Abstract:

A liquid milk tea concentrate and the process for manufacturing thereof. The liquid milk tea concentrate comprises a tea extracted mixed with milk. This ready to consume product has increased shelf life due to the specific process parameters employed in the genesis of this product. The process of manufacturing the product includes the steps of extracting the tea, mixing it with milk and thermal processing to obtain the concentrate.
A LIQUID MILK TEA CONCENTRATE AND PROCESS FOR THE MANUFACTURE THEREOF

FIELD OF THE INVENTION

The field of invention is related to the product and process of manufacturing of a liquid milk tea concentrate. The concentrate may be reconstituted to form a cup of hot tea. The present invention relates to a tea product which provides a combination of tea, milk and sugar in a suitable serve size. The present invention also relates to the process of manufacturing the tea product.

BACKGROUND OF THE INVENTION

Tea is a common beverage usually prepared by pouring hot or boiling water over made tea manufactured from leaves of the tea plant, followed by filtration and optional addition of milk and sugar as desired to the brew. As preferred taste, tea with milk is highly popular. Instant tea based premixes which contain sugar, milk powder and instant tea are also gaining popularity due to its convenience of making a hot tea by adding only hot water. Instant tea premixes with sugar and flavours are also popular, due to the convenience of not requiring boiling water and of the convenience of having added flavors like lemon and peach. These flavoured premixes are preferred as cold drinks. Tea connoisseurs tend to criticize these products for sacrificing the delicacies of tea flavor in exchange for convenience. Further, the milk tea made from instant tea based premixes is greatly criticized by tea drinkers for losing its real tea taste.

Patent and non-patent literature is inundated with the aspect of instant tea. But, the literature on the art fails to serve as a lightning rod for those who prefer to have a ready to drink hot liquid milk tea. Even the products which are present in the market do not provide liquid milk tea to the consumers with real taste of tea.

There have been several attempts by various researchers to arrive an instant tea product in the past such as PCT/IN2010/000492 whose claims are directed to water-soluble instant tea product and more particularly to completely cold and hot water soluble instant tea product. The aqueous beverage extract is subjected to fermentation and is concentrated in a rotary vacuum evaporator to obtain a concentrated form and then mixed with the aroma material which is further encapsulated in an inert water soluble carrier material. The process of the
application leads to a completely water soluble concentrated instant tea product with aroma material, where in the process comprises extraction of tea leaves, fermentation, evaporation, addition of aroma material. There is no milk solid or liquid in the instant tea concentrate.

Japanese patent application number JP 2009-289126, discloses an instant black tea product which contains non-polymeric catechins at high concentrations, which is further reduced in bitterness and astringency, and which produces an infusion having excellent appearance. The disclosed instant black tea product includes a beverage material which contains black tea leaves and dried green-tea extract and which is enclosed in a tea bag, and is characterized in that the mass ratio of the non-polymeric catechins to tannin in the beverage material is from 0.65 to 0.95. The tea with milk or an instant milk tea is not envisaged in the document.

Application number 85200789.7, which is a European Patent Application, titled as "Liquid Tea Mix Concentrate", claims a shelf-stable liquid tea mix concentrate and a tea beverage prepared there from. The object of this invention relates to providing a liquid tea mix concentrate, from which an iced tea beverage can be prepared that does not develop turbidity or precipitates upon storage under refrigeration. The liquid tea mix of said document again does not contain milk.

Across the developed world, there is a growing trend towards using tea bags, considering the convenience that they offer. All the above disclosed prior arts work towards improvement of flavour and do not provide a ready to drink hot liquid tea, which contains milk. Moreover, the cited art is bereft of the process of making ready to drink liquid tea, which includes thermal processing at specified parameters. Use of tea bags does not satiate the consumers who believe that tea prepared from tea bags is a compromise on taste. Currently, to get a thirst quenching tea, the consumer has to add the cost of fuel to get hot water besides the cost of milk, tea and optionally also sugar. This provides an obvious disadvantage to the consumers from a convenience perspective. The main limitation of preparing a liquid milk tea concentrate is that the liquid milk concentrate would not be stable even in sealed packages with sufficient shelf life. The present invention discloses a process wherein the liquid milk-tea processing allows retention of its flavour and other properties along with sterility to provide shelf life which can be up to six months. The present invention objectifies the prevalent disadvantages and works towards attainment of a ready to drink hot liquid tea, which provides a taste and experience of home prepared tea with boiled tea taste.
In view of the above requirements identified, the current application provides the following
solutions through its invention of the objectives as mentioned below:

One of the objectives of the present invention is to provide a liquid milk tea concentrate.
Another objective of the present invention is to provide a process of manufacturing the liquid milk tea concentrate.

