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(54) Title: FOAMED JUICE COMPOSITIONS COMPRISING FOAM ENHANCERS

(57) Abstract: Foamed juice products and methods of making the foamed juice products are disclosed. In a general embodiment, the foamed juice products include juice and coffee in an amount from about 0.01% w/v to about 1.0% w/v. The foamed juice products can be ready-to-drink products that can be consumed cold, warm or hot. Alternatively, the foamed juice products can be powdered products designed to be reconstituted in a liquid.



TITLE

**FOAMED JUICE COMPOSITIONS COMPRISING
FOAM ENHANCERS**

BACKGROUND

[0001] The present disclosure generally relates to food and beverage products. More specifically, the present disclosure relates to foamed juice products and methods of making the foamed juice products.

[0002] Foaming of liquids is important in many applications such as, for example, the preparation of coffee, cocoa, or the like. Foam is also often considered a highly desirable attribute for many different types of fruit and milk beverages. Therefore, the ability of a liquid to form a foam and the stability of the foam are important in order to provide a pleasing product to the intended consumer. In some instances, a foamed liquid (e.g., a beverage) can be prepared from a dried soluble powder. In this case, the formation of a stable foam upon reconstitution may be desired as is the case for espresso coffee prepared from instant powder where the presence of a fine foam layer (i.e., “crema”) is important for the consumer perception of the quality of the beverage. In other instances, a foamed beverage may be a ready-to-drink beverage.

[0003] In one example of a beverage having improved foaming properties, U.S. Patent No. 7,175,864 to Owades (“the ‘864 patent”) discloses a brewed malt beverage (e.g., beer or ale) having improved foaming properties due to the addition of caffeine. The caffeine may be provided from sources such as tea leaves, coffee beans, cocoa beans, mate leaves, guarana beans and kola nuts. The ‘864 patent states that the foaming improvement appears to be contingent on the quantity of caffeine added and notes that in beverages other than malt beverages (e.g., coffee, tea, or cola drinks) improvement of foaming was not observed. Accordingly, it appears that the caffeine of the ‘864 patent may be interacting with the alcohol of the malt beverage, which is a surfactant, to provide improved foaming.

[0004] In contrast to malt beverages, juices and juice beverages are not typically thought of as foamed beverages since they do not readily form stable foams; even sparkling juices prepared by carbonation when poured in a glass do not result in foamed beverages. Indeed, juices have a poor intrinsic foaming property that may be attributed to the lack of surface active compounds in the juices. However, there could be market for such foamed juice compositions if the intrinsic foaming properties of the juice or juice beverage could be

improved. Accordingly, there exists a need to improve the foaming properties of a juice composition.

SUMMARY

[0005] The present disclosure provides foamed juice products and methods of making the foamed juice products. In an embodiment, a foamed juice beverage is provided and includes juice and about 0.01% to about 1.0% (w/v) of coffee. The juice may be a fruit juice selected from the group consisting of apple, cherry, cranberry, grape, grapefruit, guava, mango, orange, peach, pear, pineapple, pomegranate, prune, raspberry, strawberry, or combinations thereof. The coffee may be selected from the group consisting of green coffee, roasted coffee, caffeinated coffee, decaffeinated coffee, instant coffee, or combinations thereof. The foamed juice beverage may be served hot or cold and may be a ready-to-drink beverage.

[0006] In an embodiment, the foamed juice beverage comprises 0.5% (w/v) of coffee.

[0007] In another embodiment, a powdered composition is provided and includes a powdered juice and a powdered coffee. The powdered coffee is provided in an amount ranging from about 0.01% to about 1.0% (w/v) when the powdered composition is dissolved in a liquid. The powdered juice may be a powdered fruit juice selected from the group consisting of apple, cherry, cranberry, grape, grapefruit, guava, mango, orange, peach, pear, pineapple, pomegranate, prune, raspberry, strawberry, or combinations thereof. The powdered coffee may be selected from the group consisting of green coffee, roasted coffee, caffeinated coffee, decaffeinated coffee, instant coffee, or combinations thereof.

