SUMMARY OF THE INVENTION

Throughout this document, unless otherwise indicated to the contrary, the terms "comprising", "consisting of", and the like, are to be construed as non-exhaustive, or in other words, as meaning "including, but not limited to".

The present invention was developed to overcome the difficulties related to the shelf life, preservation of natural flavor and natural sweetness of natural honey in beverages. The present invention uses gluconic acid and/or glucono delta-lactone (GDL) to complement the flavor of natural honey in addition to its use as an acidifier.

According to a first aspect of the present invention, there is provided a carbonated honey beverage having a composition comprising natural honey, ~~sodium benzoate,~~ gluconic acid or glucono-delta-lactone~~, an antifoaming agent~~ and carbonated water.

Preferably, the composition comprises a predervative.

Most preferably, the preservative is sodium benzoate.

In a preferred embodiment, the composition further comprises an antifoaming agent.

Most preferably, the antifoaming agent is dimethylpolysiloxane.

In another preferred embodiment, the composition further
~~Preferably, the carbonated honey beverage~~ comprises at least one sugar.

Most ~~P~~preferably, the at least one sugar is selected from the group consisting of glucose, fructose and other complex sugars.

Preferably, the natural honey is comprised in an amount of 1 to 50 wt%.

Preferably, the sodium benzoate is comprised in an amount of 0.01 to 1wt%.

Preferably, the gluconic acid or glucono-delta-lactone is comprised in an amount of 0.01 to 1 wt%.

Preferably, the antifoaming agent is comprised in an amount of ~~at most~~0.0008 wt% to 0.001 wt%.

Most ~~P~~preferably, the antifoaming agent is comprised in an amount of 0.0008 wt%.

Preferably, the at least one sugar is comprised in an amount of 1 to 50 wt%.

Most ~~P~~preferably, the natural honey is comprised in an amount of 9 to 25 wt%.

Most ~~P~~preferably, the natural honey is comprised in an amount of about 15 wt%.

Most ~~P~~preferably, the sodium benzoate is comprised in an amount of 0.018 wt%.

More ~~P~~preferably, the gluconic acid or glucono-delta-lactone is comprised in an amount of 0.07 to 0.25 wt%.

Most ~~P~~preferably, the glucono-delta-lactone is comprised in an amount of 0.1125 wt%.

Most ~~P~~preferably, the gluconic acid is comprised in an amount of 0.15 wt%.

More ~~P~~preferably, the at least one sugar is comprised in an amount of 1 to 10 wt%.

Most ~~P~~preferably, the at least one sugar is comprised in an amount of 3 wt%.

According to a second aspect of the present invention, there is provided a method for preparing a carbonated honey beverage comprising natural honey, sodium benzoate, gluconic acid or glucono-delta-lactone, an antifoaming agent and carbonated water, the method comprising:

weighing all ingredients;

dissolving the ingredients in hot water to form an aqueous composition;

performing a High Temperature Short Time (HTST) treatment on the aqueous composition at 80 to 85 degrees Celsius for 10 to 30 seconds; and

introducing carbon dioxide into the aqueous composition by using a carbonator.

~~Preferably, the High Temperature Short Time (HTST) treatment is performed at 80 to 85 degree Celsius for 10 to 30 seconds~~.

Preferably, the carbonator introduces the carbon dioxide at about 3.5 ± 0.2 gas volumes per minute.

BRIEF DESCRIPTION OF THE DRAWINGS

In the figures, which illustrate, by way of example only, embodiments of the present invention, in which:

FIGS. 1A to 1F show the relationship between flavour, temperature and shelf life of the carbonated honey beverage of the present invention.

FIG. 2A shows the appearance of the carbonated honey beverage of the present invention before prolonged storage.

FIG. 2B shows the appearance of the carbonated honey beverage of the present invention after prolonged storage.

FIGS. 3A to 3F show the relationship between appearance, temperature and shelf life of the carbonated honey beverage of the present invention.

FIGS. 4A to 4B show the pH readings of the carbonated honey beverage of the present invention across different test temperatures.

DETAILED DESCRIPTION

The invention relates to carbonated honey beverages, and in particular, to carbonated honey beverages containing natural honey.

~~Sodium benzoate is commonly used in soft drinks and beverages as a food preservative. According to the Agri-Food and Veterinary Authority of Singapore, the maximum permissible limit of benzoic acid is 16ppm or 0.016 %. The amount of benzoic acid in sodium benzoate is approximately 85%, hence the limit for sodium benzoate would be 0.018%. The optimal pH range for sodium benzoate to be effective is below the pH of 4.2~~.