Another objective of the invention is to provide a liquid milk tea concentrate that has a suitable shelf life. The shelf life may be at up to 6 months.

Another objective of the invention is to provide the consumer with a liquid concentrate that can be reconstituted with hot water to his desired strength and sweetness and colour.

Another objective of the present invention is to give the consumer, a taste that is desirable in the claimed liquid tea, without the effort and cost.

Another objective of the present invention is to deliver a flavoured hot tea product

Another objective of the present invention is to deliver a product, which would allow the consumer to prepare his drink to his liking with respect to colour, strength and sweetness.

Another objective of the new product disclosed herewith is to deliver boiled tea taste, similar to the one made at home, in a convenient, easy to use manner, without having to go through the actual process of making tea or using a tea bag.

Another objective of the present invention is to maintain the product stability without addition of preservatives for the claimed shelf life period, by employing process steps to preserve the product.

Another objective of the invention is to develop a process for preparing the above mentioned product.

**SUMMARY OF THE INVENTION**

In order to achieve the objectives of the present invention and to obviate the drawbacks of the prior art, the present invention provides a product and a process for the manufacture of a shelf stable liquid milk tea concentrate, which can be reconstituted with hot boiling water to form a cup of hot tea that delivers boiled tea taste. The present invention provides an innovative product which is ready to use and is a considerable improvement over the prior art. The product claimed in the present invention, comprises milk and tea solids as major ingredients and is thermally processed at specified parameters so as to preserve the shelf life of the final product. In order to achieve its objects, the invention in one of its embodiments, provides a
liquid milk tea concentrate as per predetermined ingredients, which may comprise of flavours and sweetening agents. A process for preparing a liquid milk tea concentrate is also disclosed wherein the process comprises of mixing of tea extract with milk, sugar and other optional ingredients followed by thermal processing.

As another of its embodiments, the invention further is directed to a process for the manufacture of a liquid milk tea concentrate, wherein, the process comprises of extraction of specific blend of tea, mixing of tea extract with milk and sugar, homogenization and thermal processing, followed by hot filling of the milk tea concentrate in selected packaging formats to enable single serve or multiserve.

**DESCRIPTION OF THE DRAWINGS**

Figure 1a denotes the general flow chart of the process for making liquid milk tea concentrate.

Figure 1b denotes a preferred embodiment flowchart of the process for making liquid milk tea concentrate.

Figure 2 denotes the flow chart of the process for making liquid milk tea concentrate in another preferred way.

While the invention will be described in conjunction with the illustrated embodiment, it will be understood that it is not intended to limit the invention to such embodiment. On the contrary, it is intended to cover all alternatives, modifications and equivalents as may be included within the spirit and scope of the invention as defined.

**DETAILED DESCRIPTION OF THE INVENTION**

The invention will now be described in detail with reference to the accompanying drawings. However, the present invention is not limited to the embodiments and can be modified in various forms. Thus, the embodiments of the present invention are only provided to explain more clearly the present invention to the ordinarily skilled in the art.

The present invention provides for a liquid milk tea concentrate and a process of manufacturing it, which includes the steps of extraction of tea, mixing of liquid tea extract with milk and sugar, followed by thermal processing as seen in Figure 1(a). An optional step of homogenization prior to the thermal processing or treatment of the mixture may be
included and the concentrate output is packed in holding containers such as sealed packs or sachets. Alternatively, the concentrate may be fed in to holding tubes or holding vessels or holding tanks, followed by packing. The method may further comprise of the step of mixing flavours and desired quantities of sweetening agents, if low or high sugar option is desired.

The liquid milk tea concentrate is ready for use and preferably packed in single use sachets so as to pour directly into a tea cup or mug and be used after diluting with hot or boiling water. The concentrate alternatively can be packed in multiserve packs which allow users to use it at their preferred dilution.

The process for the manufacture of a liquid milk tea concentrate as explained in Figure 1a comprises the steps of (a) making tea extract, (b) mixing with milk and sugar to obtain milk-tea mixture, (c) Thermal treatment of the mixture to obtain the concentrate.

The process may be preferably modified to comprise the steps of (a) making tea extract, (b) mixing with milk along with sugar to obtain milk-tea mixture, optionally followed by mixing other flavor and tea ingredients (c) optional homogenization of the milk-tea mixture, and (d) Thermal treatment of the mixture to obtain the concentrate. It may be noted that homogenization may occur at the time of preparation of mixture in step (b) itself.

In a preferred embodiment of the invention as depicted in Figure 1b, the tea extract along with sweetener is mixed with milk and water to achieve desired concentration, to obtain the milk-tea mixture. Thereafter the milk-tea mixture is filtered and subjected to optional homogenization. It is also a preferred embodiment that the homogenizer is a two stage homogenizer.