[0008] In an embodiment, the liquid is one of a hot and a cold liquid.

[0009] In yet another embodiment, a method of making a foamed juice product is provided. The method includes dissolving a powdered juice and a powdered coffee in a liquid to form a solution, and introducing gas bubbles into the solution to create the foamed juice product. The foamed juice product includes about 0.01% to about 1.0% (w/v) of coffee. The powdered juice may be a powdered fruit juice selected from the group consisting of apple, cherry, cranberry, grape, grapefruit, guava, mango, orange, peach, pear, pineapple, pomegranate, prune, raspberry, strawberry, or combinations thereof. The powdered coffee may be selected from the group consisting of green coffee, roasted coffee, caffeinated coffee, decaffeinated coffee, instant coffee, or combinations thereof.

[0010] In an embodiment, the foamed juice beverage comprises 0.5% (w/v) of coffee.

[0011] In an embodiment, the foamed juice product is one of a hot beverage and a cold beverage.

[0012] In an embodiment, the gas bubbles are introduced by a method selected from the group consisting of agitating the solution, stirring the solution, sparging gas into the solution, microporous structures for gas release, or combinations thereof.

[0013] In an embodiment, foam can be generated by a method selected from the group consisting of mechanical whipping, water jet whipper-less systems, sonication, or combinations thereof.

[0014] In an embodiment, foam can be generated from liquid beverages by dissolving of gas under saturation in closed containers under low temperature conditions, widget type mechanisms, or combinations thereof.

[0015] In still yet another embodiment, a method of making a powdered juice composition is provided. The method includes providing a solution comprising juice and coffee, injecting gas into the solution, and drying the solution, wherein the coffee is provided in an amount of about 0.01% to about 1.0% (w/v).

[0016] In an embodiment, the solution is spray-dried.

[0017] In an embodiment, the solution is freeze-dried.

[0018] An advantage of the present disclosure is to provide an improved juice product.

[0019] Another advantage of the present disclosure is to provide a foamed juice product having coffee to enhance foaming properties of a juice.

[0020] Yet another advantage of the present disclosure is to provide a method of making a foamed juice product.

[0021] Still yet another advantage of the present disclosure is to provide a method of making a powdered composition.

[0022] Another advantage of the present disclosure is to provide a method of making a liquid composition.

[0023] Additional features and advantages are described herein, and will be apparent from, the following Detailed Description and the figures.

BRIEF DESCRIPTION OF THE FIGURES

[0024] FIG. 1 shows the impact on the foaming properties of apple juice by adding various coffees.

[0025] FIG. 2 shows the impact on the foaming properties of various juices by adding instant soluble coffee.

DETAILED DESCRIPTION

[0026] As used in this disclosure and the appended claims, the singular forms “a,” “an” and “the” include plural referents unless the context clearly dictates otherwise. As used herein, “about” is understood to refer to numbers in a range of numerals. Moreover, all numerical ranges herein should be understood to include all integer, whole or fractions, within the range. The products disclosed herein may lack any element that is not specifically disclosed herein. Thus, “comprising,” as used herein, includes “consisting essentially of” and “consisting of.”

[0027] The present disclosure relates generally to foamed juice products and methods of making the foamed juice products. In a general embodiment, the foamed juice products include juice and coffee in an amount from about 0.01% to about 1.0% (w/v). The foamed juice products can be ready-to-drink products that can be consumed cold, warm or hot. Alternatively, the foamed juice products can be powdered products designed to be reconstituted in a liquid.

[0028] As discussed above, foam is often considered a highly desirable attribute for fruit and milk beverages such as shakes. A foamed liquid is produced by introducing gas into a liquid to produce a sufficient amount of bubbles to form a foam on the top of the liquid. The foam may be produced directly in the liquid (e.g., by introducing gas bubbles into the liquid by agitating or stirring the liquid manually or by a suitable machine). Foam may also be produced by a dried, soluble powder that contains gas that is released in the form of bubbles when the powder is dissolved. Such a powder may be produced by drying a liquid so as to form a dried, soluble powder. When reconstituted with a hot or cold liquid to form a beverage, the gas entrapped in the pores of the powder will be released into the liquid and form a foam on the surface.