In accordance with a first embodiment of the invention, there is provided a carbonated honey beverage having a composition comprising natural honey, ~~sodium benzoate,~~ gluconic acid or glucono-delta-lactone and carbonated water. The inventor has found that a carbonated honey beverage having a composition comprising natural honey, sodium benzoate, pure lactic acid and carbonated water and sugar contains a sour taste arising from the presence of the lactic acid which does not complement the natural sweet profile of natural honey. This is so despite the added presence of sugar in the composition. As gluconic acid is naturally found in honey and has a milder acid profile when used, the pure lactic acid in the composition is substituted with gluconic acid or glucono-delta-lactone.

Sodium benzoate is commonly used in soft drinks and beverages as a food preservative. According to the Agri-Food and Veterinary Authority of Singapore, the maximum permissible limit of benzoic acid is 0.016 %. The amount of benzoic acid in sodium benzoate is approximately 85%, hence the limit for sodium benzoate would be 0.018%. The optimal pH range for sodium benzoate to be effective is below the pH of 4.2

In addition, the inventor has found that the composition is prone to heavy foaming due

to the presence of natural honey. An antifoaming agent, preferably dimethylpolysiloxane, ~~is~~may therefore be added to reduce foaming and hence wastage during production. The concentration of dimethylpolysiloxane should preferably be 8ppm to 10ppm.

The composition comprising natural honey, ~~sodium benzoate,~~ gluconic acid or glucono-delta-lactone, ~~antifoaming agent~~ and carbonated water preferably with sodium benzoate as preservative and an antifoaming agent such as dimethypolysiloxane, preserves the flavor and sweetness of natural

honey while maintaining a long shelf life.

The honey present in the composition is preferably Australian honey and comprises 1 to 50 wt% of the composition. More preferably, honey present in the composition is comprised in an amount of 9 to 25 wt% or about 15 wt%.

The sodium benzoate present in the composition is preferably comprised in an amount of 0.01 to 1 wt% of the composition. More preferably, the sodium benzoate present in the composition is comprised in an amount of 0.018 wt%.

The gluconic acid present in the composition is preferably comprised in an amount of 0.01 to 1 wt% of the composition. More preferably, the gluconic acid present in the composition is comprised in an amount of 0.07 to 0.25 wt% or about 0.15%.

The antifoaming agent present in the composition is preferably ~~at most~~0.0008 to 0.001 wt% of the composition. More preferably, the antifoaming agent present in the composition is comprised in an amount of 0.0008%.

The carbonated water present in the composition is preferably between 50 to 99 wt% of the composition.

Optionally, 1 to 50 wt% glucose, fructose and/or other complex sugars may be added to sweeten the composition. More preferably, the glucose, fructose and/or other complex sugars present in the composition is comprised in an amount of 1 to 10 wt% or about 3 wt%.

Optionally, natural and/or artificial flavouring may be added to the composition.

[Examples]

The carbonated honey beverage of the present invention is formed by firstly weighing all ingredients required to prepare the base honey syrup, followed by dissolving the ingredients in hot water to form a first part of the composition. High Temperature Short Time (HTST) treatment is performed on the first part of the composition at preferably 80 to 85 degree celsius for 10 to 30 seconds to improve the shelf life of the composition. Carbonation then takes place by topping up a second part of the composition using carbonator at 3.5 ± 0.2 gas volumes.

In accordance with a second embodiment of the invention, there is provided a

carbonated honey beverage having a composition comprising natural honey, sodium

benzoate, glucono-delta-lactone (GDL), anti-foaming agent and carbonated water. The compositions of natural honey, sodium benzoate, anti-foaming agent and carbonated water are as described in the first embodiment. Gluconic acid is replaced by glucono-delta-lactone (GDL) which performs the same function as gluconic acid and upon the addition of water to GDL, hydrolyses to gluconic acid. The GDL present in the composition is preferably comprised in an amount of 0.01 to 1 wt% of the composition. More preferably, the GDL present in the composition is comprised in an amount of 0.07 to 0.25 wt% or 0.1125 wt%.

Tables 1A and 1B illustrate ~~a~~ compositions of a carbonated honey beverage suitable for the working of the present invention, where the carbonated honey beverage is formed by the method described above.