It is a preferred embodiment of the invention to have hot water added at the time of mixing of the milk and tea extract.

Figure 2 denotes the flow chart of the process for making liquid milk tea concentrate in another preferred way. As shown in Figure 2, the various ingredients are mixed preferably in a jacketed vessel which allows high shear mixing. The mixture is then filtered and the filtered mixture is homogenized and stored in a tank labeled ready tank in Figure 2, prior to thermal processing by way of pasteurization. The liquid milk tea is held in holding tubes during pasteurisation and thereafter filled in the holding tanks at a temperature suitable for hot filling. The downstream processing for packaging involve filling the product hot in the
desired packaging format, followed by passing the filled packs through cooling and drying tunnels and thereafter packaging the same in secondary packs. In this process the step of homogenization is optional.

In one of the preferred embodiment, the process of manufacture of a liquid milk tea concentrate involves the extraction of specified blend of tea. The tea extract concentration used in the process is in the range of 40-50 Brix, preferred concentration range being 42-45 Brix (about 42 to 45% solids). The process of extraction of tea involves water extraction of a specific type of tea blend at 95 degrees Celsius in an extractor with tea to water ratio at 1 to 5 - 8 and contact time between 5 to 20 min. This tea extract obtained is mixed with other ingredients including sugar syrup having a concentration of 62 to 65 Brix (about 62 to 65 % solids), milk in form of milk solids and/or solid non-dairy creamer and/or dairy whiteners and/or dairy whiteners, flavours and hot water (hereinafter called as "ingredients") in a mixer, preferably a high shear mixer. Mixing of ingredients is carried out at a temperature of 70 to 80 degrees Celsius. The above process gives a concentrated mixture of about 60-65 Brix, preferred concentration range being 63 Brix.

The process of mixing is optionally followed by filtration so as to denude the mixture of any solid particles, which might be left in the milk-tea mixture.

The mixture is optionally moved to a homogenizer. The process of homogenization is used to make the mixture homogenous and can be done through a two stage homogenizer. This is followed by thermal processing of the concentrate such as by way of pasteurization at a temperature of 95 degrees Celsius for 192 seconds.

Pasteurization is usually carried out at low temperature for high duration than at high temperatures for less duration. This process involves stepwise mixing of ingredients to avoid curdling at a specific temperature and a step of pasteurization, which is carried at high temperatures for a significant period of time. This step of pasteurization in the disclosed invention assists in preventing any curdling of the mixture and the development of the desired boiled tea taste. The output of pasteurization, the liquid milk-tea concentrate, is filled in packs which can be multiserve or single serve, which are filled at a temperature between 85 to 92 degrees Celsius, preferred temperature range being between 87 to 89 degrees Celsius in various packaging formats.
In another embodiment of the invention, the thermal processing of the milk-tea mixture is by using Ultra high temperature (UHT) process. The UHT process conditions are at temperatures between 103 to 124 Deg C and holding time between 15 sec to 30 sec, which do not affect the consistency or quality of the product. The product, i.e. liquid milk-tea concentrate may then be filled aseptically at ambient temperatures in various types of packaging.

The liquid milk tea concentrate preferably may comprise of 2 to 6 % tea solids, 35 to 45 % sugar, 12 to 22% milk solids, 0.3 to 5 % non-dairy creamer, 0.0002 to 0.01% tea flavors, 0.002 to 0.01 % milk flavor and 30 to 50 % water, as ingredients.

The invention can be worked by using tea extract in combination with extracts having functional characteristics which includes but is not limited to herbal, spice and ayurvedic extracts and active ingredients. Such tea, when extracted and included in the liquid milk tea concentrate, can be used as both, as a functional drink and also as a refreshing flavoured liquid for the recipient. The functional extracts include, but not limited to black tea extracts, green tea extracts, herbal extracts or a combination of these.

In another embodiment, the invention can involve the use of other methods for the extraction of tea, which include, but are not limited to high temperature, high pressure extraction of tea, water extraction of tea and others, so that the tea extract used in the invention retains the inherent flavor and the shelf life of the final product can be increased.

In yet another embodiment, the invention can use pre-made black tea liquid extract or powdered extract, meeting specific quality.

In yet another embodiment, the invention uses liquid tea extract in combination with green tea extract in powder form.

In yet another embodiment, the invention can be worked by using different forms of sweetening agents, which include but are not limited sugar, glucose, or a mixture of these two or other low sugar variants present in the market, which make the final product with balanced sweetness with reduced calories to the end beverage product, so that the level of sugar in the whole finished product can be manipulated.
In yet another embodiment, the percentage of sweetening agent in the liquid milk tea concentrate can be reduced or increased based on the need of the recipients, which includes but is not limited to use of less percentage of sugar or other sweeteners in the whole concentrate.

