

FLOWABLE LIQUID COMPOSITION

FIELD OF INVENTION

This invention relates to a flowable liquid composition. In particular the
5 invention relates to a flowable liquid composition comprising an edible gum
and a viscosity inhibiting carrier for use as a liquid food viscosity regulator.

BACKGROUND

In the food industry, it is often desirable to add viscosity enhancers to
10 food formulations to increase the viscosity of the end product. Examples of
such end products include yoghurts and desserts. It is also often desirable to
provide viscous thickened liquids, particularly for the geriatric and
convalescent markets. The thickened liquids need to be of a particular,
known and repeatable viscosity to be applicable to these markets.

15 Currently, these products are pre-prepared by mixing the foodstuff
with the viscosity enhancer before packaging, and providing the final
thickened product already packaged. In some instances, the thickener is
provided as a pre-mixed viscous emulsion or gel, which is then added to the
food to be thickened, and stirred. It is often difficult to properly mix these gels
20 into the food as the gel is not easily disperse and tends to clump, resulting in
lumpy end products.

Viscosity enhancers can also be provided in powdered form for the
end user to mix into the food to be thickened, but this presents problems with

inconsistencies in incorporating the powder and the potential to incorporate air into very thick products. Also, addition of the powdered thickener usually results in a lumpy, inconsistent product which would not be desirable for consumption, especially for geriatric consumers, or patients suffering from dysphagia.

Dysphagia is a condition where the process of swallowing is impaired. During eating, this can lead to the entry of liquid or solid food into the trachea (windpipe) and lungs (known as aspiration) of the sufferer. Dysphagia can occur at any age but is most common in the elderly, especially if they have suffered a stroke or have dementia. A management strategy for sufferers of dysphagia is to consume foods that are texture modified (thickened foods and beverages) that slow the swallowing reflex and allow the windpipe time to close before the food passes, thereby preventing aspiration.

It would be advantageous to provide a composition which could be added *in situ* to any hot or cold food or beverage to give a thickened liquid of known and repeatable viscosity.

The most commonly used viscosity enhancers used in the food industry are the edible gums. Edible gums are polysaccharides capable of causing a large viscosity increase in solution, even at small concentrations. In the food industry they are used as thickening agents, gelling agents, emulsifiers and stabilisers. Most often these gums are found in the woody elements of plants or in seed coatings. Examples include agar, obtained from seaweed, alginic acid, from seaweed, beta-glucan, from oat or barley

bran, carrageenan, from seaweed, guar gum, from guar beans, gum arabic, from the sap of *Acacia* trees, gum tragacanth, from the sap of *Astragalus* shrubs, locust bean gum, from the seeds of the carob tree, sodium alginate, from seaweed, and xanthan gum, one example produced by bacterial fermentation.

When these gums are dissolved into aqueous solution, the gums restrict the movement of water molecules and cause a considerable increase in viscosity, from thickening to gel formation.

Generally these gums are provided in powder form and can be difficult to disperse in a solution or foodstuff as they tend to hydrate rapidly before each individual powder particle is dispersed and form clumps and lumps in the solution. It is known that edible gums can be dispersed in a foodstuff by adding the powder into a product using high shear mixing to ensure efficient dispersion, or pre-blending the gum with another powder ingredient to separate the gum particles before they contact water. One of the problems with these techniques is that the gum expresses its viscosity once in solution, making it difficult to dispense the solution unless the gum concentration is low. This has implications for the addition of the solution to the foodstuff, as the viscosity and concentration of the end product will be affected by the amount of solution added.

Also, such solutions are not stable and must be used immediately or preservatives. Hence gum compositions of this type are not prepared, stored

or sold in this form, but normally kept in powdered form until just prior to use in the production of the food product.

In addition, dispensing of powders and gums by volume (for example using a cup measure) is inherently inaccurate due to the variation in bulk density of the powders and gums.

Therefore, there would be an advantage if it were possible to provide a liquid edible gum viscosity-inhibited composition which only expresses its viscosity when added to a hot or cold food or beverage, which may overcome at least some of the above-mentioned disadvantages or provide a useful or commercial choice.

SUMMARY OF THE INVENTION

In one form, although it need not be the only or indeed the broadest form, the invention resides in a stable liquid composition of less than 7500cP comprising at least one edible gum and at least one viscosity inhibiting carrier, wherein addition of the composition to a hot or cold foodstuff increases the viscosity of the foodstuff to greater than 400cP.