Table 1A: Ingredients Table

Ingredients	% in Throw (Diluted by 1 part syrup to 5 parts water)	g per 150ml bottle	%
Honey (85%)	72	13.5	9
Sugar	24	4.5	3
Sodium Benzoate (E211)	0.108	0.027	0.018
Glucono delta-lactone (E575)	0.675	0.169	0.1125
Natural Flavouring: Lime F17497	0.18	0.03375	0.0225
Artificial Flavouring: Lemon Juice XAP300170	0.18	0.03375	0.0225
Citric Acid (E330)	0.12	0.03	0.02
Anti-Foam: Dimethyl Polysiloxane (E900)	-	-	8 ppm
Carbonated water (to 3.5 gas volumes)	-	Top Up to Volume	

Table 1B: Ingredients Table

Ingredients	g per 250 ml can	Amount
Honey (85%)	37.5	15 %
Sodium Benzoate (E211)	0.045	0.018 %
Glucono delta-lactone (E575)	0.281	0.1125 %
Anti-Foam(containing dimethylpolysiloxane (E900)): 1510-US Dow Corning	-	8 ppm
Carbonated water (to 3.5 gas volumes)	Top Up to Volume	

[Shelf Life Tests]

Samples of the carbonated honey beverages of Tables 1A and 1B were packaged in glass bottles with crown caps enclosure and stored at 4°C (control), 25°C (target), 30°C, 35°C and 40°C to evaluate projected shelf life. The storage temperatures were statistically selected to enable a proper projection of the actual shelf life. PH analysis was measured using the S20 Mettler Toledo pH meter. Results were averaged from three readings. Sugar solids or also known as the brix of the samples were measured at different intervals. The samples were also analyzed for (i) yeast and mould count, (ii) coliforms as well as (iii) total plate count. The sensory attributes of flavour and appearance are presented based on the feedback from internal panellists. The samples were served chilled so as to retain its carbonation. A group of regular five panellists were used each time during the tasting. The flavour and appearance acceptability were assessed using a 6-point rating scale, where -5 denotes "extremely poorer than control", -3 denotes "moderate deterioration" whilst 0 denotes "same as control" and "no significant deterioration". Based on these, linear regression was deployed to obtain the actual acceptable shelf life.

The measured sweetness of the samples was about 10.2° and 11.1° – 11.5° Brix. The brix and pH values are documented in Tables 2A and 2B.

Table 2A: Properties of Accepted Beverage

Attributes	% As prepared	% Diluted with 4 parts water	% After HTST	% After Carbonation
Brix	45.1	10.7	10.4	10.5
pH	3.4			

Table 2B: Properties of Accepted Beverage

Attributes	Values
Brix	11.1 - 11.5
pH	3.4 ± 0.2
Carbonation (Gas volume)	3.5 ± 0.2
Net Volume Per Can (ml)	250 ml min.

Sensory evaluation was conducted and assessed based on appearance and flavour. Figures 1A to 1F show that despite the gradual decrease in flavour with prolonged storage, the overall lemon lime flavour was still reasonably detectable and acceptable to the panellists at all temperatures throughout the tests.

Figures 3A and 3B show the samples before and after storage. It was observed that the beverage

was found to darken slightly with time from a light yellow hue to slight tinge of brown upon prolonged storage. This could be attributed to the drinks undergoing some chemical change under the elevated temperature conditions. Figures 3A and 3B shows the results of the appearance of the beverage across 15 and 23 weeks of testing. From both Figures 1 and 3, the flavour attribute could be seen deteriorating at a faster rate compared to the appearance and is hence the critical factor that limits the shelf life of the beverage. Based on these results, the beverage is estimated to last at least one year at 25°C.

Microbial analysis of the samples found that the Total Plate Count (TPC) readings were below the maximum allowable limit of 10^5 according to the Eleventh Schedule of the Singapore Food Regulation 35 (2). In addition, the counts of coliforms and yeast & mould were not detected. This ascertained that the HTST performed has rendered the beverage safe for consumption under ambient conditions. The results are depicted in Tables 3A and 3B.

Table 3A: Microbial Test Results at Different Test Times and Temperatures

Week	TPC (CFU/g)	COLIFORM (MPN/g)	Yeast & Mold (CFU/g)	Temp °C
0	80	<3.0	<10	4
4	10	<3.0	<10	40
6	30	<3.0	<10	35
8	<10	<3.0	<10	30
8	<10	<3.0	<10	40
12	<10	<3.0	<10	25
12	10	<3.0	<10	35

Table 3B: Microbial Test Results at Different Test Times and Temperatures

Week	TPC (CFU/g)	Coliform (MPN/g)	Yeast & Mould (CFU/g)	Temp (°C)
1	<10	<3	<10	25
11	20	<3	<10	40
13	<10	<3	<10	35
22	<10	<3	<10	40