In yet another embodiment, natural flavours, which include but are not limited to flavours having preservative characteristics and others, can be used to tag aroma and other flavour qualities to the final product. The flavours which may be used include those known to person skilled in the art for tea flavouring such as including but not limited to cinnamon, lemon, masala, cardamom, almond, walnut, rose, vanilla, berries, caramel, jasmine, tulsi, fennel, orange, chocolate, peppermint, clove, ginger, peach, nutmeg, bergamot, cocoa, etc or their combination.

In yet another embodiment, different modes of filtration, which include but are not limited to deep bed filtration, cross filtration, cake filtration and others, can be used for filtering the mixed ingredients.

In yet another embodiment, the method of thermal processing could be High temperature - extended time (HTET) or Ultra-high temperature (UHT) and correspondingly suitable packaging is used for packing the final product.

In yet another embodiment, any package can be used for filling the final product, which include but are not limited to foil laminate sachets, bottles, multi-layer paper board laminate carton (eg. tetrapak) and others, which are compatible with the method of thermal processing.

In yet another embodiment, any mode of cooling the final product, which includes but are not limited to the modes of direct and indirect cooling and others, can be used in the invention for cooling the final product prior to packaging.

The liquid milk tea concentrate of the present invention is herewith exemplified for one of the preferred embodiments and the details are presented herewith as example:

**Example 1:** 407g tea extract (43% w/w) was added and blended thoroughly with milk and sugar mixture. The milk-sugar mixture was obtained by mixing 2036g sugar with 1660ml water at 70 Deg C in a high shear Silverson homogeniser, to which 750g Dairy Whitener and
150g non dairy creamer was added. The temperature was then maintained between 40 and 50 Deg C. The mixture was blended for 5 minutes to ensure no lumps are present prior to mixing with the tea extract.

250mg milk flavor and 10mg black tea flavor was added to the milk tea extract and the mixture was further homogenized for 3 min. The mixture is then heat treated at 95 Deg for 192 sec and the resulting concentrate was immediately filled hot (at > 85 Deg C) in hot fill PET bottles, sealed and cooled in ambient water held in a water tank.

The concentrate on reconstitution with hot boiling water resulted in a hot milk tea.

**Example 2**: 2036g sugar was mixed with 1881ml water at 70 Deg C in a Silverson homogeniser, to which 750g Dairy Whitener and 150g non dairy creamer was added and a temperature of 40 to 50 Deg C is maintained. The mixture was blended for 5 minutes to ensure no lumps are present. To this homogeneous mixture, 184.2g hot soluble instant tea powder (5% moisture) was added and blended thoroughly. To this 250g milk flavor and 10mg black tea flavor was added and the mixture was further homogenized for 3 min. The mixture is then thermally processes at 95 Deg for 192 sec to obtain the liquid milk tea concentrate which was immediately filled hot (at > 85 Deg C) in hot fill PET bottles, sealed and cooled in ambient water held in a water tank.

The concentrate on reconstitution with hot boiling water resulted in a ready for consumption hot milk tea. The example may also be carried out with low sugar variants instead of sugar.

**Example 3**: 61.08Kg sugar was mixed with 49.25Lit water at 70 Deg C in a high shear industrial mixer, to which 22.5Kg Dairy Whitener and 4.5Kg non dairy creamer was added, maintaining the temperature between 40 and 50 Deg C. The mixture was blended for 5 minutes to ensure no lumps are present. To this homogeneous mixture, 11.68 Kg tea extract (45% w/w tea solids) was added and blended thoroughly. To this 7.5g milk flavor and 3g black tea flavor was added and blended thoroughly to obtain the 149 Kg of liquid milk tea mixture.

**Example 3a**: 75 Kg of the liquid milk tea mixture obtained in Example 3 above was homogenized in a two stage homogenizer and sent through a pasteurizer at 95 Deg C with holding time of 192 sec to obtain the liquid milk tea concentrate and was immediately filled
hot (at > 85 Deg C) in hot fill PET bottles and Pet/foil/poly sachets, sealed and cooled in ambient water held in a water tank.

**Example 3b**: 74 Kg of the concentrate obtained in Example 3 was sent through a pasteurizer without the homogenization. The product was processed at 95 Deg C with holding time of 192 sec to obtain the liquid milk tea concentrate which was filled hot (at > 85 Deg C) in hot fill PET bottles and Pet/foil/poly sachets, sealed and further cooled in ambient water held in a water tank.