In another form, the invention resides in a stable liquid composition of less than 7500cP comprising at least one edible gum and more than one viscosity inhibiting carrier, wherein addition of the composition to a hot or cold foodstuff increases the viscosity of the foodstuff to greater than 400cP

In another form, the invention resides in a method of increasing the viscosity of a hot or cold foodstuff to greater than 400cP, the method

comprising addition to the foodstuff of stable liquid composition of less than 7500cP comprising at least one edible gum and at least one viscosity inhibiting carrier.

In a further form the invention resides in a method of providing a foodstuff with viscosity of at least 400cP to feed a person suffering from dysphagia, the method comprising addition to the foodstuff of a stable liquid composition of less than 7500cP comprising at least one edible gum and at least one viscosity inhibiting carrier.

In a further form, the invention resides in a method of manufacturing a stable liquid composition comprising adding at least one edible gum to at least one viscosity inhibiting carrier and mixing the composition; wherein the viscosity of the composition is less than 7500cP and the composition is stable for at least six months.

In a further form, the invention resides in a method of manufacturing a stable liquid composition comprising adding at least one edible gum to more than one viscosity inhibiting carrier and mixing the composition; wherein the viscosity of the composition is less than 7500cP and the composition is stable for at least six months.

In a further form, the invention resides in a stable liquid composition made by the methods described above, the composition comprising at least one edible gum and at least one viscosity inhibiting carrier, or more than one viscosity inhibiting carrier, wherein the viscosity of the composition is less than 7500cP.

The invention allows the viscosity of a hot or cold foodstuff to be increased in a predictable and repeatable manner. This is particularly important in the preparation of foodstuffs for persons suffering from dysphagia where the viscosity of the foodstuff is critical. Particularly, a liquid edible gum viscosity-inhibited composition of the invention permits easy and accurate dispensing via a precision volumetric pump.

The edible gums can include one or more of any practicable edible gum, including guar gum, xanthan gum, agar, alginic acid/sodium alginate, beta glucan, carrageenan, gum Arabic, gum tragacanth, locust bean gum, carboxymethylcellulose, methylcellulose, hydroxypropyl methylcellulose, gum ghatti, gum karaya, pectin (high methoxy and low methoxy), larch gum, fucellaran, starches, gelatin, and gellan gum.

The viscosity inhibiting carrier can include one or more than one carrier selected from the list including concentrated sugar solution, invert sugar, concentrated polydextrose solution, ethanol, glycerol, sorbitol, vegetable oil for example canola oil, propylene glycol, triacetin, and alcohols.

In order that the invention may be more readily understood and put into practice, one or more preferred embodiments thereof will now be described, by way of example only.

DETAILED DESCRIPTION OF THE INVENTION

The invention advantageously provides a liquid composition which is flowable and stable, and when added to a hot or cold food or beverage,

easily disperses the edible gum in the food or beverage to uniformly thicken the food or beverage to the desired viscosity. Using the composition of the invention, the viscosity of the thickened food or beverage can be predicted and reliably repeated.

5 As discussed previously, edible gums are usually provided in powder form or gel form and are difficult to disperse in a solution or foodstuff as they tend to form lumps in the solution. It is known that edible gums can be dispersed in a foodstuff by adding the powder into a product using high shear mixing to ensure efficient dispersion, or pre-blending the gum with
10 another powder ingredient to separate the gum particles before they contact water. One of the problems with these techniques is that the gum expresses its viscosity once in solution, making it difficult to dispense the solution unless the gum concentration is low. This has implications for the addition of the solution to the foodstuff, as the viscosity and concentration of the end
15 product will be affected by the amount of solution added. Edible gums can be dispersed using non-hydrating liquids, for example alcohol, glycerine, polyols or vegetable oils individually, however many of these liquids has its own disadvantages when trying to produce a stable product that has useable commercial shelf life.

20 Also, such solutions are sometimes not stable and must be used immediately or preservatised. Hence gum solutions of this type are not prepared, stored and marketed in this form, but normally kept in powdered form until just prior to use in the production of the food product.

The present invention provides a flowable liquid composition which is stable, and can be stored for up to 6 to 24 months without significant degradation in the performance of the thickener. The liquid composition of the invention is concentrated and can accommodate a higher percentage of edible gum without losing the flowable character of the composition. This enables easy and accurate dispensing of the formulation into the foodstuff of choice.

