition in the preparation of e.g. a food product for oral administration, a food supplement, a pet food product, a pet food supplement, a cosmetic preparation or a pharmaceutical preparation.

WO 2007/039452 A1

Water dispersible composition and method for preparing same

Field of the invention

The invention relates to a water dispersible composition, preferably a powder composition consisting of water extractible bioactive components of exclusively fruit or vegetable or plant origin, its method of preparation as well as its use as primary composition in the preparation of various food products, food supplements, pet food products, pet food supplements or cosmetic or pharmaceutical preparations.

Background of the invention

Pigments and bioactive compounds extracted from fruits or plant materials are widely used in the food industry as functional ingredients. Among all of them, wolfberry (*Lycium barbarum*) is one of the most valued functional ingredients in China, especially for its benefits for eyesight, the immune system, and its anti-ageing properties, associated with the multiple bioactive compounds present in the fruit. It is traditionally consumed through hot water extraction.

Many other bioactive ingredients are also well perceived by consumers for their beneficial properties, but their application in e.g. food products is either difficult or provides poor bioavailability. In addition to that, current extraction techniques afford the desired ingredients in very low yield and lead frequently to some deterioration of the genuine properties of the extracted ingredients. As a matter of fact, fruits are usually rich in reducing sugars, making the drying and handling of their powder very difficult.

A large number of extraction techniques are already known. For example, in WO03020053, a process for extracting carotenoïds from carotenoïd-containing plant matter is described. It comprises (i) mixing the plant matter with water to achieve Brix not greater than 10 DEG; (ii) crushing the mixture from step (i) and separating the solids from the liquid to obtain two phases, i.e. pulp and serum; (iii) extracting the pulp to obtain carotenoïd-containing plant oleoresin. Such a water extraction technique is natural and preserves to some extent the properties of the carotenoïd extract, but is not as efficient as compared to the use of a solvent.

US 6,648,564 describes a process for forming, isolating and purifying xanthophyll crystals by saponification of a xanthophyll diester-containing plant extract in a composition of propylene glycol and aqueous alkali to form xanthophyll crystals. The substantially pure xanthophyll crystals so obtained are suitable for human consumption and can be used as a nutritional supplement and as an additive in food. However, solvent extraction techniques are more difficult to handle, and using solvent definitely impairs the genuine natural character, its perception from the consumer and/or some of the nutritional functions of the product.

WO 2005/020948 discloses a method for extracting carotenoïds from fruits or vegetables relatively rich in carotenoïds like e.g. lycopene or carotenes by subjecting the fruit or vegetable material to boiling with water at neutral pH, separating the liquid phase and eventually drying it to afford a fairly lycopene rich material. Said material is unfortunately hard to get in its dry form and consequently of limited use.

Conventional extraction techniques usually extract a few compounds of the plant or fruit material, leaving some other bioactive compounds in the rest. For example, polysaccharides, polyphenols and other non lipophilic compounds are not extracted together with the lipophilic components such as carotenoïds, lipophilic vitamins and other lipids.

It is thus an object of the present invention to address the above problems by providing a method for extracting and collecting bioactive ingredient from a fruit or a plant material with improved stability, miscibility, dispersibility in aqueous systems and, also, with enhanced bioavailability as compared to similar extracts from the prior art . Further objects of the invention shall become apparent from the details of the description here below.

Summary of the invention

As a first object the invention provides a process for preparing a primary water dispersible composition consisting of water extractible lipophilic and non lipophilic bioactive components of exclusively fruit or vegetable or plant origin, which comprises:

a) subjecting a selected fruit or vegetable or plant material to homogenisation at a pH of about 8 to 11 and at a temperature comprised between about 20 – 25 and 50° C,

b) separating the liquid extract from the homogenised mass and subsequently bringing it to neutrality, and

c) eventually concentrating or drying the neutralized liquid extract.

Another object of the invention is a primary composition consisting of water extractible lipophilic and non lipophilic bioactive components of exclusively fruit or vegetable or plant origin as well, wherein the profile of said bioactive components is similar if not identical to that of the corresponding whole fruit or vegetable, and its use in the preparation of a food product for oral administration, a food supplement, a pet food product, a pet food supplement or a cosmetic or a pharmaceutical preparation.