The pH value is a scaled measurement of the alkalinity or acidity of foods where pH 14 is a highly alkaline state whilst pH 1 being highly acidic. Typically, food spoilage will cause a drop in pH (food acidify) due to the by-products of bacterial growth. Therefore, pH

is used as a supporting evidence to further ascertain if the food product has undergone any chemical changes due to spoilage. Often, pH data measures the stability of the product but does not necessarily indicate any quality changes. The pH readings across different test temperatures are depicted in Figures 4A and 4B. It was observed that the pH measured at different weeks for the respective test temperatures did not deviate much from the control (3.4, 3.71) and is not indicative of the product spoilage.

Although the foregoing invention has been described in some detail by way of illustration and example, and with regard to one or more embodiments, for the purposes of

~~I~~ CLAIMS:

1. A carbonated honey beverage having a composition comprising natural honey~~, sodium benzoate, gluconic acid or glucono-delta-lactone, an antifoaming agent and carbonated water~~ in an amount of 9 to 25 wt%, gluconic acid or glucono-delta-lactone and carbonated water, wherein the gluconic acid or gluco-delta-lactone is added to the composition such that the composition has a pH of from about 3.2 to about 3.6.

2. The carbonated honey beverage of claim 1 wherein the composition comprises ~~at least one sugar~~ a preservative.

3. The carbonated honey beverage of claim 2 wherein ~~the at least one sugar is selected from the group consisting of glucose, fructose and other complex sugars~~ the preservative is sodium benzoate.

4. The carbonated honey beverage of any of the preceding claims wherein the ~~natural honey is comprised in an amount of 1 to 50 wt%~~ composition further comprises an antifoaming agent.

5. The carbonated honey beverage of ~~any of the preceding claims wherein the sodium benzoate is comprised in an amount of 0.01 to 1 wt%~~ claim 4 wherein the antifoaming agent is dimethylpolysiloxane.

6. The carbonated honey beverage of any of the preceding claims wherein the ~~gluconic acid or glucono-delta-lactone is comprised in an amount of 0.01 to 1 wt%~~ composition further comprises at least one sugar.

7. The carbonated honey beverage of ~~any of the preceding claims wherein the antifoaming agent is comprised in an amount of at most 0.001 wt%~~ claim 6 wherein the at least one sugar is selected from the group consisting of glucose, fructose and complex sugars.

8. The carbonated honey beverage of ~~claim 7 wherein the antifoaming agent is comprised in an amount of 0.0008%~~ any of claims 3 to 7 wherein the sodium benzoate is comprised in an amount of 0.01 to 1 wt%.

9. The carbonated honey beverage of ~~claim 2 or 3 wherein the sugar is comprised in an amount of 1 to 50 wt%~~ any of the preceding claims wherein the gluconic acid or glucono-delta-lactone is comprised in an amount of 0.01 to 1 wt%.

10. The carbonated honey beverage of ~~claim 4 wherein the natural honey is comprised in an amount of 9 to 25 wt%~~ any of claims 5 to 9 wherein the antifoaming agent is comprised in an amount of 0.0008 wt%. to 0.001 wt%.

11. The carbonated honey beverage of claim 10 wherein the ~~natural honey is comprised in an amount of 15 wt%~~ antifoaming agent is comprised in an amount of about 0.0008%.

12. The carbonated honey beverage of claim ~~5 wherein the sodium benzoate is comprised in an amount of 0.018 wt%~~ 6 or 7 wherein the at least one sugar is comprised in an amount of 1 to 50 wt%.

13. The carbonated honey beverage of claim ~~6 wherein the gluconic acid or glucono-delta-lactone is comprised in an amount of 0.07 to 0.25 wt%~~ 1 wherein the natural honey is comprised in an amount of about 15 wt%.

14. The carbonated honey beverage of claim ~~13 wherein the glucono- delta- lactone is comprised in an amount of 0.1125 wt%~~ 8 wherein the sodium benzoate is comprised in an amount of about 0.018 wt%.

15. The carbonated honey beverage of claim ~~13 wherein the gluconic acid is comprised in an amount of 0.15 wt%~~ 9 wherein the gluconic acid or glucono-delta-lactone is comprised in an amount of 0.07 to 0.25 wt%.

16. The carbonated honey beverage of claim ~~9 wherein the sugar is comprised in an amount of 1 to 10 wt%~~ 15 wherein the glucono- delta-lactone is comprised in an amount of about 0.1125 wt%.