Because the composition of the invention is stable, and the viscosity remains constant for a commercially reasonable period of time, the formulation can be provided as a packaged product *per se* to the end user. The end user can reliably calculate the amount of the product of the invention to add to a food or beverage to achieve a desired end viscosity. The liquid composition of the invention is then easily dispensed and easily mixed into the foodstuff to give the desired end product.

Stability of the composition of the invention over time is indicated by retention of colour (if any), flavour (if any), and viscosity of the concentrate, clarity and ability to express viscosity to a predetermined level when added to a food or beverage.

Referring to the aspects of the invention summarised above, the viscosity inhibiting carrier or mixtures of carriers in which the edible gum is dispersed can be any practicable viscosity inhibitor or mixture of inhibitors which allows dispersion of the edible gum, while inhibiting the viscosity expression of the gum, until the composition is added to a foodstuff. The

inventors have found a number of effective carriers and mixtures of carriers for use in the composition of the invention. More than one carrier can be combined in the liquid composition of the invention to maximise the efficacy of the composition.

5 An example of a viscosity inhibiting carrier of the invention is a concentrated sugar solution, or concentrated solution of a sugar derivative. The concentrated sugar or sugar derivative solution can include any practicable sugar, mixture of sugars, or sugar derivatives such as sucrose, fructose, glucose, maltose, or any other mono-, di-, tri- or polysaccharide, or
10 a derivative such as polydextrose, which can be dissolved in water to high level of concentration. Other sources of sugars can also be used, for example fruit or vegetable juice concentrates. The amount of water needed to effect high concentration depends on the sugar or mixture of sugars being used. Concentrations can therefore range from 50%-90w/wt. Some of the
15 sugar or sugar derivative soluble solids can be replaced with other food approved soluble solids like salt and food acids, up to a value of 30% of the total soluble solids, with the ultimate maximum level being determined by taste.

 Further examples of carriers useful in the invention include ethyl
20 alcohol, glycerol, sorbitol, concentrated erythritol solutions, isomalt, lactitol, mannitol, maltitol, xylitol, triacetin, propylene glycol, and vegetable and/or animal fats and oils.

Edible gum can be added to the composition of the invention in amounts ranging from 0.1 to 60%, depending on the carrier, the gum to be used, and the desired viscosity of the composition of the invention. The edible gum can be any edible gum or mixture of gums which will not hydrate in the carrier, and will therefore retain the flowable nature of the composition of the invention. Examples of such gums are guar gum, gum arabic, gum ghatti, gum karaya, gum tragacanth, psyllium seed gum, quince seed gum, pectins, larch gum, stractan, carrageenan, gelatin, gellan gum, tara gum, alginates, pregel starches, cellulose gums, xanthan gum, locust bean gum, and mixtures of any of the foregoing.

The viscosity of the liquid composition of the invention can be between 400cP and 7500cP making the composition flowable and easy to package and dispense.

The liquid composition of the invention can also include other components such as colours, flavours, protein (animal and plant), dietary fibres, vitamins and minerals, humectants, for example glycerol and sorbitol, fats and oils, emulsifiers, acidity regulators, antioxidants, low calorie bulking agents, firming agents, flavour enhancers, foaming agents, gelling agents, preservatives, sequestrants, stabilisers.

Ingredients that normally hydrate and thicken, for example proteins, dietary fibre, bulking agents, would also be inhibited from hydrating and thickening in the composition of the invention, meaning that these ingredients can also be used in higher levels in a concentrate of the

composition of the invention, without unduly affecting the viscosity of the composition.

The manufacture of the composition of the invention can include a step of heating the carrier to assist dispersion of the gum. The heated composition can be hot-fill packaged, or cooled prior to packaging.

It is clear from the above description that the invention provides a product with many advantages over those currently available. The composition of the invention allows production and provision of a stable, flowable liquid composition for easy addition to a hot or cold food or beverage. The desired viscosity of the end product can be reliably and repeatably adjusted by adjusting the amount of flowable composition added to the food or beverage.

The following non-limiting Examples describe aspects of the invention for illustrative purposes.

Example 1: Method of Manufacture

The following general method is used for manufacture of a liquid composition of the invention, and used in respect of some of the Examples below.