Organoleptic properties of the liquid milk tea concentrate obtained in example 3a and 3b were checked. No difference in organoleptic properties was noted in concentrates from 3a and 3b.

**Example 4**: 2000g sugar was mixed with 1490ml water at 70 Deg C in a Silverson homogeniser, to which 1077g Dairy Whitener and 19g non dairy creamer was added. The temperature of the mixture is maintained between 40 and 50 Deg C. The mixture was blended for 5 minutes to ensure no lumps are present. To this homogeneous mixture, 409g liquid tea extract (47% (w/w)) and 5g green tea extract (90% polyphenols, 5% moisture) were added and blended thoroughly. To this 420mg black tea flavor was added and the mixture was further homogenized for 3 min. The mixture is then heat treated at 95 Deg for 192 sec to obtain the liquid milk tea concentrate. The concentrate was then packed either in hot fill PET bottles or foil laminate packs.

**Example 5**: 2000g sugar was mixed with 1490ml water at 70 Deg C in a Silverson homogeniser, to which 1077g Dairy Whitener and 19g non dairy creamer was added. The temperature of the mixture is maintained between 50 and 60 Deg C. The mixture was blended for 5 minutes to ensure no lumps are present. To this homogeneous mixture, 409g liquid tea extract (47% (w/w)) and 5g green tea extract (90% polyphenols, 5% moisture) were added and blended thoroughly. To this 420mg black tea flavor was added and the mixture was further homogenized for 3 min, maintaining the temperature between 45 and 50 Deg C. The mixture was then thermally processed at 105 Deg C for 15 sec in a pilot scale UHT processor and the output was the liquid milk tea concentrate at 35 Deg C. The concentrate was filled in PET bottles, sealed and further cooled in ambient water held in a water tank.
Example 6: 2000g sugar was mixed with 1490ml water at 70 Deg C in a Silverson homogeniser, to which 1077g Dairy Whitener and 19g non dairy creamer was added. Temperature of the mixture was maintained between 40 to 45 Deg C. The mixture was blended for 5 minutes to ensure no lumps are present. To this homogeneous mixture, 409g liquid tea extract (47% (w/w)) and 5g green tea extract (90% polyphenols, 5% moisture) were added and blended thoroughly. To this 420mg black tea flavor was added and the mixture was further homogenized for 3 min. The quantity of homogenized mixture at this stage was about 5000g.

Example 6a: To 2500g of the mixture obtained from Example 6, 300mg of Ginger oleoresin was added and the mixture was homogenized for 5 min. The mixture is then thermally processed with 95 Deg heat for 192 sec to obtain the liquid milk tea concentrate. It was packed immediately (at > 85 Deg C) in hot fill PET bottles, sealed and cooled in ambient water held in a water tank.

The concentrate on reconstitution with hot boiling water resulted in a ginger flavoured hot milk tea.

Example 6b: To 2500g of the mixture obtained from Example 6, 200mg of Cardamom oleoresin was added and the mixture was homogenized for 5 min. The mixture is then heated to 95 Deg and held for 192 sec to obtain the liquid milk tea concentrate. It was packed hot (at > 85 Deg C) in hot fill PET bottles, sealed and cooled in ambient water held in a water tank.

The concentrate on reconstitution with hot boiling water resulted in a cardamom flavoured hot milk tea.

Example 7: 308.1 kg sugar was mixed with 200 kg water heated to 90 Deg C and blended well through recirculation. Added 162 Kg milk powder followed by 9 kg Non-dairy creamer and 1.2 kg green tea extract. The temperature of the mixture was brought down to 50 - 55 Deg C and 84 Kg tea extract (43% solids) along with 0.06 Kg tea flavor was added and blended well to a homogeneous mixture. The homogenous mixture was filtered through 105 micron mesh. The total quantity of the concentrate obtained was 764 Kg.

Example 7a: 375 kg of the concentrate from Example 7 was homogenized in a two stage homogenizer (250/50 bar pressure). The homogenized mixture was subjected to thermal processing line (UHT) at 105 Deg C for 15 sec. The UHT output was cooled to 55 Deg C and
the concentrate was filled in multilayer paper board laminate packs (eg. tetrapak) at the same temperature.

**Example 7b:** 389 kg of the concentrate from Example 7 was homogenized in a two stage homogenizer (250/50 bar pressure). The homogenized mixture was subjected to thermal processing line (UHT) at 118 Deg C for 15 sec. The UHT output was cooled to about 55 Deg C and the concentrate was filled in multilayer paper board laminate packs (eg. tetrapak) at the same temperature.