[0029] Juices, however, are not typically thought of as foamed beverages since they do not readily form stable foams. Additionally, even sparkling juices prepared by carbonation when poured in a glass do not result in foamed beverages. As such, foamed juice beverages are not a known produce category due to the poor intrinsic foaming properties of juices. Such poor foaming properties may be attributed to a lack of surface active compounds in a juice. In this regard, mixtures of milk and juice can usually be foamed because the milk proteins act as surface active molecules that support the foam. This creates a shake-like

beverage containing fruit juice. However, such a product cannot be considered as a juice beverage.

[0030] Further, it is generally observed that various juices (e.g., apple, pear, white grape, etc.) do not support foam formation when foam is generated, for example, using high energy mechanical agitation such as whipping or low energy foam generation as with carbonation or other means.

[0031] In contrast, Applicants have surprisingly found that a composition including fruit juice and a small amount of coffee exhibited superior foaming properties with high foam volumes, stability and excellent foam texture. Indeed, Applicants have surprisingly found that several different types of coffees, and even very low amounts of coffee, were able to provide foamed juice compositions when gas is released into a liquid, e.g., by dissolution of a foaming powder or whipping of the liquid.

[0032] For example, and as shown in FIG. 1, Applicants investigated the impact of adding different types of coffee to apple juice. In the experiments, Applicants measured the whippability index (i.e., the air to liquid ratio) of apple juice alone, 0.1% green coffee alone, and 0.1% instant (soluble) coffee alone. These three control measurement were then compared with (i) apple juice with 0.1% green coffee, (ii) apple juice with 0.1% decaffeinated green coffee, and (iii) apple juice with 0.1% instant coffee. As is clearly shown in FIG. 1, the apple juice compositions comprising coffee provided significant improvements in the whippability index when compared to the apple juice alone, 0.1% green coffee alone, and the 0.1% instant coffee alone. The comparison in FIG. 1, therefore, clearly shows the synergistic effect that is achieved in the combinations illustrated.

[0033] The improved foaming observed by Applicants was achieved even when coffee was added at very low concentrations (e.g., amounts of about 0.05% (w/v basis)). Therefore, while lower amounts of coffee may be used to improve foaming properties of a composition, higher concentrations of coffee (>0.5% to about 1.0%) benefited foaming significantly, but tended to impact the taste and color of the juice beverage.

[0034] In any embodiments described herein, coffee is provided in an amount ranging from about 0.01% to about 1.0% by weight. More specifically, the amount can be about 0.01%, 0.02%, 0.03%, 0.04%, 0.05%, 0.06%, 0.07%, 0.08%, 0.09%, 0.1%, 0.2%, 0.3%, 0.4%, 0.5%, 0.6%, 0.7%, 0.8%, 0.9%, and 1.0% by weight/volume basis and the like. It should be appreciated that any two amounts of the coffee recited herein can further represent end points in a preferred range of amounts. For example, the amount of about 0.1% and

about 0.5% by weight/volume can represent the individual amounts of coffee as well as a preferred range of the coffee ranging from about 0.1% to about 0.5% by weight.

[0035] Applicants also surprisingly found that the improved foaming was observed regardless of the type of coffee used, as is also shown in FIG. 1. For example, FIG. 1 demonstrates that improved foaming was observed with a variety of coffees including, for example, green coffee, decaffeinated green coffee, and instant coffee. Without being bound by any theories, Applicants believe that it is not the caffeine that acts as a surface active molecule in the present foamed juice products. In fact, similar improvements in foaming properties were seen regardless of the caffeine content. Rather, Applicants believe that other coffee molecules such as, for example, polyphenoles, arabinogalactans, and melanoidines are interacting synergistically with the juice components to provide the improved foaming properties. The skilled artisan will appreciate, therefore, that the coffee of the present disclosure may be any type of coffee including, but not limited to, green coffee, roasted coffee, caffeinated coffee, decaffeinated coffee, instant coffee, etc.