- Sugar is dissolved in water substantially to saturation, or alternatively a fruit or vegetable concentrate may be used;
- The saturated solution is heated to between 30°C and 80°C;
- The edible gum is added to the warmed solution and mixed to disperse;
- Other additives such as citric acid, colours, flavourants are added to the solution and mixed to dissolution;

- The resultant composition is either hot-fill packaged, or cooled to room temperature and cold-fill packaged.

Example 2: Composition 1

	Apple concentrate 70Bx	95%
5	Guar Gum	3%
	Citric Acid	1%
	Food flavours	0.5%
	Food colours	0.5%

Using the method described in Example 1 above, this composition is a
 10 flowable liquid of 500cP that disperses easily in water to reliably and
 repeatably give an end product solution of 1000cP.

Example 3: Composition 2

	Sucrose	66%
	Water	27%
15	Guar Gum	5%
	Citric Acid	1%
	Food flavours	0.5%
	Food colours	0.5%

Using the method described in Example 1 above, this composition is a
 20 flowable liquid of 900cP that disperses easily in water to reliably and
 repeatably give an end product of 4500cP.

Example 4: Composition 3

	Polydextrose	44%
	Water	35%
25	Guar Gum	10%
	Maltodextrin	6.8%
	Glycerine	2%
	Sorbitol	2%

Citric Acid	0.2%
Sodium Citrate	0.1%
Xanthan Gum	0.06%

- 5
- Polydextrose is dissolved in water substantially to saturation;
 - The saturated solution is heated to between 30°C and 80°C;
 - The guar gum and xanthan gum are added to the warmed solution and mixed to disperse;
 - The remaining components are added to the solution and mixed to
- 10 dissolution;
- The resultant composition is either hot-fill packaged, or cooled to room temperature and cold-fill packaged.

This composition is a flowable liquid of 1500cps that disperses easily in water to reliably and repeatably give viscosities in the range of 500 to 10

- 15 000cps as determined by fixing the ratio of the weight of Composition 3 to the weight of water, or other food liquid such as milk, juice or tea.

Example 5: Composition 4

20	Ethanol	30%
	Propylene glycol	19.2%
	Xanthan Gum	30%
	Carboxymethylcellulose (CMC)	0.2%
	Water	20%

- 25
- The CMC is dispersed in the water and allowed to hydrate.
 - The alcohol is added to the CMC/water blend, followed by the propylene glycol
 - The mixture is mixed well.
 - Xanthan gum is added and mixed well.

- Other additives such as citric acid, colours, flavourants can be added to the mix if desired.
- The composition is filled into packaging.

This composition is a flowable liquid of 400cps that disperses in water, or
5 other liquid food, easily and repeatedly to give an end product of 1000cps
when 3 grams of the composition is added to 200ml of water (or other
liquid).

Throughout the specification the aim has been to describe the
preferred embodiments of the invention without limiting the invention to any
10 one embodiment or specific collection of features.

Throughout this specification, unless the context requires otherwise,
the word "comprises", and variations such as "comprise" or "comprising", will
be understood to imply the inclusion of a stated integer or group of integers
or steps but not to the exclusion of any other integer or group of integers.

15 Any reference to publications cited in this specification is not an
admission that the disclosures constitute common general knowledge in
Australia.

Claims

1. A stable liquid composition of less than 7500cP comprising at least one edible gum and at least one viscosity inhibiting carrier, wherein addition of the composition to a hot or cold foodstuff increases the viscosity of the foodstuff to greater than 400cP.
2. A stable liquid composition of less than 7500cP comprising at least one edible gum and more than one viscosity inhibiting carrier, wherein addition of the composition to a hot or cold foodstuff increases the viscosity of the foodstuff to greater than 400cP.
3. The composition of claim 1 or claim 2 wherein the at least one edible gum is selected from the group consisting of guar gum, xanthan gum, agar, alginic acid, sodium alginate, beta glucan, carrageenan, gum Arabic, gum tragacanth, locust bean gum, carboxymethylcellulose, methylcellulose, hydroxypropyl methylcellulose, gum ghatti, gum karaya, pectin, larch gum, fucellaran, starches, gelatin, and gellan gum.
4. The composition of claim 3 wherein the viscosity inhibiting carrier or carriers is selected from the group consisting of concentrated sugar solution, fruit or vegetable juice concentrate, invert sugar, concentrated polydextrose solution, alcohol, glycerol, sorbitol, vegetable oil, propylene glycol triacetin, lecithin and n-propanol.
5. The composition of claim 1 or claim 2 wherein the at least one edible gum is selected from the group consisting of galactomannans and the viscosity inhibiting carrier or carriers is selected from the group consisting of

concentrated sugar solutions.