17. The carbonated honey beverage of claim ~~16 wherein the sugar is comprised in an amount of 3 wt%~~ 15 wherein the gluconic acid is comprised in an amount of about 0.15 wt%.

18. The carbonated honey beverage of claim 12 wherein the at least one sugar is comprised in an amount of 1 to 10 wt%.

19. The carbonated honey beverage of claim 18 wherein the at least one sugar is comprised in an amount of about 3 wt%.

~~18~~20. A method for preparing a carbonated honey beverage comprising natural honey, sodium benzoate, gluconic acid or glucono-delta-lactone, an antifoaming agent and carbonated water, the method comprising:

weighing all ingredients;

dissolving the ingredients in hot water to form an aqueous composition;

performing a High Temperature Short Time (HTST) treatment on the aqueous composition at 80 to 85 degree Celsius for 10 to 30 seconds; and

introducing carbon dioxide into the aqueous composition by using a carbonator~~.~~,

wherein the gluconic acid or gluco-delta-lactone is added such that the carbonated honey beverage has a pH of from about 3.2 to about 3.6.

~~19. The method of claim 18 wherein the High Temperature Short Time (HTST) treatment is performed at 80 to 85 degree Celsius for 10 to 30 seconds.~~

~~20~~21. The method of claim ~~19~~20 wherein the carbonator introduces the carbon dioxide at about 3.5 ± 0.2 gas volumes per minute.

SUMMARY OF THE INVENTION

Throughout this document, unless otherwise indicated to the contrary, the terms "comprising", "consisting of", and the like, are to be construed as non-exhaustive, or in other words, as meaning "including, but not limited to".

The present invention was developed to overcome the difficulties related to the shelf life, preservation of natural flavor and natural sweetness of natural honey in beverages. The present invention uses gluconic acid and/or glucono delta-lactone (GDL) to complement the flavor of natural honey in addition to its use as an acidifier. According to a first aspect of the present invention, there is provided a carbonated honey beverage having a composition comprising natural honey, gluconic acid or glucono-delta-lactone and carbonated water.

Preferably, the composition comprises a preservative.

Most preferably, the preservative is sodium benzoate.

In a preferred embodiment, the composition further comprises an antifoaming agent.

Most preferably, the antifoaming agent is dimethylpolysiloxane.

In another preferred embodiment, the composition further comprises at least one sugar.

Most preferably, the at least one sugar is selected from the group consisting of glucose, fructose and other complex sugars

Preferably, the natural honey is comprised in an amount of 1 to 50 wt%.

Preferably, the sodium benzoate is comprised in an amount of 0.01 to 1 wt%.

Preferably, the gluconic acid or glucono-delta-lactone is comprised in an amount of 0.01 to 1 wt%.

Preferably, the antifoaming agent is comprised in an amount of 0.0008 wt%. to 0.001 wt%.

Most preferably, the antifoaming agent is comprised in an amount of about 0.0008%.

Preferably, the at least one sugar is comprised in an amount of 1 to 50 wt%.

More preferably, the natural honey is comprised in an amount of 9 to 25 wt%.

Most preferably, the natural honey is comprised in an amount of about 15 wt%.

Most preferably, the sodium benzoate is comprised in an amount of about 0.018 wt%.

More preferably, the gluconic acid or glucono-delta-lactone is comprised in an amount of 0.07 to 0.25 wt%.

Most preferably, the glucono-delta-lactone is comprised in an amount of about 0.1125 wt%.

Most preferably, the gluconic acid is comprised in an amount of about 0.15 wt%.

More preferably, the at least one sugar is comprised in an amount of 1 to 10 wt%.

Most preferably, the at least one sugar is comprised in an amount of about 3 wt%.

According to a second aspect of the present invention, there is provided a method for preparing a carbonated honey beverage comprising natural honey, sodium benzoate, gluconic acid or glucono-delta-lactone, an antifoaming agent and carbonated water, the method comprising:

weighing all ingredients;

dissolving the ingredients in hot water to form an aqueous composition;

performing a High Temperature Short Time (HTST) treatment on the aqueous composition at 80 to 85 degree Celsius for 10 to 30 seconds; and

introducing carbon dioxide into the aqueous composition by using a carbonator.

Preferably, the carbonator introduces the carbon dioxide at about 3.5 ± 0.2 gas volumes per minute.

BRIEF DESCRIPTION OF THE DRAWINGS

In the figures, which illustrate, by way of example only, embodiments of the present invention, in which:

FIGS. 1A to 1F show the relationship between flavour, temperature and shelf life of the carbonated honey beverage of the present invention.