[0036] Similarly, Applicants also surprisingly found that the improved foaming properties were not limited to just apple juice and were observed in several different types of juices. For example, and as shown in FIG. 2, Applicants performed experiments to compare the whippability index of several different types of juices (e.g., apple, pear, and white grape) alone, with the whippability index of each of the different juices with 0.1% instant coffee added. Again, as shown in FIG. 2, a significant improvement in foaming properties was observed when the instant coffee was added to the juices.

[0037] Applicants also surprisingly found that the improved foaming properties were observed for a wide range of temperatures including, for example, refrigeration temperatures (e.g., about 35° to about 38°F) to typical hot coffee temperatures (e.g., about 155°F to about 180°F). Adding of ice to the juice beverage with added coffee did not have detrimental effects on foam volume, stability, or texture. Accordingly, the foamed juice products of the present disclosure may be beverages that are served cold, hot, or at any temperature therebetween.

[0038] The fruit juice and coffee compositions of the present disclosure may be provided to a consumer in the form of a ready-to-drink beverage, a juice concentrate containing coffee for reconstitution in a liquid (e.g., water), or as a powdered composition designed for reconstitution. The ready-to-drink beverages may be foamed by agitation, addition of injected gas, or other known means. The powdered composition may be reconstituted by shaking or otherwise agitating the powder in a liquid. Alternatively, the

powdered composition may be designed for reconstitution in a typical coffee/espresso machine.

[0039] In an embodiment, foam can be generated by a method selected from the group consisting of mechanical whipping, water jet whipper-less systems, sonication, or combinations thereof. Foam can also be generated from liquid beverages by dissolving of gas under saturation in closed containers under low temperature conditions, widget type mechanisms, or combinations thereof.

[0040] In any embodiments described herein, the foamed juice products can include one or more stabilizers, vitamins and/or minerals, but these ingredients are not required to achieve the desired foaming effects. Examples of stabilizers include gelatins, starches, gums, emulsifying agents, buffers, carbonates and the like.

[0041] Examples of minerals, vitamins and other micronutrients optionally present in the nutritional compositions include vitamin A, vitamin B1, vitamin B2, vitamin B6, vitamin B12, vitamin E, vitamin K, vitamin C, vitamin D, folic acid, inositol, niacin, biotin, pantothenic acid, choline, calcium, phosphorous, iodine, iron, magnesium, copper, zinc, manganese, chloride, potassium, sodium, selenium, chromium, molybdenum, taurine, and L-carnitine.

[0042] In an embodiment, a method of making a foamed juice product is provided. The method includes dissolving a powdered juice and a powdered coffee in a liquid to form a solution, and introducing gas bubbles into the solution to create the foamed juice product. The foamed juice product includes an amount of coffee ranging from about 0.01% to about 1.0% (w/v). The powdered juice may be a powdered fruit juice selected from the group consisting of apple, cherry, cranberry, grape, grapefruit, guava, mango, orange, peach, pear, pineapple, pomegranate, prune, raspberry, strawberry, or combinations thereof. The powdered coffee may be selected from the group consisting of green coffee, roasted coffee, caffeinated coffee, decaffeinated coffee, instant coffee, or combinations thereof. The gas bubbles may be introduced by a method selected from the group consisting of agitating the solution, stirring the solution, sparging gas into the solution, or combinations thereof.

[0043] In still yet another embodiment, a method of making a powdered juice composition is provided. The method includes providing a solution comprising juice and coffee, injecting gas into the solution, and drying the solution, wherein the coffee component of the solution provides an amount of coffee ranging from about 0.01% to about 1.0% (w/v). In an embodiment, the product is spray-dried or freeze-dried.

[0044] It should be understood that various changes and modifications to the presently preferred embodiments described herein will be apparent to those skilled in the art. Such changes and modifications can be made without departing from the spirit and scope of the present subject matter and without diminishing its intended advantages. It is therefore intended that such changes and modifications be covered by the appended claims.