Still another object of the invention is the use of the said primary composition for preparing an oral, cosmetic or pharmaceutical composition intended for improving skin health, in particular for photo protection of the skin or for protecting skin tissue against ageing or for preparing an oral, topical or pharmaceutical composition intended for eye health or an oral, cosmetic or pharmaceutical composition intended for stimulating the immune system or for preparing an oral, cosmetic or pharmaceutical composition for preventing or treating cardiovascular diseases or disorders or cancers or diabetes.

Detailed description of the invention

Within the following description, the term bioactive compound is understood to mean molecules or components showing biological activity or health impact when orally ingested or applied in cosmetics.

According to the invention the whole fruit or vegetable or plant material is subjected to homogenization in relatively weak alkaline conditions, i.e. at a pH of about 8 and higher, generally comprised between about 8 and 11. Said homogenization is carried out at a moderate temperature, most frequently at a temperature comprised between room temperature (usually 20 to 25°C) and max. 50°C so that to preserve as much as possible the integrity of all the bioactive ingredients which are present in the whole fruit or vegetable mass. More elevated temperatures, e.g. 60 0r 70°C or even higher can also be taken into consideration.

Depending on the fruits or vegetable or plant material subjected to treatment the latter material can be first washed with water; said washing is preferably carried out at room temperature (usually 20 to 25°C) or slightly above. Doing so enables discarding highly soluble fruits or vegetable components like e.g. reducing sugars or highly hydrophilic components which provide undesired hygroscopy to the final extracts. Furthermore,

discarding said highly soluble components consequently increases the concentration of bioactive lipophilic material.

Homogenization is performed according to techniques usual in the art, e.g. by means of high speed mixers or rotating mills to achieve the necessary crushing of all the fibrous and cellular material.

Insoluble, solid particles of the homogenized fruit or vegetable or plant mass are then separated from the liquid phase by means of any suitable technique, most conveniently by means of centrifugation. The resulting liquid phase, indeed a fairly clear suspension of coloured material in most instances, is subsequently brought to neutrality (pH 7), preferably by the addition the requested amount of a food grade acid.

Concentration of the neutralized liquid material is performed using any technique which will preserve the integrity of the extracted material, i.e. which will not or almost not impair the genuine properties of all the bioactive components initially present in the whole fruit or vegetable or plant material.

It is a preferred embodiment of the invention to dry the said liquid extract. For doing so, although spray drying may be considered in some instances, freeze drying is the preferred drying method. The powder composition so achieved is stable and easy to handle.

It has been observed that such extracts of exclusively fruit or vegetable or plant origin present an improved or increased bioactivity as compared to similar extracts prepared according to the prior art, definitely much closer to the activity which characterises said ingredients in their natural environment. Such extracts, i.e. preferably powder compositions of the invention comprise what is defined as “water extractible components” within the frame of the invention, i.e. mainly water soluble components such as polysaccharides, proteins or peptides, antioxidants like polyphenols and vitamins, minerals and also lipophilic components like e.g. carotenoïds either entrapped in polysaccharides (e.g. starch derivatives, dextrin …) or as protein complexes or associations.

The fruit or vegetable or plant material used within the frame of the invention can be in the form of vegetables, leaves, flowers, fruits, seeds and other parts of the plant, or a mixture thereof.

In a preferred embodiment, berries or any other flavonoïd-, polyphenols- or carotenoïd-rich fruit or vegetable or seeds are selected. For example, berries such as wolfberry, blueberry, cranberry, mulberry, blackberry, gooseberry, white currant, blackcurrant, red currant, raspberry, sea buckthorn, strawberry, arbutus berry or grapes and other fruits such as apples, melons, kiwi, cherries, red date, prunes, peaches, persimmons, citrus fruits such as mandarin, orange, tangerine, grapefruit, for example, may be used. Flowers such as chamomile, chrysanthemum, bitter orange, honeysuckle, jasmine and safflower may be used. Vegetables such as tomato, spinach, celery, carrots, pea, kale, parsley, watercress, cabbage, broccoli, lettuce, Brussels sprouts, collard greens, turnip greens, fennel or onions can also be used as well as seeds such as corn, black rice, cocoa, coffee and ingredients such as tea, thyme, sweet red pepper.

