Title: WATER-SOLUBLE INSTANT TEA PRODUCT AND PROCESS OF PREPARATION THEREOF

Abstract: The invention relates to water-soluble instant tea product and more particularly to the instant completely cold and hot water soluble instant tea product. Present invention also provides instant completely water soluble tea product of any suitable size and grade, consisting ginger oil which acts as a natural preservative and gives a pleasant aroma. The aqueous beverage extract is subjected to fermentation and further it is concentrated in a rotary vacuum evaporator to obtain a concentrated form and then mixed with the aroma material. This can further be encapsulated in an inert water soluble carrier material to get a defined shape and to enhance its storage time.
FIELD OF INVENTION:

The present invention relates to water-soluble instant tea product, more particularly to the water soluble instant tea product, that dissolves completely in both hot and cold water, without leaving any noticeable residue. The cold and hot water soluble, instant tea product of present invention optionally comprises ginger oil which acts as a natural preservative and gives a pleasant aroma.

BACKGROUND OF THE INVENTION

Tea is the most widely consumed beverage in the world. Black leaf tea is traditionally produced by oxidising and drying freshly plucked green tea leaves. Such tea is usually infused in hot water, the spent tea leaves are then removed and a hot beverage, to which other ingredients may be added, is consumed in most countries. Most tea beverages are brewed from black tea. Black tea is manufactured by processing plucked green tea leaves. This process typically includes withering, maceration, fermentation, and drying operations. The manufacturing process results in black tea particles of varying sizes, which are sieved into grades according to their sizes and market requirement.

The manufacturing process, however, results in a marked reduction in the content of water solubles within the tea leaves. The reduction, in turn, results in part of the green leaf soluble components becoming insoluble. It is believed that the insoluble components are the result of polymeric substances formed by enzyme oxidation occurring during the fermentation step. More specifically, during fermentation, colorless green leaf polyphenols (or catechins) undergo endogenous enzyme mediated oxidation to produce colored polyphenols called Theaflavins (TFs) and Thearubigins (TRs). These colored polyphenols are responsible for the
colors characteristic to black tea and its liquor. The insolubles created during fermentation can be either cold or hot water insoluble. In addition to the insoluble components, there are many compounds present in black tea that are only sparingly soluble in cold water. Many of these partially cold water soluble compounds give tea beverages their unique organoleptical properties. As a result of these insoluble and partially soluble components, when traditional black leaves are brewed in cold water the result is a beverage weak in both color and taste.

For the reasons stated above, traditionally black teas are usually brewed in hot or boiling water. Namely, the required amount of tea, either loose or in tea bag form, is brewed in boiling water for 2 or 3 minutes, strained and used as a hot beverage. This avoids the problem of cold water insoluble components and also generates a tea beverage of acceptable color and taste.

However, in some regions of the world, tea is best enjoyed as a cold beverage, namely iced tea. For example, the hot brewed tea can be refrigerated to achieve an acceptable temperature. Alternatively ice can be added to the hot brewed tea prior to consumption. Yet, both of these options add another step to the process, requiring a substantial amount of additional time.

Another alternative is to brew the tea in cold water for an extended period of time. Yet even with extended brewing times, this option fails to produce a tea with an acceptable strength or color. For this reason conventionally manufactured tea cannot be used for brewing in cold water and similar applications. Still yet another alternative is to use cold water soluble instant tea. These teas typically come in a powder form. Thus, the resulting tea beverage is not brewed; rather it is created by the addition of water. Consequently, these instant teas produce a beverage lacking in flavor and taste, and require the use of additives such as flavor enhancers and or sweeteners, eg. Ready to drink (RTD) beverage or Dry mix.

Hence it is desirable to have concentrated cold or hot water soluble tea products from which one can make tea based beverages with good organoleptic properties as these are very popular due to the convenience of use. They can also be used to prepare iced tea drinks that are very
popular in some countries. The concentrated cold or hot water soluble tea products may be liquid or they may be dried to give powders.