FIG. 2A shows the appearance of the carbonated honey beverage of the present invention before prolonged storage.

FIG. 2B shows the appearance of the carbonated honey beverage of the present invention after prolonged storage.

FIGS. 3A to 3F show the relationship between appearance, temperature and shelf life of the carbonated honey beverage of the present invention.

FIGS. 4A to 4B show the pH readings of the carbonated honey beverage of the present invention across different test temperatures.

DETAILED DESCRIPTION

The invention relates to carbonated honey beverages, and in particular, to carbonated honey beverages containing natural honey.

In accordance with a first embodiment of the invention, there is provided a carbonated honey beverage having a composition comprising natural honey, gluconic acid or glucono-delta-lactone and carbonated water. The inventor has found that a carbonated honey beverage having a composition comprising natural honey, sodium benzoate, pure lactic acid and carbonated water and sugar contains a sour taste arising from the presence of the lactic acid which does not complement the natural sweet profile of natural honey. This is so despite the added presence of sugar in the composition. As gluconic acid is naturally found in honey and has a milder acid profile when used, the pure lactic acid in the composition is substituted with gluconic acid or glucono-delta-lactone.

Sodium benzoate is commonly used in soft drinks and beverages as a food preservative. According to the Agri-Food and Veterinary Authority of Singapore, the maximum permissible limit of benzoic acid is 0.016 %. The amount of benzoic acid in sodium benzoate is approximately 85%, hence the limit for sodium benzoate would be 0.018%. The optimal pH range for sodium benzoate to be effective is below the pH of 4.2.

In addition, the inventor has found that the composition is prone to heavy foaming due to the presence of natural honey. An antifoaming agent, preferably dimethylpolysiloxane, may therefore be added to reduce foaming and hence wastage during production. The concentration of dimethylpolysiloxane should preferably be 8 ppm to 10 ppm.

The composition comprising natural honey, gluconic acid or glucono-delta-lactone, and carbonated water, preferably with sodium benzoate as preservative and an antifoaming agent such as dimethypolysiloxane, preserves the flavor and sweetness of natural honey while maintaining a long shelf life.

The honey present in the composition is preferably Australian honey and comprises 1 to 50 wt% of the composition. More preferably, honey present in the composition is comprised in an amount of 9 to 25 wt% or about 15 wt%.

The sodium benzoate present in the composition is preferably comprised in an amount of 0.01 to 1 wt% of the composition. More preferably, the sodium benzoate present in the composition is comprised in an amount of 0.018 wt%.

The gluconic acid present in the composition is preferably comprised in an amount of 0.01 to 1 wt% of the composition. More preferably, the gluconic acid present in the composition is comprised in an amount of 0.07 to 0.25 wt% or about 0.15 wt%.

The antifoaming agent present in the composition is preferably 0.0008 to 0.001 wt% of the composition. More preferably, the antifoaming agent present in the composition is comprised in an amount of 0.0008 wt%.

The carbonated water present in the composition is preferably between 50 to 99 wt% of the composition.

Optionally, 1 to 50 wt% glucose, fructose and/or other complex sugars may be added to sweeten the composition. More preferably, the glucose, fructose and/or other complex sugars present in the composition is comprised in an amount of 1 to 10 wt% or about 3 wt%.

Optionally, natural and/or artificial flavouring may be added to the composition.

[Examples]

The carbonated honey beverage of the present invention is formed by firstly weighing all ingredients required to prepare the base honey syrup, followed by dissolving the ingredients in hot water to form a first part of the composition. High Temperature Short Time (HTST) treatment is performed on the first part of the composition at preferably 80 to 85 degree Celsius for 10 to 30 seconds to improve the shelf life of the composition.

Carbonation then takes place by topping up a second part of the composition using carbonator at 3.5 ± 0.2 gas volumes.

In accordance with a second embodiment of the invention, there is provided a carbonated honey beverage having a composition comprising natural honey, sodium benzoate, glucono-delta-lactone (GDL), anti-foaming agent and carbonated water. The compositions of natural honey, sodium benzoate, anti-foaming agent and carbonated water are as described in the first embodiment. Gluconic acid is replaced by glucono-delta-lactone (GDL) which performs the same function as gluconic acid and upon the addition of water to GDL, hydrolyses to gluconic acid. The GDL present in the composition is preferably comprised in an amount of 0.01 to 1 wt% of the composition. More preferably, the GDL present in the composition is comprised in an amount of 0.07 to 0.25 wt% or about 0.1125 wt%.