Fruits, vegetables or plant materials may be used in the form of fresh, concentrated or dried material, for example, air or freeze dried material.

The essential bioactive components of fruit, vegetable or plant material may comprise lipids, alkaloids, proteins, carbohydrates, carotenoïds, polyphenolic compounds such as flavonoïds, and vitamins or minerals, for example. In particular, the bioactive compounds may be flavonoïds such as flavones (e.g. apigenin, luteolin or diosmetin), flavonols (e.g. quercetin, myricetin, kaempferol), flavanones (e.g. naringenin, hesperidin), catechins (e.g. epicatechin, gallocatechin), anthocyanidins (e.g. pelargonidin, malvidin, cyanidin) or isoflavones (e.g. genistein, daidzein); carotenoïds such as carotenes and xanthophylls (e.g. lycopene, carotene, phytofluene, phytoene, canthaxanthin, astaxanthin, beta-cryptoxanthin, capsanthin, lutein, zeaxanthin, or those in the form of fatty acid esters; carbohydrates such as arabinogalactan proteins (e.g. lycium barbarum polysaccharide); vitamins (e.g. vitamin C, B, E...); minerals (e.g. selenium, calcium, magnesium, potassium).

As referred to here above, the present invention provides a composition, preferably a powder composition having a similar profile of its essential nutrients similar if not identical to that the whole fruit or vegetable; furthermore it exhibits a good stability, miscibility with

water and bioavailability. The powder compositions of the invention are indeed highly dispersible in an aqueous system, either in cold or hot water.

According to another embodiment of the invention such a composition is used as primary composition in the preparation of a food product for oral administration, a food supplement, a pet food product, a pet food supplement, a cosmetic or a pharmaceutical preparation.

Within that context, the said primary composition further comprises one or more of emulsifiers, stabilizers, antioxidants and other additives. Use is made of emulsifiers compatible in food, such as phospholipids, for example lecithin, polyoxyethylene sorbitan mono- or tristearate, monolaurate, monopalmitate, mono- or trioleate, a mono- or diglyceride. Use may also be made of any type of stabilizer that is known in food, in cosmetics or in pharmaceuticals. Use is made of any type of antioxidants that is known in food, in cosmetics or in pharmaceuticals. Use is made, as additives, of flavorings, colorants and any other additive known in food, in cosmetics or in pharmaceuticals. These emulsifiers, stabilizers, antioxidants and additives are added according to the final use of the primary composition.

The said primary composition may also contain synthetic or natural bioactive ingredients such as amino acids, fatty acids, vitamins, minerals, carotenoïds, polyphenols, etc. that can be added either by dry or by wet mixing to said composition before pasteurization and/or drying.

According to a further aspect, the present invention relates to an oral composition comprising the primary composition described above in a foodstuff, in a food supplement, in a pet food product, in a cosmetic preparation or in a pharmaceutical preparation.

In a preferred embodiment, a food composition for human consumption is supplemented by the above primary composition. This composition may be a nutritional complete formula, a dairy product, a chilled or shelf stable beverage, a mineral or purified water, a liquid drink, a soup, a dietary supplement, a meal replacement, a nutritional bar, a confectionery, a milk or a fermented milk product, a yoghurt, a milk based powder, an enteral nutrition product, an infant formula, an infant nutritional product, a cereal product or a

fermented cereal based product, an ice-cream, a chocolate, coffee, a culinary product such as mayonnaise, tomato puree or salad dressings or a pet food.

In this case, the primary composition can be dispersed in the above-mentioned foods or drinks so as to have a daily intake in bioactive nutrients as described above, which depends mainly on the fruit, vegetable or plant material utilized or on the desired effect and target tissue. The amount of the primary composition or food composition to be consumed by the individual to obtain a beneficial effect will also depend upon its size, its type, and its age.

The nutritional supplement for oral administration may be in capsules, gelatine capsules, soft capsules, tablets, sugar-coated tablets, pills, pastes or pastilles, gums, or drinkable solutions or emulsions, syrup or a gel, with a dose of about 0.1 to 100% of the primary composition, which can then be taken directly with water or by any other known means. This supplement may also include a sweetener, a stabilizer, an antioxidant, an additive, a flavoring or a colorant. A supplement for cosmetic purpose can additionally comprise a compound active with respect to the skin. Methods for preparing them are common knowledge.