Over the years attempts have been made to overcome the aforementioned problems and produce a tea which is soluble in cold and hot water. The invention presented in EP1835813 discloses the process for making a cold water soluble tea product comprising the steps of extracting tea material with water to give a tea extract, deleafing the tea extract, concentrating the deleafed tea extract, cooling the extract, decreaming the concentrated tea extract to provide a cream fraction and a decreamed fraction, solubilising the cream fraction in water and then subjecting the solubilised cream fraction to an ultrafiltration step so as to produce a permeate and a retentate and recovering the permeate.

WO02/100184 suggests mixing an extract of tea material with an anionic colloidal material while making a concentrated cold water soluble tea product.

The US6761918 disclose a method of processing green tea leaves to produce black tea particles which can be brewed in cold water. The method is designed to produce high polyphenol cold brew tea or conventional tea of any suitable size and grade.

The US6482450 discloses a method for preparing cold water infusing leaf tea. Green tea leaves are macerated, treated with tannase, fermented in the presence of hydrogen peroxide in an amount that is sufficient to activate endogenous peroxidases to oxidise gallic acid and other compounds that are liberated by the tannase treatment, and then dried.

The US4732773 discloses instant fruit tea beverage in the form of a powder, granules or paste which contain cocoa powder or powdery edible acids and/or vitamins, vegetable extracts and/or vegetable powders and/or fruit extracts and/or fruit powders, and optionally flavoring and/or aromatizing agents, and a carrier are prepared by using a protein as a carrier which protein is dispersible and/or soluble in a liquid.
The US6589575 discloses a process for manufacturing a black leaf tea that is infusible in hot or cold water. The process involves macerating freshly plucked tea leaves, allowing them to ferment, firing the leaves to arrest fermentation and then drying them to yield black leaf tea, wherein the tea leaves are treated with a solubilising compound selected ascorbic acid, dehydroascorbic acid, 1-scorbamic acid, 5-phenyl-3,4-diketo-gamma-butyrolactone (4-phenyl-2,3-diketo-gamma-butyrolactone) or their salts and mixtures thereof in an amount that is sufficient for the black leaf tea to be soluble in water at 5 to 100 °C.

The US6426106 discloses a method for making a cold water soluble black tea extract which involves extracting tea solids from black tea leaves using an extraction liquid to provide a whole tea extract, oxidizing the whole tea extract under superatmospheric pressure and at a temperature above 60 degree C. to provide a cold water soluble liquor, cooling the cold water soluble liquor to precipitate any residual cold water insoluble material, and separating the residual cold water insoluble material from the cold water soluble liquor to give the cold water soluble black tea extract.

The US4004038 discloses cold water soluble tea concentrates and powders which are prepared by extracting tea leaves with hot water, selectively removing nonpolyphenolic, high molecular weight compounds from the tea extract while retaining the phenolic compounds therein and concentrating the resultant extract.

The US5736182 discloses a process for the production of a concentrated aroma solution from an aqueous solution containing water-soluble aroma components; for example coffee, tea or fruit aroma components. Soluble solids are added to the aqueous solution to provide a fortified solution. Then the fortified solution is chilled to provide ice and a concentrated aqueous liquid. The concentrated aqueous liquid has a concentration of soluble solids above about 9% by weight and contains water-soluble aroma components. Although each of the above described tea processing methods achieves its individual objective but none of them disclose a process for completely cold as well as hot water soluble
instant tea product, that doesn't leave a noticeable residue. The prior art doesn't provide an instant tea product which has aroma material such as ginger oil. Moreover the process described in prior art, involves formation of tablets or cubes of the dry beverage substances. Tea tablets or cubes are usually formed by combining tea with a binder (fat or emulsifier) and a desired shape is given. The binder used should not affect the taste or appearance of the final product after dissolving in water. The production of tea by using this method has got disadvantages in that the binder used is not completely eliminated from the beverage and sometimes also affects its taste or appearance. Further, this type of instant tea products leaves tea residues at the bottom of the cup i.e. not dissolved completely. Accordingly, there is a real and continuing need for development of cost-effective, time saving and easy method for preparation of water soluble tea product with complete solubility without leaving any residues/ turbid matter. Hence the present inventors aim is to develop the easy and convenient process for preparation of completely cold as well as hot water soluble instant tea product having aroma of ginger which acts as natural preservative along with pleasant aroma.