**Example 8:** 308.1 kg sugar was mixed with 200 kg water heated to 90 Deg C and blended well through recirculation. Added 162 Kg milk powder followed by 9 kg Non-dairy creamer. The temperature of the mixture was brought down to 50 - 55 Deg C and 82.93 Kg tea extract (45% solids) along with 0.06 Kg tea flavor and 0.01 Kg milk flavor was added and blended well to get a homogeneous mixture. The homogenous mixture was filtered through 105 micron mesh and was subjected to thermal processing (UHT) at 105 Deg C for 15 sec. The UHT output was cooled to about 55 Deg C and the concentrate was filled in multilayer paper board laminate packs (eg. tetrapak) at the same temperature.

The product obtained in Example 1 to 8 have an ambient shelf life of about six months, when packed in Pet /foil/poly laminates, PET bottles or in multilayer laminate pack cartons (tetrapak). The product on evaluation had similar taste characteristics of home prepared tea, with characteristic boiled tea taste, throughout the shelf life period.

In view of the above, the invention discloses a liquid milk tea concentrate comprising of tea extract mixed with milk, which is ready for consumption. The consumption may be after dilution with hot water i.e. the concentrate may be reconstituted with hot water to desired strength and sweetness and colour. The said concentrate is preferably in sealed holding packs such as sachets, bottles, tetrapak packs etc. and most preferably in a suitable serve size. This may be a sachet for single serve or multi serve purposes. The liquid milk tea concentrate may also have flavours or a level of sweetening agents to make this low sugar or calorie product. Further, product stability is maintained without addition of preservatives for the required shelf life period by employing process steps to preserve the product.
The process for the manufacture of a liquid milk tea concentrate as disclosed herein summarily comprises the steps of:

(a) obtaining tea extract with desired characteristics,

(b) mixing with milk and other optional ingredients such as sweetener to obtain milk-tea mixture,

(c) optional homogenization of the milk-tea mixture,

(d) thermal processing of the homogenized mixture to obtain the concentrate and

(e) filling the concentrate in various kinds of packs of varying serve size.

The tea extract in preferred embodiment is to be a from a specific blend of tea extracted at 95 degrees Celsius in an extractor with tea to water ratio of 1 to 5 - 8 with 5 to 20 min contact time. The tea extract concentration is preferred to be used is in the range of 40-50% (about 40 to 50 Brix) solids. The tea concentrate to be manufactured by mixing extract with sugar, milk solids and other ingredients, The final concentrate to have a preferred solid content of about 60 to 68% (about 60 to 68 Brix). Also the tea extract may he mixed with sweetening agents and or flavouring agents prior to addition of milk or with milk; the milk may be in the form of milk solids or milk creamer or dairy whitener or non-dairy creamer or in combination, which may also be along with water or dissolved in water; which may be filtered if desired. Various sweetening agents can be used such as sugar syrup. It is preferred that the sweetening agent (syrup) concentration is 62 Brix. The mixing step is preferably at a temperature of 70-80 Degree Celsius. The process of thermal processing may be UHT or HTET. The final concentrate is filled in sealed packs or holding vessels. Prior to of filling in holding vessels or packs, the liquid milk tea may also be held in holding tubes of the pasteuriser.

Although the invention of process and product has been described in connection with the embodiment of the present invention, illustrated in the accompanying drawings, it is not limited thereto. It will be apparent to those skilled in the art that various substitutions, modifications and changes may be made thereto without departing from the scope and spirit of the invention. The invention as described herein above partakes the essence of different steps enumerated supra and is not limited to the subjective wording of terms used herein.
We Claim:

1. A liquid milk tea concentrate comprising of tea extract mixed with milk, which is ready for consumption.

2. The liquid milk tea concentrate as claimed in claim 1, wherein said concentrate is in sealed packs, said sealed packs being sachets, bottles, multi-layer laminate packs and others preferably a sachet for single use.

3. The liquid milk tea concentrate as claimed in claim 1, wherein flavours are also mixed with milk.

4. The liquid milk tea concentrate as claimed in claim 1, wherein sweetening agents are also mixed with milk in varied concentrations.

5. The liquid milk tea concentrate as claimed in claim 1, wherein said concentrate is stable for consumption up to six months.

6. The liquid milk tea concentrate as claimed in any one of claims 1 to 4, wherein the concentrate is composed of 2 to 6% tea solids, 35 to 45% sugar, 12 to 22% milk solids, 0.3 to 5% non-dairy creamer, 0.0002 to 0.01% tea flavors, 0.002 to 0.01% milk flavor and 30 to 50% water, as ingredients.

7. The liquid milk tea concentrate as claimed in claim 6, wherein the concentrate is composed of 4.9% tea solids, 40.4% sugar, 21.3% milk solids, 1.2% non dairy creamer, 0.006% tea flavour, 0.001% milk flavour and 32.5% water.