In another embodiment, a pharmaceutical composition can be administered for prophylactic and/or therapeutic treatments. In therapeutic applications, compositions are administered to a patient already suffering from a disease, as described herein under, in an amount sufficient to cure or at least partially arrest the symptoms of the disease and its complications. An amount adequate to accomplish this is defined as "a therapeutically effective dose". Amounts effective for this will depend on the severity of the disease and the weight and general state of the patient. In prophylactic applications, compositions according to the invention are administered to a patient susceptible to or otherwise at risk of a particular disease. Such an amount is defined to be "a prophylactic effective dose". In this use, the precise amounts again depend on the patient's state of health and weight.

The primary composition of the invention is preferably administered with a pharmaceutically acceptable carrier, the nature of the carrier differing with the mode of administration, for example, enteral, oral and topical (including ophthalmic) routes. The desired formulation can be made using a variety of excipients including, for example, pharmaceutical grades of mannitol, lactose, starch, magnesium stearate, sodium saccharin,

cellulose, magnesium carbonate. This composition may be a tablet, a capsule, a pill, a solution, a suspension, syrup, a dried oral supplement, a wet oral supplement.

It will be appreciated that the skilled person will, based on his own knowledge select the appropriate components and galenic form to target the active compound to the tissue of interest, e.g. the skin, colon, stomach, eyes, kidney or liver, taking into account the route of administration.

The invention also relates to a cosmetic composition comprising the primary composition described above. It may be formulated in lotions, shampoos, creams, sun-screens, after-sun creams, anti-ageing creams and/or ointments, for example. This composition which can be used topically additionally comprises a fat or oil which can be used in cosmetics, for example those mentioned in the CTFA work, Cosmetic Ingredients Handbook, Washington. It is also possible to add other cosmetically active ingredients. The composition additionally comprises a structuring agent and an emulsifier. Other excipients, colorants, fragrances or opacifiers can also be added to the composition. It will be appreciated that the present cosmetic products will contain a mixture of different ingredients known to the skilled person, ensuring a fast penetration of the said substance into the skin and preventing degradation thereof during storage.

It will be understood that the concept of the present invention may likewise be applied as an adjuvant therapy assisting in presently used medications. Since the compounds of the present invention may easily be administered together with food material special clinical food may be applied containing a high amount of the said substances. It will be clear that on reading the present specification together with the appending claims the skilled person will envisage a variety of different alternatives to the specific embodiments mentioned herein.

Administering to a pet or human, a food, nutritional supplement, a cosmetic or pharmaceutical composition as described above, results in an improved skin health, in particular for photo protection of the skin or for protecting skin tissue against ageing, e.g. for inhibiting damage to the skin and/or mucous membranes by inhibiting collagenases and enhancing the synthesis of collagen. In fact, the use of the primary composition as described above makes it possible to enhance the bioavailability of the said bioactive compounds in the body and to slow down the ageing of the skin, for example. It may also be useful in the

prevention or treatment of sensible, dry or reactive skins, or for improving skin density or firmness.

The composition described here above may also be used for the preparation of an oral, topical or pharmaceutical composition for eyesight, in particular for reducing risk of cataract and age-related macular degeneration. It can be used also for preventing or treating cardiovascular diseases or disorders or cancers and for stimulating or improving the native immune system and reducing blood glucose, for example.

The following examples illustrate the invention in more detail without restricting the same thereto. All percentages are given by weight otherwise indicated.

Example 1: Water-dispersible wolfberry formulation

160 g of tap water and 2 g of sodium bicarbonate were introduced into a 0.5-liter glass-reactor. 40 g of dried wolfberry fruits containing 0.29% of zeaxanthin palmitate were added to the above solution, and the mixture was homogenized with a mixing device (Polytron®, at 26000 rpm) during 15 minutes. The temperature was maintained below 30°C by cooling with an ice bath. The resulting mixture had a pH of 8.3. The mixture was then centrifuged at 2000 G for 10 minutes. The solid residue was discarded (50 g). The liquid phase (150 g) was neutralized to pH 7 by adding 0.8 g of 50% aqueous solution of citric acid. The red-orange liquid was lyophilized and 33.2 g of a red-orange powder was obtained.