OBJECTIVE OF THE INVENTION

The primary objective of the present invention is to produce water soluble instant tea product that dissolves completely in both hot and cold water.

An another objective of the present invention is to produce water soluble instant tea product that dissolves completely in both hot and cold water, without leaving any noticeable residue.

The present invention is also directed towards producing water soluble instant tea product that dissolves completely in both hot and cold water and additionally comprises ginger oil which acts as a natural preservative and gives a pleasant aroma.
Another objective of the present invention is to develop an improved process for preparation of instant water soluble tea product that dissolves completely in both hot and cold water.

One more objective of present invention was to produce, a liquid to viscous liquid concentrated water soluble instant tea product, consisting of tea leaf extracts and aroma material, wherein said water soluble instant tea product is free from conventional binders.

The resulting tea product that exists as liquid to viscous liquid form, exhibits an improved taste, appearance and the added aroma the formulated tea composition may further be encapsulated in an inert water-soluble carrier-material in order to enhance the storage time of the product with a defined shape.

It is also an object of this invention to provide a process for preparing completely water soluble instant tea product of suitable size and shape, having ginger oil as an aroma material and natural preservative.

The foregoing has outlined rather broadly the more pertinent and important features of the present invention in order that the detailed description of the invention that follows may be better understood so that the present contribution to the art can be more fully appreciated. Additional features of the invention will be described hereinafter, which form the subject of the claims of the invention. It should be appreciated by those skilled in the art that the conception and the specific embodiment disclosed may be readily utilized as a basis for modifying or designing other structures for carrying out the same purposes of the present invention. It should also be realized by those skilled in the art that such equivalent constructions do not depart from the spirit and scope of the invention as set forth in the appended claims.
SUMMARY OF THE INVENTION

The invention provides a readily water-soluble concentrated tea product that is optionally flavored. However, if desired appropriate flavors can be added to the tea product of present invention.

The water soluble instant tea product of present invention dissolves completely in both hot and cold water, without leaving any noticeable residue.

The water soluble instant tea product of present invention can be presented in the physical forms, selected from the group comprising of but not limited to, powder, regular granular tea, cubes, spheres, liquid, viscous liquid. However, the water soluble instant tea product in form of liquid or viscous liquid is more preferred.

The water soluble instant tea product of present invention optionally contains preservatives, which may be of natural or synthetic origin.

The present invention also provides a process of preparation of water soluble instant tea product, from the aqueous component produced from grinding and cold water extraction of tea leaves.

The process of preparation of water soluble instant tea product, comprises withering of the tea leaves after plucking it from the garden. Withered leaves are grinded to get the extracts and mixed with small quantity of water. The aqueous component produced from grinding and cold water extraction of tea leaves is separated from tea leaves pulp by filtration. The aqueous component thus obtained is then fermented at proper condition of temperature till the colour of the extracts changes to brown. This is followed by evaporation of the aqueous material with the help of a rotary vacuum evaporator. The resultant concentrates are mixed with a few drops of aroma material (ginger oil) and then kept in a clean glass vial and capped well, which is
then sterilized in an autoclave at 151b/inch² for 15 minutes in order to check contamination of the product and also to enhance the duration of storage.

Two drops of the resultant product is sufficient to prepare a cup of tea, in cold or hot water.

DETAILED DESCRIPTION OF THE INVENTION

The present invention provides water-soluble instant tea product that is soluble in both hot and cold water.