Tables 1A and 1B illustrate compositions of a carbonated honey beverage suitable for the working of the present invention, where the carbonated honey beverage is formed by the method described above.

Table 1A: Ingredients Table

Ingredients	% in Throw (Diluted by 1 part syrup to 5 parts water)	g per 150ml bottle	%
Honey (85%)	72	13.5	9
Sugar	24	4.5	3
Sodium Benzoate (E211)	0.108	0.027	0.018
Glucono delta-lactone (E575)	0.675	0.169	0.1125
Natural Flavouring: Lime F17497	0.18	0.03375	0.0225
Artificial Flavouring: Lemon Juice XAP300170	0.18	0.03375	0.0225
Citric Acid (E330)	0.12	0.03	0.02
Anti-Foam: Dimethyl Polysiloxane (E900)	-	-	8 ppm
Carbonated water (to 3.5 gas volumes)	-	Top Up to Volume	

Table 1B: Ingredients Table

Ingredients	g per 250 ml can	Amount
Honey (85%)	37.5	15 %
Sodium Benzoate (E211)	0.045	0.018 %
Glucono delta-lactone (E575)	0.281	0.1125 %
Anti-Foam(containing dimethylpolysiloxane (E900)): 1510-US Dow Corning	-	8 ppm
Carbonated water (to 3.5 gas volumes)	Top Up to Volume	

[Shelf Life Tests]

Samples of the carbonated honey beverages of Tables 1A and 1B were packaged in glass bottles with crown caps enclosure and stored at 4°C (control), 25°C (target), 30°C, 35°C and 40°C to evaluate projected shelf life. The storage temperatures were statistically selected to enable a proper projection of the actual shelf life. PH analysis was measured using the S20 Mettler Toledo pH meter. Results were averaged from three readings. Sugar solids or also known as the brix of the samples were measured at different intervals. The samples were also analyzed for (i) yeast and mould count, (ii) coliforms as well as (iii) total plate count. The sensory attributes of flavour and appearance are presented based on the feedback from internal panellists. The samples were served chilled so as to retain its carbonation. A group of regular five panellists were used each time during the tasting. The flavour and appearance acceptability were assessed using a 6-point rating scale, where -5 denotes "extremely poorer than control", -3 denotes "moderate deterioration" whilst 0 denotes "same as control" and "no significant deterioration". Based on these, linear regression was deployed to obtain the actual acceptable shelf life.

The measured sweetness of the samples was about 10.2° and 11.1° – 11.5° Brix. The brix and pH values are documented in Tables 2A and 2B.

Table 2A: Properties of Accepted Beverage

Attributes	% As prepared	% Diluted with 4 parts water	% After HTST	% After Carbonation
Brix	45.1	10.7	10.4	10.2
pH	3.4			

Table 2B: Properties of Accepted Beverage

Attributes	Values
Brix	11.1 - 11.5
pH	3.4 ± 0.2
Carbonation (Gas volume)	3.5 ± 0.2
Net Volume Per Can (ml)	250 ml min.

Sensory evaluation was conducted and assessed based on appearance and flavour. Figures 1A to 1F show that despite the gradual decrease in flavour with prolonged storage, the overall honey flavour was still reasonably detectable and acceptable to the panellists at all temperatures throughout the tests.

Figures 3A and 3B show the samples before and after storage. It was observed that the beverage was found to darken slightly with time from a light yellow hue to slight tinge of brown upon prolonged storage. This could be attributed to the drinks undergoing some chemical change under the elevated temperature conditions. Figures 3A and 3B show the results of the appearance of the beverage across 15 and 23 weeks of testing. From both Figures 1 and 3, the flavour attribute could be seen deteriorating at a faster rate compared to the appearance and is hence the critical factor that limits the shelf life of the beverage. Based on these results, the beverage is estimated to last at least one year at 25°C.

Microbial analysis of the samples found that the Total Plate Count (TPC) readings

were below the maximum allowable limit of 10^5 according to the Eleventh Schedule of the Singapore Food Regulation 35 (2). In addition, the counts of coliforms and yeast & mould were not detected. This ascertained that the HTST performed has rendered the beverage safe for consumption under ambient conditions. The results are depicted in Tables 3A and 3B.