This powder contains all the essential bioactive components of wolfberry and it can be dispersed in water to form a stable suspension. The zeaxanthin palmitate content of the powder is 0.28 %; the yield in zeaxanthin palmitate is 80 %.

Example 2: Water-dispersible zeaxanthin concentrate (2-steps process)

2.1. Removal of water-soluble compounds (mainly sugars)

250 g of dried wolfberry fruits containing 0.29% of zeaxanthin palmitate were introduced into a 3.0-liter glass-reactor. 1.5 liter of tap water was added and the mixture was gently mixed at room temperature during 1 hour. The liquid phase was then separated and a second washing of the fruit solids was carried out with 1 liter of water under the same

conditions. The two liquid phases were combined and lyophilized to obtain 157 g of powder that contains less than 0.02% of zeaxanthin palmitate.

2.2. Water-dispersible zeaxanthin concentrate

The above water-washed wolfberry fruits were introduced into a 2-liter reactor equipped with a pH-electrode. Additional 250 g of tap water was added and the pH of the mixture was brought up to 10.5 by adding a 10% aqueous solution of sodium hydroxide. The mixture was homogenized with a mixing device (Polytron®, at 26000 rpm) during 15 minutes. During the homogenization the pH of the mixture was maintained at 10.5 by addition of a 10% aqueous solution of sodium hydroxide. The temperature was kept below 30°C by cooling with an ice bath. The mixture was then centrifuged at 2000 G for 10 minutes. The solid residue was discarded. The liquid phase was pasteurized at 85°C for 2 minutes and then neutralized to pH of 7.0 by adding 6.8 g of 50% aqueous solution of citric acid. The resulting liquid was lyophilized and 68.8 g of a red powder was obtained.

This powder can be dispersed in water to form a stable suspension. The zeaxanthin palmitate content of the powder is 0.81%. The yield in zeaxanthin palmitate is 76.8%.

Example 3: Preparation of a dairy product

The primary composition as prepared in Example 1 is used for the manufacture of fermented yogurt-like milk products. To do this, 1L of a milk product containing 2.8 % of fats and supplemented with 2 % of skimmed milk powder and 6 % of sucrose was prepared, pasteurized and its temperature then lowered to 42°C. Precultures of a non-thickening strain of Streptococcus thermophilus and of a non-viscous strain of Lactobacillus bulgaricus were reactivated in a sterile MSK culture medium containing 10% of reconstituted milk powder and 0.1% of commercial yeast extract. The pasteurized milk product is then inoculated with 1% of each of these reactivated precultures and this milk product was then allowed to ferment at 32°C until the pH reached a value of 4.5. To the fermented milk, yogurt-like product, the primary composition as in example 1 (1%) was added and stored at 4°C.

Example 4 : Preparation of a pet food product

A feed mixture was made up of corn, corn gluten, chicken and fish, salts, vitamins and minerals. The moistened feed leaving the pre-conditioner was then fed into an extruder-

cooker and gelatinised. The gelatinised matrix leaving the extruder was forced through a die and extruded. The extrudate leaving the die head was cut into pieces suitable for feeding to dogs, dried at about 110°C for about 20 minutes, and cooled to form pellets. The resulting water activity of the pellets was about 0.6. The pellets were coated by spraying a coating substrate comprising tallow fat and the primary composition as prepared in Example 1.

Example 5 : Preparation of a cosmetic for oral administration

A composition in the form of a hard capsule has the following formulation:

Compound	mg per capsule
primary composition of example 1	500
Excipient for the core	
Microcrystalline cellulose	70
Encompress TM	60
Magnesium stearate	3
Anhydrous colloidal silica	1
Coating agent	
Gum-lack	5
Talc	61
Sucrose	250
Polyvidone	6
Titanium dioxide	0.3
Colouring agent	5

Table 1.

The composition can administered to the individual in an amount of 2 to 3 capsules daily.

CLAIMS

1. A process for preparing a water dispersible primary composition consisting of water extractible, lipophilic and non lipophilic bioactive components of exclusively fruit or vegetable or plant origin, which comprises:

a) subjecting the selected fruit or vegetable or plant material to homogenisation at a pH of 8 to 11 and at a temperature comprised between 20-25 and 50°C,

b) separating the liquid extract from the homogenised mass and subsequently bringing it to neutrality, and

c) eventually concentrating or drying the neutralized liquid extract.