In one of the preferred embodiment, the water-soluble instant tea product doesn't leave any noticeable residue behind, but still has an improved taste, appearance and aroma.

The water-soluble instant tea product consists of concentrated tea leaf extract and an aroma material.

In one of the embodiment, the water soluble instant tea product of present invention is free from conventional binders.

In one embodiment, the water soluble instant tea product of present invention is liquid or viscous liquid.

In one of the embodiment present invention provides a process for preparation of water soluble instant tea product, from the aqueous component produced from grinding and cold water extraction of tea leaves.

The present invention provides water-soluble instant tea product in the form of, liquid or viscous liquid or dry powder or granules, spheres or cubes, however the liquid to viscous liquid is more preferred. The formulated tea composition may further be encapsulated in an
The process of preparation of water-soluble instant tea product, which is completely soluble in hot or cold water, and doesn't leave any noticeable residue behind, comprises following steps.

1. Plucking of tea leaves form garden
2. Grinding the tea leaves and extraction in cold water
3. Filtration of aqueous component obtained after extraction in cold water
4. Fermentation
5. Concentrated by evaporation
6. Addition of Ginger oil
7. Sterilization by autoclaving
8. Water soluble instant Tea product

The various parameters of abovesaid process are optimized in order to reduced time and cost. The extraction of tea leaves is carried manually in mortar and pestle or in a grinder machine with cold water. The fermentation is carried to the filtered extract at room temperature for 45 minutes to 1 hour till the color of the extract turned into brown. The evaporation of fermented extract is carried in a rotary vacuum evaporator to obtain concentrated extract. The aroma material such as ginger oil ranges from 0.3% to 6.5% (v/v) and preferably 1% (v/v) is added to the concentrated tea product which enhances the flavor and storage property as a natural preservative. Optionally the sterilization by autoclaving at 121°C, 151b pressure for 15 minutes is carried to check contamination for the product. This sterilized tea product can be stored for long period without compromising its pleasant flavor, typical colour and taste. The product produced is in liquid or/and viscous fluid form and which can be encapsulated in inert water-soluble carrier-material in order to enhance the storage time of the product with a defined shape. All of this is achieved without sacrificing any color, quality, flavor or taste. The various steps in the method of the present invention are described more fully hereinafter.
water soluble carrier material to get a defined shape and to enhance the storage time of the product.

The detail explanation of various important steps of preparation of water soluble instant tea product, are provided hereinafter.

**Plucking**

The first step of the method is plucking. This step is carried out on freshly picked green tea leaves of first bush stage; specifically, a mature two or three tea leaf and a bud harvested from tea gardens of Tinsukia. This type tea covers the Assam type, the China type and all hybrids including Combod varieties.

**Withering**

The next step in the manufacturing process is withering, during the withering process these freshly plucked leaves are allowed to lose their moisture. This is achieved by spreading the leaves out on a floor of a room and promoting the circulation of either hot or cold air around the leaves. The leaves are kept on the floor for a time period of between 1 to 2 hours. The exact length of time required for withering is dependent upon the initial moisture of the leaves and the final desired moisture. Longer withering times are required for leaves with higher moisture contents, or if the process requires especially dry leaves. The result of the withering process is flaccid tea leaves. This flaccid state of the leaf is the result of both the physical and chemical effects of the withering process. That is, withering creates both physical changes in the leaf (i.e. loss of moisture) as well as chemical changes in the leaf (i.e. the concentration of cell fluids followed by various reactions). The flaccid nature of the leaf resulting during the withering process is a prerequisite to subsequent processing steps.

**Grinding and cold water extraction**
The next step in the manufacturing process is grinding and cold water extraction. Grinding can be carried out in mortar and pestle or in a grinding machine, it involves the breaking up of cell wall of tea leaves which in turn allows enzymes and polyphenols present within tea leaves separately, to come in contact with each other. These results in an enzyme mediated air oxidation of the polyphenols. Without proper grinding, the biochemical changes during oxidation/fermentation will not be satisfactory and the result will be poor tea quality.