6. The composition of claim 1 or claim 2 wherein the at least one edible gum is selected from the group consisting of gums derived from bacterial fermentation and the viscosity inhibiting carrier or carriers is selected from the group consisting of alcohols and triglycerides.

7. A method of increasing the viscosity of a hot or cold foodstuff to greater than 400cP, the method comprising addition to the foodstuff of stable liquid composition of less than 7500cP comprising at least one edible gum and at least one viscosity inhibiting carrier.

8. A method of increasing the viscosity of a hot or cold foodstuff to greater than 400cP, the method comprising addition to the foodstuff of stable liquid composition of less than 7500cP comprising at least one edible gum and more than one viscosity inhibiting carrier.

9. The method of claim 7 or claim 8 wherein the at least one edible gum is selected from the group consisting of guar gum, xanthan gum, agar, alginic acid, sodium alginate, beta glucan, carrageenan, gum Arabic, gum tragacanth, locust bean gum, carboxymethylcellulose, methylcellulose, hydroxypropyl methylcellulose, gum ghatti, gum karaya, pectin, larch gum, fucellaran, starches, gelatin, and gellan gum.

10. The method of claim 7 or claim 8 wherein the viscosity inhibiting carrier or carriers is selected from the group consisting of concentrated sugar solution, fruit or vegetable juice concentrate, invert sugar, concentrated polydextrose solution, alcohol, glycerol, sorbitol, vegetable oil, propylene

glycol triacetin, lecithin and n-propanol.

11. The method of claim 7 or claim 8 wherein the at least one edible gum is selected from the group consisting of galactomannans and the viscosity inhibiting carrier or carriers is selected from the group consisting of concentrated sugar solutions.

12. The method of claim 7 or claim 8 wherein the at least one edible gum is selected from the group consisting of gums derived from bacterial fermentation and the viscosity inhibiting carrier or carriers is selected from the group consisting of alcohols and triglycerides.

13. A method of providing a foodstuff with viscosity of at least 400cP to feed a person suffering from dysphagia, the method comprising addition to the foodstuff of a stable liquid composition of less than 7500cP comprising at least one edible gum and at least one viscosity inhibiting carrier.

14. A method of manufacturing a stable liquid composition comprising adding at least one edible gum to at least one viscosity inhibiting carrier and mixing the composition; wherein the viscosity of the composition is less than 7500cP and the composition is stable for at least six months.

15. A method of manufacturing a stable liquid composition comprising adding at least one edible gum to more than one viscosity inhibiting carrier and mixing the composition; wherein the viscosity of the composition is less than 7500cP and the composition is stable for at least six months.

16. The method of claim 14 or 15 wherein the at least one edible gum is selected from the group consisting of guar gum, xanthan gum, agar, alginic

acid, sodium alginate, beta glucan, carrageenan, gum Arabic, gum tragacanth, locust bean gum, carboxymethylcellulose, methylcellulose, hydroxypropyl methylcellulose, gum ghatti, gum karaya, pectin, larch gum, fucellaran, starches, gelatin, and gellan gum.

5 17. The method of claim 14 or claim 15 wherein the viscosity inhibiting carrier or carriers is selected from the group consisting of concentrated sugar solution, fruit or vegetable juice concentrate, invert sugar, concentrated polydextrose solution, alcohol, glycerol, sorbitol, vegetable oil, propylene glycol triacetin, lecithin and n-propanol.

10 18. The method of claim 14 or 15 wherein the at least one edible gum is selected from the group consisting of galactomannans and the viscosity inhibiting carrier or carriers is selected from the group consisting of concentrated sugar solutions.

15 19. The method of claim 14 or claim 15 wherein the at least one edible gum is selected from the group consisting of gums derived from bacterial fermentation and the viscosity inhibiting carrier or carriers is selected from the group consisting of alcohols and triglycerides.

20. A stable liquid composition made by the method of claim 14 or claim 15.

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