2. The process according to claim 1 wherein the selected fruit or vegetable or plant material is washed with water at room temperature prior to the homogenization.

3. The process according to any of claims 1 and 2 wherein the extractible lipophilic bioactive components are selected form the group of lipids, carotenoïds and lipophilic vitamins.

4. The process according to any of claims 1 and 2 wherein the extractible, non lipophilic bioactive components are selected from the group of alkaloids, carbohydrates, polyphenols like flavonoïds, hydrosoluble vitamins and minerals.

5. The process according to any of claims 1 to 4, wherein step a) is performed on a crude or washed fruit or vegetable or plant material, at a temperature lower than 30°C.

6. The process according to any of claims 1 to 5, wherein drying according to step c) is performed by freeze drying.

7. A primary composition consisting of water extractible, lipophilic and non lipophilic bioactive components of exclusively fruit or vegetable or plant origin wherein the profile of said bioactive components is similar if not identical to that of the corresponding whole fruit or vegetable.

8. The composition according to claim 7 wherein the extractible lipophilic bioactive components are selected form the group of lipids, carotenoïds and lipophilic vitamins.

9. The composition according to claim 8, wherein the carotenoïds are carotenes and xanthophylls such as lycopene, carotene, phytofluene, phytoene, canthaxanthin, astaxanthin, beta-cryptoxanthin, capsanthin, lutein, zeaxanthin, or those in the form of fatty acid esters.

10. The composition according to claim 7 wherein the extractible, non lipophilic bioactive components are selected from the group of alkaloids, carbohydrates, polyphenols like flavonoïds, hydrosoluble vitamins and minerals.

11. The composition according to claim 10, wherein the flavonoïds are flavones such as apigenin, luteolin or diosmetin, flavonols such as quercetin, myricetin, kaempferol, flavanones such as naringenin, and hesperidin, catechins such as epicatechin and gallocatechin, anthocyanidins such as pelargonidin, malvidin, cyanidin or isoflavones such as genistein, daidzein.

12. The composition according to any of claims 7 to 11, which is a water dispersible powder composition.

13. The composition according to any one of claims 7 to 12, wherein the fruit, vegetable or plant material is a berry such as wolfberry, blueberry, cranberry, white currant, red currant, blackcurrant, mulberry, blackberry, gooseberry, raspberry, sea buckthorn, strawberry, arbutus berry, grapes, or any other flavonoïd, polyphenol or carotenoïd-rich fruit, vegetables, seeds, flowers or plant materials such as apples, melons, kiwi, cherries, red date, prunes, peaches, persimmons, citrus fruits such as mandarin, orange, tangerine, grapefruit, and chamomile, chrysanthemum, bitter orange, honeysuckle, jasmine and safflower, and tomato, spinach, celery, carrots, pea, kale, parsley, watercress, cabbage, broccoli, lettuce, Brussels sprouts, collard greens, turnip greens, fennel, onions, tea, corn, cocoa, coffee, thyme or sweet red pepper.

14. The use of the primary composition according to any one of claims 7 to 13 for preparing a food product for oral administration, a food supplement, a pet food product, a pet food supplement, a cosmetic preparation or a pharmaceutical preparation.

15. The use of the primary composition according to any one of claims 7 to 13 for preparing an oral, cosmetic or pharmaceutical composition intended for improving skin health, in particular for photo protection of the skin or for protecting skin tissue against ageing.

16. The use of the primary composition according to any one of claims 7 to 13 for preparing an oral, topical or pharmaceutical composition intended for eye health.

17. The use of the primary composition according to any one of claims 7 to 13 for preparing an oral, cosmetic or pharmaceutical composition intended for stimulating the immune system.

18. The use of the primary composition according to any one of claims 7 to 13 for preparing an oral, cosmetic or pharmaceutical composition for preventing or treating cardiovascular diseases or disorders or cancers or diabetes.