The withered tea leaves are taken for grinding and also cold water is used for extraction, wherein they are broken up into a form of paste or a viscous liquid. In the preferred embodiment, the leaves are subjected to complete grinding manually in a mortar and pestle or in a grinding machine.

**Filtration**

During filtration, the leaf debris is separated from the extract/filtrate, which is achieved by using a muslin cloth or a filter paper. The liquid filtrate will be used for subsequent steps.

**Fermentation**

During fermentation, the polyphenols (catechins) present in tea particles are oxidized. This oxidation process turns the green tea into golden brown during fermentation. The enzyme liberated from the tea leaf extract is responsible to bring the fermentation. During the fermentation step, the catechins present within the tea extract undergo an enzyme mediated air oxidation to form colored compounds. These compounds are Theaflavins (TFs) and Thearubigins (TRs). The TFs and TRs give the resulting tea liquor its characteristic color and flavor. That is the TFs are orange yellow in color and the TRs are reddish brown and both impart a combination of similar colors to the resulting tea liquor. While TFs are responsible for the briskness and brightness of the tea liquor, the color and strength is provided by TRs, which is achieved between 45 minutes to 1 hour, the colour of the extract turned into brown.
and also it gives a typical tea flavor as an indication of fermentation, usually fermentation is
carried Out in the morning hours at room temperature i.e 25°C to 27°C.

**Concentrated by evaporation**

The resulting fermented tea extract were concentrated by using rotary vacuum evaporator at
a temperature between 35°C to 45°C for 2 to 3 hours for an volume of 100ml extract.

**Addition of ginger oil**

The resulting concentrated tea extract to which 1% (y/v) of ginger oil was added as an aroma
material; one can use a minimum concentration of 0.3% and a maximum concentration of
6.5% of ginger oil to the concentrated extract. Ginger oil adds a pleasant aroma and also acts
as a natural preservative to the final product.

**Sterilization by autoclaving**

The final step of the process is the sterilization, which is carried out in an autoclave at a
temperature of 121°C, 15 lb pressure for 15 minutes in order to ensure, free from
contamination and also to enhance the duration of the final tea product. The resulting liquid or
viscous material thus obtained can be stored at room temperature up to nine months to one
year and under refrigerated condition up to one and half years to two years.

The water soluble instant tea product prepared in accordance with present invention, can be
presented in the physical forms, selected from the group comprising of but not limited to,
powder, regular granular tea, cubes, spheres, liquid, viscous liquid. However, the water
soluble instant tea product in form of liquid or viscous liquid is more preferred
Two drops of the resultant product is sufficient to prepare a cup of tea, in cold or hot water. It mixes with water very easily and no residues remain at the bottom unlike in other tea products.

The formulated tea composition of the present invention may further be encapsulated in an inert water-soluble carrier-material in order to enhance the storage time of the product with a defined shape.

EXAMPLE:

The following specific example presented to illustrate the best mode of carrying out the process and product of the present invention but do not limit the scope of the invention.

The present study was carried out to develop a process for preparation of instant water soluble tea product having ginger oil as an aroma material and natural preservative. Five hundred grams of fresh green tea leaves were taken and kept for withering for about 1 to 2 hours at room temperature and air circulated with a fan motor, this withered leaves were taken for grinding in a grinder with addition of water in between at a total 1/3’d volume. This extract is kept in a container allowed it for fermentation to take place at room temperature till the colour of the extract turned into brown and also it gives a typical tea flavor as an indication of fermentation. The fermented extract is then concentrated in a rotary vacuum evaporator. To the concentrated extract 1% (v/v) ginger oil is added. The entire mixture is then sterilized in an autoclave at 121°C, 15 lb pressure for 15 minutes. The resulting product thus obtained can be stored in room temperature up to nine months to one year and under refrigerated condition up to one and half years to two years. Two drops of the resultant product is sufficient to prepare a cup of tea, in cold or hot water.
We Claim,