Table 3A: Microbial Test Results at Different Test Times and Temperatures

Week	TPC (CFU/g)	COLIFORM (MPN/g)	Yeast & Mold (CFU/g)	Temp °C
0	80	<3.0	<10	4
4	10	<3.0	<10	40
6	30	<3.0	<10	35
8	<10	<3.0	<10	30
8	<10	<3.0	<10	40
12	<10	<3.0	<10	25
12	10	<3.0	<10	35

Table 3B: Microbial Test Results at Different Test Times and Temperatures

Week	TPC (CFU/g)	Coliform (MPN/g)	Yeast & Mould (CFU/g)	Temp (°C)
1	<10	<3	<10	25
11	20	<3	<10	40
13	<10	<3	<10	35
22	<10	<3	<10	40

The pH value is a scaled measurement of the alkalinity or acidity of foods where pH 14 is a highly alkaline state whilst pH 1 being highly acidic. Typically, food spoilage will cause a drop in pH (food acidify) due to the by-products of bacterial growth. Therefore, pH is used as a supporting evidence to further ascertain if the food product has undergone any chemical changes due to spoilage. Often, pH data measures the stability of the product but does not necessarily indicate any quality changes. The pH readings across different test temperatures are depicted in Figures 4A and 4B. It was observed that the pH measured at different weeks for the respective test temperatures did not deviate much from the control (3.4, 3.71) and is not indicative of the product spoilage.

Although the foregoing invention has been described in some detail by way of illustration and example, and with regard to one or more embodiments, for the purposes of

CLAIMS:

1. A carbonated honey beverage having a composition comprising natural honey in an amount of 9 to 25 wt%, gluconic acid or glucono-delta-lactone and carbonated water, wherein the gluconic acid or gluco-delta-lactone is added to the composition such that the composition has a pH of from about 3.2 to about 3.6.

2. The carbonated honey beverage of claim 1 wherein the composition comprises a preservative.

3. The carbonated honey beverage of claim 2 wherein the preservative is sodium benzoate.

4. The carbonated honey beverage of any of the preceding claims wherein the composition further comprises an antifoaming agent.

5. The carbonated honey beverage of claim 4 wherein the antifoaming agent is dimethylpolysiloxane.

6. The carbonated honey beverage of any of the preceding claims wherein the composition further comprises at least one sugar.

7. The carbonated honey beverage of claim 6 wherein the at least one sugar is selected from the group consisting of glucose, fructose and complex sugars.

8. The carbonated honey beverage of any of claims 3 to 7 wherein the sodium benzoate is comprised in an amount of 0.01 to 1 wt%.

9. The carbonated honey beverage of any of the preceding claims wherein the gluconic acid or glucono-delta-lactone is comprised in an amount of 0.01 to 1 wt%.

10. The carbonated honey beverage of any of claims 5 to 9 wherein the antifoaming agent is comprised in an amount of 0.0008 wt%. to 0.001 wt%.

11. The carbonated honey beverage of claim 10 wherein the antifoaming agent is comprised in an amount of about 0.0008%.

12. The carbonated honey beverage of claim 6 or 7 wherein the at least one sugar is comprised in an amount of 1 to 50 wt%.

13. The carbonated honey beverage of claim 1 wherein the natural honey is comprised in

an amount of about 15 wt%.

14. The carbonated honey beverage of claim 8 wherein the sodium benzoate is comprised in an amount of about 0.018 wt%.

15. The carbonated honey beverage of claim 9 wherein the gluconic acid or glucono-delta-lactone is comprised in an amount of 0.07 to 0.25 wt%.

16. The carbonated honey beverage of claim 15 wherein the glucono- delta-lactone is comprised in an amount of about 0.1125 wt%.

17. The carbonated honey beverage of claim 15 wherein the gluconic acid is comprised in an amount of about 0.15 wt%.

18. The carbonated honey beverage of claim 12 wherein the at least one sugar is comprised in an amount of 1 to 10 wt%.

19. The carbonated honey beverage of claim 18 wherein the at least one sugar is comprised in an amount of about 3 wt%.

20. A method for preparing a carbonated honey beverage comprising natural honey, sodium benzoate, gluconic acid or glucono-delta-lactone, an antifoaming agent and carbonated water, the method comprising:

weighing all ingredients;

dissolving the ingredients in hot water to form an aqueous composition;

performing a High Temperature Short Time (HTST) treatment on the aqueous composition at 80 to 85 degree Celsius for 10 to 30 seconds; and

introducing carbon dioxide into the aqueous composition by using a carbonator,

wherein the gluconic acid or gluco-delta-lactone is added such that the carbonated honey beverage has a pH of from about 3.2 to about 3.6.

21. The method of claim 20 wherein the carbonator introduces the carbon dioxide at about 3.5 ± 0.2 gas volumes per minute.