19. A food product for oral administration, a food supplement, a pet food product, a pet food supplement, a cosmetic preparation or a pharmaceutical preparation which comprises the primary composition according to any one of claims 7 to 13.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/066511

A. CLASSIFICATION OF SUBJECT MATTER
INV. A23L1/30 A23L1/221 A23L1/275

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A23L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)
EPO-Internal, WPI Data, PAJ, FSTA

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2003/027747 A1 (YATCILLA MICHAEL T ET AL) 6 February 2003 (2003-02-06) claims 1,2 paragraph [0030] -----	1,7,13, 14,19
X	US 2001/002264 A1 (BOK SONG-HAE ET AL) 31 May 2001 (2001-05-31) claims 3,6-8,10,11 paragraphs [0016] - [0030], [0056] examples 2(2),(3) -----	1,3-5, 7-19

-/--

[X] Further documents are listed in the continuation of Box C.

[X] 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 document 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" 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

"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

"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.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
31 January 2007	09/02/2007
Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer Bondar, Daniela

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2006/066511

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 465 019 B1 (BOK SONG-HAE ET AL) 15 October 2002 (2002-10-15) claims 9,14,15 column 3, lines 1-19,26-28 column 1, lines 49-52 column 2, lines 64,65 table I	1,3-5, 7-11, 13-19
X	US 3 206 316 A (KLAUI HEINRICH) 14 September 1965 (1965-09-14) claims 1,5 column 1, lines 57-64	7-10
X	EP 1 477 177 A (KANEKA CORPORATION) 17 November 2004 (2004-11-17) paragraphs [0002], [0026] - [0033], [0066]	7-11, 13-19
X	WO 03/074067 A (STONER, GARY, D; CASSADY, JOHN, M; KLAUNIG, JAMES, E; STOKES, DALE) 12 September 2003 (2003-09-12) claims	13-19
X	US 2003/139610 A1 (KHARE ANIL BHAGWAN ET AL) 24 July 2003 (2003-07-24) claims 1,10,15 paragraphs [0003], [0005], [0031], [0033] - [0036], [0040], [0041], [0050], [0054]	1,3, 7-11, 13-19
A	WO 2005/020948 A (NESTEC S.A; BORTLIK, KARLHEINZ; DURUZ, ELIANE; KOLODZIEJCZYK, ERIC; FE) 10 March 2005 (2005-03-10) the whole document	1-19
A	WO 03/020053 A (LYCORED NATURAL PRODUCTS INDUSTRIES LTD; ZELKHA, MORRIS; SEDLOV, TANYA) 13 March 2003 (2003-03-13) cited in the application the whole document	1-19

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2006/066511

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2003027747 A1	06-02-2003	US 2004202733 A1	14-10-2004
US 2001002264 A1	31-05-2001	US 2001014357 A1	16-08-2001
US 6465019 B1	15-10-2002	CA 2327356 A1	21-10-1999
		CN 1296387 A	23-05-2001
		DE 69914470 D1	04-03-2004
		DE 69914470 T2	08-07-2004
		EP 1069834 A1	24-01-2001
		JP 3485893 B2	13-01-2004
		JP 2002511237 T	16-04-2002
		WO 9952380 A1	21-10-1999
US 3206316 A	14-09-1965	CH 420822 A	15-09-1966
		ES 271247 A1	16-03-1962
		GB 918399 A	13-02-1963
EP 1477177 A	17-11-2004	AU 2003211247 A1	09-09-2003
		CA 2475600 A1	28-08-2003
		CN 1633302 A	29-06-2005
		WO 03070263 A1	28-08-2003
		US 2005118288 A1	02-06-2005
WO 03074067 A	12-09-2003	AU 2003217848 A1	16-09-2003
US 2003139610 A1	24-07-2003	NONE	
WO 2005020948 A	10-03-2005	AU 2004267942 A1	10-03-2005
		BR PI0413691 A	24-10-2006
		CA 2536240 A1	10-03-2005
		CN 1835733 A	20-09-2006
		EP 1508325 A1	23-02-2005
		KR 20060097107 A	13-09-2006
		US 2006286187 A1	21-12-2006
WO 03020053 A	13-03-2003	BR 0212639 A	24-08-2004
		CA 2458789 A1	13-03-2003
		CN 1578628 A	09-02-2005
		EP 1423020 A1	02-06-2004
		JP 2005501541 T	20-01-2005
		MA 26285 A1	01-09-2004
		MX PA04002083 A	07-06-2004
		NZ 531299 A	27-08-2004
		US 2003044499 A1	06-03-2003
		ZA 200401476 A	30-08-2004