8. A process for the manufacture of a liquid milk tea concentrate, wherein, the process comprises
   (a) obtaining tea extract,
   (b) mixing with milk to obtain milk-tea mixture,
   (c) optional homogenization of the milk-tea mixture,
   (d) thermal processing of the mixture to obtain the concentrate and
   (e) optionally, filling the concentrate in single or multiserve packs.
9. The process as claimed in claim 8, wherein the tea extract is obtained from a specific blend of tea extracted at 95 degrees Celsius in an extractor with tea to water ratio of 1 to 5-8.

10. The process as claimed in claim 8, wherein the tea extract concentration used is in the range of 40-50 Brix, and is manufactured by extraction.

11. The process as claimed in claim 8, wherein the milk-tea mixture is homogenized at about 60 to 65 Brix.

12. The process as claimed in claim 8, further comprising the step (a2) wherein the tea extract is mixed with sweetening agents, prior to step (b) or during step (b).

13. The process as claimed in claim 12, wherein said sweetening agent is sugar syrup.

14. The process as claimed in claim 8, wherein in step (b) additional agents are also mixed including additional flavouring agents.

15. The process as claimed in claim 12, wherein the sweetening agent concentration is 62 Brix.

16. The process as claimed in claim 8, wherein mixing of ingredients takes place at temperature of 70-80 degrees Celsius.

17. The process as claimed in claim 8, wherein said milk may be milk solids or milk creamer or dairy whitener or non dairy whitener which may optionally be along with water or dissolved in water.

18. The process as claimed in claim 8, further comprising the step (b2) wherein the milk-tea mixture is filtered, prior to step (c).
19. The process as claimed in claim 8, wherein the homogenizer is a two stage homogenizer

20. The process as claimed in claims 8 to 19, wherein the thermal processing is by way of pasteurization preferably carried out at a temperature of 92-96 degrees Celsius for 175-205 seconds.

21. The process as claimed in claims 8 to 19, wherein the thermal processing is by way of Ultra High Temperature treatment preferably at a temperature of 103 to 124 degrees Celsius for 15-30 seconds.

22. The process as claimed in claim 8, wherein prior to step (e) of filling in holding vessels or packs, the liquid milk tea is held in holding tubes of the pasteuriser.

23. The process as claimed in claim 6, wherein the liquid milk tea concentrate is filled in packs at a temperature between 85 to 92 degrees Celsius.

24. The process as claimed in claim 6, wherein the packs can be a sealed packs or a sachet, preferably a single use sachet.
Figure 2
## A. CLASSIFICATION OF SUBJECT MATTER

**INV. A23F3/16**

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)

A23F

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)

EPO-Internal, WPI Data, FSTA

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td>US 5 952 032 A (MORDINI MAURO DOMINICK [US] ET AL) 14 September 1999 (1999-09-14) column 3, line 17 - line 22; examples</td>
<td>6,7, 10, 20,21</td>
</tr>
<tr>
<td>X</td>
<td>EP 0 517 424 AI (GEN FOODS INC [US] KRAFT FOODS INC [US]) 9 December 1992 (1992-12-09) page 4, line 38 - line 40; claims 1, 3</td>
<td>6,7, 10, 20,21</td>
</tr>
<tr>
<td>A</td>
<td>EP 0 162 526 A2 (PROCTER &amp; GAMBLE [US]) 27 November 1985 (1985-11-27) cited in the application on abstract; example 1</td>
<td>6,7, 10, 20,21</td>
</tr>
</tbody>
</table>

* 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) on which 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

Date of the actual completion of the international search

7 July 2014

Date of mailing of the international search report

16/07/2014

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040
Fax: (+31-70) 340-3016

Authorized officer

Saunders , Thomas

Form PCT/ISA/210 (second sheet) (April 2005)
<table>
<thead>
<tr>
<th>Category</th>
<th>Citation of document, with indication, where appropriate, of the relevant passages</th>
<th>Relevant to claim No.</th>
</tr>
</thead>
</table>
### INTERNATIONAL SEARCH REPORT

**Box 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:

1. 

- **Claims Nos.:**
  - because they relate to subject matter not required to be searched by this Authority, namely:

2. 

- **Claims Nos.:**
  - 1-5, 8, 9, 11-19, 22-24
  - 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:
  - see FURTHER INFORMATION sheet PCT/ISA/210

3. 

- **Claims Nos.:**
  - because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

**Box No. III** Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

1. 

- As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. 

- As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.

3. 

- As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

4. 

- No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

**Remark on Protest**

- The additional search fees were accompanied by the applicant’s protest and, where applicable, the payment of a protest fee.