CLAIMS

The invention is claimed as follows:

1. A foamed juice beverage comprising:
juice; and
about 0.01% to about 1.0% (w/v) of coffee.
2. The beverage of Claim 1, wherein the foamed juice beverage comprises 0.1 to 0.5% (w/v) coffee.
3. The beverage of Claim 1, wherein the coffee is selected from the group consisting of green coffee, roasted coffee, caffeinated coffee, decaffeinated coffee, instant coffee, and combinations thereof.
4. The beverage of Claim 1, wherein the foamed juice beverage is one of a hot beverage and a cold beverage.
5. The beverage of Claim 1, wherein the beverage is a ready-to-drink foamed juice beverage.
6. The beverage of Claim 1, wherein the juice is a fruit juice selected from the group consisting of apple, cherry, cranberry, grape, grapefruit, guava, mango, orange, peach, pear, pineapple, pomegranate, prune, raspberry, strawberry, and combinations thereof.
7. The beverage of Claim 1, wherein the foamed juice beverage is prepared from a juice concentrate containing coffee.
8. A powdered composition comprising:
a powdered juice; and
a powdered coffee present in an amount to provide an amount of coffee ranging from about 0.01% to about 1.0% (w/v) when the powdered composition is dissolved in a liquid.

9. The composition of Claim 8, wherein the powdered coffee is present in an amount to provide about 0.5% (w/v) of coffee when the powdered composition is dissolved in a liquid.

10. The composition of Claim 8, wherein coffee is selected from the group consisting of green coffee, roasted coffee, caffeinated coffee, decaffeinated coffee, instant coffee, and combinations thereof.

11. The composition of Claim 8, wherein the liquid is one of a hot and a cold liquid.

12. The composition of Claim 8, wherein the powdered juice is a powdered fruit juice selected from the group consisting of apple, cherry, cranberry, grape, grapefruit, guava, mango, orange, peach, pear, pineapple, pomegranate, prune, raspberry, strawberry, and combinations thereof.

13. A method of making a foamed juice product, the method comprising:
dissolving a powdered juice and a powdered coffee in a liquid to form a solution; and
introducing gas bubbles into the solution to create the foamed juice product, wherein the foamed juice product comprises coffee in an amount of about 0.01% to about 1.0% (w/v).

14. The method of Claim 13, wherein the coffee is provided in the foamed juice product in an amount of about 0.5% (w/v).

15. The method of Claim 13, wherein powdered coffee is selected from the group consisting of green coffee, roasted coffee, caffeinated coffee, decaffeinated coffee, instant coffee, and combinations thereof.

16. The method of Claim 13, wherein the powdered juice is a powdered fruit juice selected from the group consisting of apple, cherry, cranberry, grape, grapefruit, guava, mango, orange, peach, pear, pineapple, pomegranate, prune, raspberry, strawberry, and combinations thereof.

17. The method of Claim 13, wherein the foamed juice product is one of a hot beverage and a cold beverage.

18. The method of Claim 13, wherein the gas bubbles are introduced by a method selected from the group consisting of agitating the solution, stirring the solution, sparging gas into the solution, microporous structures for gas release, and combinations thereof.

19. A method of making a powdered juice product, the method comprising:
providing a solution comprising juice and coffee;
injecting gas into the solution; and
drying the solution, wherein the coffee is provided in an amount of about 0.01% to about 1.0% (w/v).