1. A water soluble instant tea product that is soluble in both hot and cold water.

2. The water soluble instant tea product of claim 1, which doesn't leave any noticeable residue behind.

3. The water soluble instant tea product of claim 1, that doesn't contain a conventional binder.

4. The water soluble instant tea product comprising concentrated tea leaf extract and an aroma material.

5. The water soluble instant tea product of claim 4, is liquid or viscous liquid.

6. The water soluble instant tea product of claim 4, wherein the concentrated tea extract is prepared from the aqueous component produced after grinding and cold water extraction of tea leaves.

7. The water soluble instant tea product of 4, wherein aroma material is ginger oil.

8. The process of preparation of water-soluble instant tea product comprises,
   i. extraction of tea leaves in cold water
   ii. Filtration of aqueous component
   iii. Fermentation of aqueous component
   iv. evaporation;
   v. addition of aroma material.

9. The process as claimed in claim 8 wherein extraction of tea leaves is carried manually in mortar and pestle or in a grinder machine with cold water.
10. The process as claimed in claim 8 wherein fermentation is carried to the filtered extract at room temperature for 45 minutes to 1 hour till the color of the extract turned into brown.

11. The process as claimed in claim 8, wherein evaporation of fermented extract is carried in a rotary vacuum evaporator to obtain concentrated extract.

12. The process as claimed in claim 8, wherein the aroma material added is ginger oil.

13. The process as claimed in claim 12, wherein ginger oil is from 0.3% to 6.5% (v/v).

14. The process as claimed in claim 12, wherein ginger oil is 1% (v/v).

15. The process as claimed in claim 8, further involving sterilization by autoclaving.

16. The water-soluble instant tea product of claim 4, encapsulated in or deposited over an inert water soluble carrier material.
INTERNATIONAL SEARCH REPORT

PCT/IN 2010/000492

A. CLASSIFICATION OF SUBJECT MATTER

IPC*: A23F3/18 (2006.01); A23F3/40 (2006.01); A61K 36/9068 (2006.01)

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)

IPC*: A23F3/18; A23F3/40; A61K36/9068

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 practicable, search terms used)

EPODOC, WPI, TXTWOT, TXTJPT, TXTJPS, TXTE

C. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>A</td>
<td>CN 1539305 A (INST TEA CHINESE ACAD AGRIC) 27 October 2004 (27.10.2004) abstract (WPI; Acc.No.: 2005-123483)</td>
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<td>A</td>
<td>JP 2005168428 A (KAO CORP) 30 June 2005 (30.06.2005) abstract (WPI; Acc.No.: 2005-462272)</td>
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D-D Further documents are listed in the continuation of Box C.

* 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" 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

17 December 2010 (17.12.2010)

Date of mailing of the international search report

3 January 2011 (03.01.2011)

Name and mailing address of the ISA/ AT

Austrian Patent Office
Dresdner Straße 87, A-1200 Vienna

Authorized officer

KRENN M.

Facsimile No. +43 / 1 / 534 24 / 535

Telephone No. +43 / 1 / 534 24 / 435
Continuation of first sheet

Continuation No. II:

Observations where certain claims were found unsearchable

(Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

Claims Nos.: 1-7, 16 because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

The tea product according to claims 1-7 is insufficiently characterized, because claims 1-4 do not disclose those features making the tea product water-soluble. It is recommended to formulate product-by-process claims (Instant tea product obtained by a process ...) instead of product claims 1-7.

A tea product cannot be characterized by the fact that it is encapsulated in or applied over a carrier (claim 16). However, e.g. a capsule can be characterized by its content of a certain tea product.
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Form PCT/ISA/210 (continuation of second sheet (1)) (January 2004)
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