- The additional search fees were accompanied by the applicant’s protest but the applicable protest fee was not paid within the time limit specified in the invitation.

- No protest accompanied the payment of additional search fees.
Claim 1 refers to a liquid milk tea concentrate as an essential feature. The term "concentrate" is a relative one and the description fails to provide any precise definition of what the concentrate should be. As such, a standard tea beverage prepared by brewing tea in hot water and then adding milk can be considered to represent a concentrate. For example, a tea beverage made from tea intended to give a relatively strong flavour (e.g. Irish breakfast tea blend) and left to brew for a relatively long time before adding milk could be regarded as representing a liquid milk tea concentrate with respect to a tea beverage made from tea intended to give a relatively weak flavour (e.g. Earl Grey tea) and left to brew for a relatively short time before adding milk.

Since making a strong cup of tea and adding milk has been done by millions of people every day for over 100 years, the initial phase of the search has revealed a large amount of prior art which is relevant to the issue of novelty. So much prior art exists that it is impossible to determine which parts of the claim 1 may be said to define subject-matter for which protection might legitimately be sought (Article 6 PCT). For these reasons, the search was performed taking into consideration the extent of the search of claim 1.

The search for the product according to claim 1 was restricted to claims 6 and 7, where the tea solids concentrate is clearly defined.

Similarly, claim 8 simply describes the preparation of a tea beverage with milk. In particular, the term "thermal processing" used in step (d) is essentially meaningless - simply allowing the tea beverage to cool represents a thermal processing event.

The search of was the process according to claim 8 was therefore restricted to claim 10, where the tea solids concentrate is clearly defined, as well as to claims 20 and 21 inssofar as they are partly dependent upon claim 10.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1 (e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examination Authority is normally not to carry out a preliminary examination on any matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the applicant proceeds into the relevant phase before the EPO, the applicant is reminded that a search may be carried out during examination on before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.
<table>
<thead>
<tr>
<th>Patent document cited in search report</th>
<th>Publication date</th>
<th>Patent family member(s)</th>
<th>Publication date</th>
</tr>
</thead>
<tbody>
<tr>
<td>US 5952032</td>
<td>14-09-1999</td>
<td>CA 2224740 AI</td>
<td>15-03-1999</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 5952032 A</td>
<td>14-09-1999</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 5980969 A</td>
<td>09-11-1999</td>
</tr>
<tr>
<td></td>
<td></td>
<td>AU 643139 B2</td>
<td>04-11-1993</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CA 2069360 AI</td>
<td>06-12-1992</td>
</tr>
<tr>
<td></td>
<td></td>
<td>CN 1068936 A</td>
<td>17-02-1993</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DE 69203394 DI</td>
<td>17-08-1995</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DE 69203394 T2</td>
<td>04-01-1996</td>
</tr>
<tr>
<td></td>
<td></td>
<td>DK 0517424 T3</td>
<td>27-11-1995</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EP 0517424 AI</td>
<td>09-12-1992</td>
</tr>
<tr>
<td></td>
<td></td>
<td>ES 2075623 T3</td>
<td>01-10-1995</td>
</tr>
<tr>
<td></td>
<td></td>
<td>FI 922289 A</td>
<td>06-12-1992</td>
</tr>
<tr>
<td></td>
<td></td>
<td>GR 3017199 T3</td>
<td>30-11-1995</td>
</tr>
<tr>
<td></td>
<td></td>
<td>HK 152296 A</td>
<td>16-08-1996</td>
</tr>
<tr>
<td></td>
<td></td>
<td>IE 921608 AI</td>
<td>16-12-1992</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP H05176677 A</td>
<td>20-07-1993</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NO 922216 A</td>
<td>07-12-1992</td>
</tr>
<tr>
<td></td>
<td></td>
<td>NZ 242907 A</td>
<td>26-08-1993</td>
</tr>
<tr>
<td></td>
<td></td>
<td>US 5202145 A</td>
<td>13-04-1993</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WO 2008057224 A2</td>
<td>15-05-2008</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EP 0162526 A2</td>
<td>27-11-1985</td>
</tr>
<tr>
<td></td>
<td></td>
<td>JP S6156041 A</td>
<td>20-03-1986</td>
</tr>
<tr>
<td>US 2011123700</td>
<td>26-05-2011</td>
<td>NONE</td>
<td></td>
</tr>
<tr>
<td>WO 2009020902</td>
<td>12-02-2009</td>
<td>US 2009041914 AI</td>
<td>12-02-2009</td>
</tr>
<tr>
<td></td>
<td></td>
<td>WO 2009020902 A</td>
<td>12-02-2009</td>
</tr>
</tbody>
</table>