20. The method of Claim 19, wherein the solution is spray-dried or freeze-dried.

FIG. 1

Foaming Properties of Apple Juice: Impact of adding Coffees

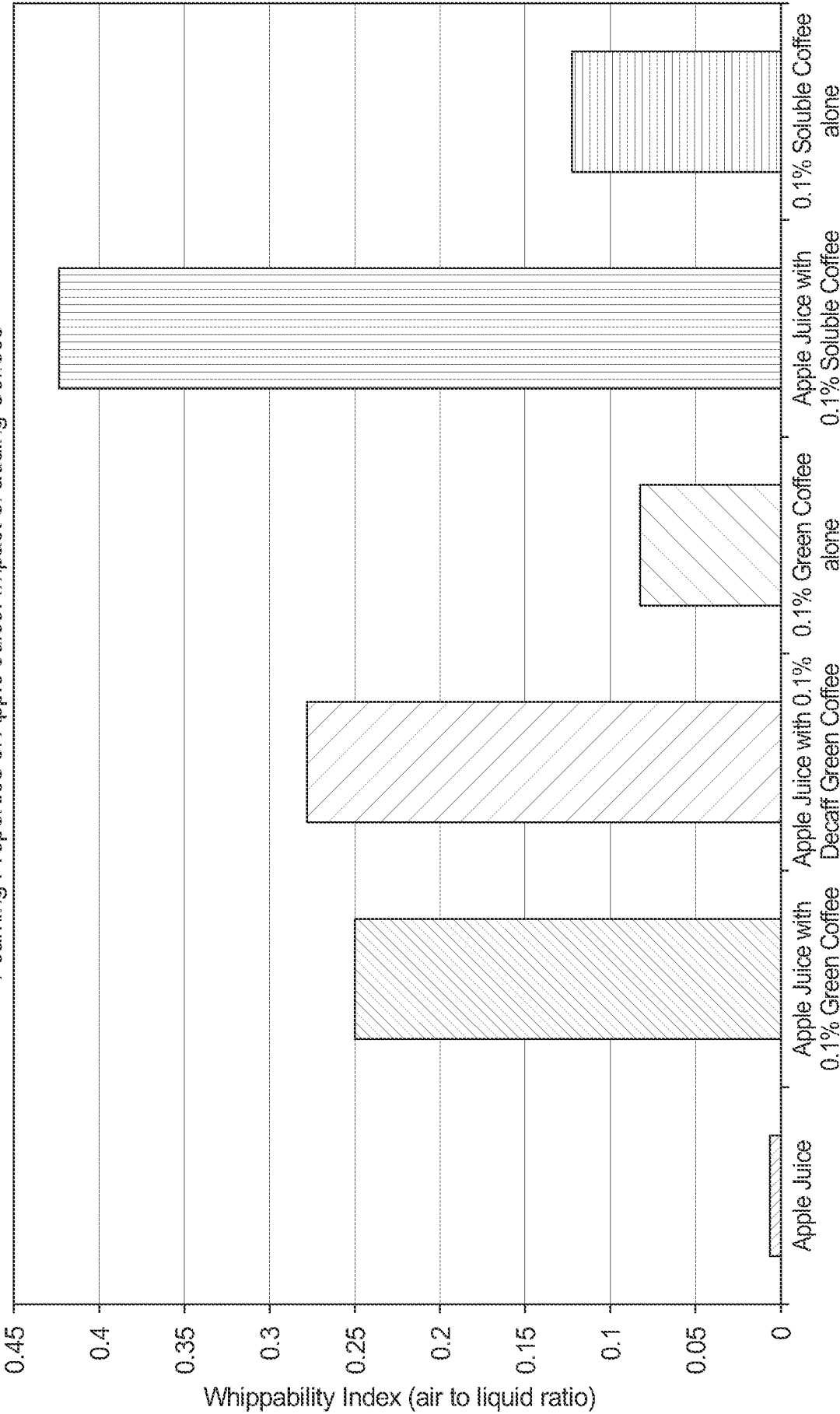
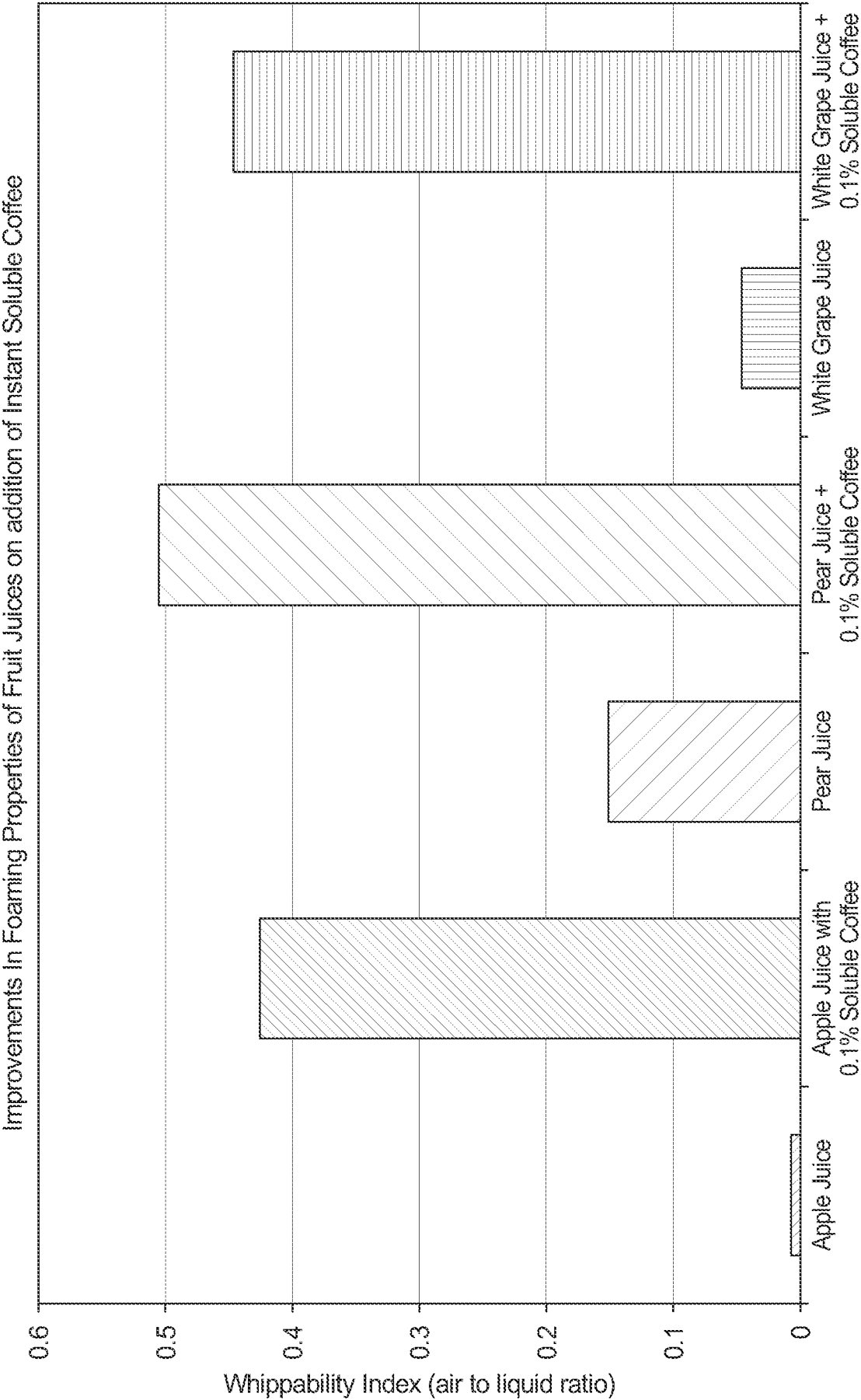


FIG. 2



INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER INV. A23L2/02 A23L2/39 A23F5/32 A23L2/40 A23L2/54 ADD.		
According to International Patent Classification (IPC) or to both national classification and IPC		
B. FIELDS SEARCHED Minimum documentation searched (classification system followed by classification symbols) A23L 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		
C. DOCUMENTS CONSIDERED TO BE RELEVANT		
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☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.		
* Special categories of cited documents : "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family		
Date of the actual completion of the international search 18 February 2014		Date of mailing of the international search report 25/02/2014
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 Diller, Reinhard

INTERNATIONAL SEARCH REPORT

International application No
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INTERNATIONAL SEARCH REPORT

Information on patent family members

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