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<b>(54) Title:</b> SUGAR-FREE, LOW-CALORIE BASE FOR HARD-BOILED CONFECTIONS  <b>(57) Abstract</b> <p>The present invention relates to sugar-free, low-calorie base suitable for use in stable, sugar-free, hard-boiled confections, based on a polydextrose that is essentially free of mono- and disaccharides, and a sugar alcohol component comprising a predominant amount of mannitol. The present invention also relates to a stable, sugar-free, hard-boiled confection comprising this base, as well as a syrup suitable for use in producing this confection.</p>		

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## **SUGAR-FREE, LOW-CALORIE BASE FOR HARD-BOILED CONFECTIONS**

### **FIELD OF THE INVENTION**

The present invention relates to a sugar-free, low-calorie base suitable for stable, sugar-free, hard-boiled confections, the base comprising a polydextrose which is essentially free of mono- and disaccharides, more preferably essentially free of reducing sugar functionality, and a sugar alcohol component containing a predominant amount of mannitol. The present invention also relates to sugar-free, stable, hard-boiled confections which, in addition to the base and residual water (from the hard-boiling process), may optionally contain one or more other additives and/or adjuvants well-known in the sugar-free confection art (such as a flavoring). The present invention still further relates to syrups particularly suitable for producing the aforementioned hard-boiled confections.

### **BACKGROUND OF THE INVENTION**

"Low-calorie", as understood in accordance with the present invention, refers to a product possessing a caloric content of less than or equal to 30% of a comparable equivalent weight sucrose-based product. Stated another way, sucrose has an established caloric content of 4 kcal/g, thus a "low-calorie" base, syrup or confection in accordance with the present invention must possess a caloric content of less than or equal to 1.2 kcal/g (solids).

A "stable" product, as understood in accordance with the present invention, is a product with acceptably low cold flow, graining and moisture gain characteristics. Unacceptable cold flow can result in a product that distorts either during packaging or during storage; unacceptable graining can result in a product that transforms from a clear state to a streaked or crystallized state during storage; and unacceptable moisture gain can influence cold flow and graining, as well other factors involving product integrity such as adhesion to packaging). An acceptable stability may vary depending on a variety of factors such as product type, packaging, end use and the like; however, these factors

and the overall concept of stability is well known to those of ordinary skill in the relevant field.

Sugar-free or reduced sugar hard-boiled confections, such as hard-boiled candies and hard-boiled medicated lozenges, are in general well known in the art. These products have typically been prepared utilizing the following ingredients or combination of ingredients as the base: hydrogenated starch hydrolyzates ("HSH"); sorbitol; lactitol in conjunction with HSH; isomalt; and certain types of polydextrose which contain mono- and disaccharides in combination with selected ingredients such as HSH or sugar alcohols. The medicated lozenges further include selected therapeutic/active ingredients. See, for example, US5629042, EP-A-0377278, EP-A-0455600, WO92/02149 and JP-A-07/67536, all of which are incorporated by reference herein for all purposes as if fully set forth.

Most of the above bases result in products displaying various disadvantages in terms of stability, manufacturing difficulty and/or appearance. Furthermore, such bases have not provided a sufficiently low caloric value to be labeled "low-calorie".

For example, hard-boiled confections prepared with HSH as the base generally possess cold flow characteristics that may cause the product to distort either during packaging or during storage. Such products often require more expensive packaging alternatives, have a reduced shelf life, and suffer from poor product quality and consumer acceptance. Further the HSH base has a caloric content of about 3 kcal/g or more.

Hard-boiled confections prepared with sorbitol as the base generally possess graining characteristics that may cause the product to change from an amorphous glass state to a fine crystalline state, which reduces shelf life, delivers poor mouthfeel, reduces flavor quality and is perceived as unacceptable by consumers. Further, the sorbitol base has a caloric content of about 2.6 kcal/g or more.

Hard-boiled confections prepared with the combination of HSH and lactitol as the base often exhibit graining during the shelf storage period. Such

products often have a comparatively short shelf life and lack consumer appeal. Moreover, the HSH/lactitol base has a caloric content of about 2.5 kcal/g or more.

5 Hard-boiled confections prepared with isomalt as the base exhibit a tendency to grain upon extended storage. Further, the boiled, hot product mass exhibits a noticeably low viscosity. The low viscosity often requires extended production time to allow the mass to cool prior to the addition of flavoring, coloring or active ingredients. The isomalt base further has a caloric content of about 2 kcal/g or more.

10 Hard-boiled confections prepared with a combination of certain types of polydextrose and selected sugar alcohols as the base tend to absorb moisture and exhibit cold flow tendencies. Often, during processing at higher polydextrose levels and elevated temperatures, the boiled mass exhibits a high viscosity that makes mixing of flavoring, coloring and active ingredients difficult. Further,  
15 unwanted air bubbles may be incorporated into the product. Moreover, because of the mono- and disaccharides present in certain types of polydextrose, the maximum concentration of polydextrose in sugar-free hard-boiled products is often limited due to restrictions on the total sugar content allowed by regulatory guidelines and labeling requirements. The typical polydextrose/sugar alcohol  
20 bases have a caloric content of about 1.5 kcal/g or more.

Because polydextrose in general has a number of advantageous properties, it would be highly desirable to formulate a low-calorie polydextrose base for sugar-free, stable, hard-boiled confections.

## 25 SUMMARY OF THE INVENTION

The present invention addresses the foregoing problem by providing a base suitable for use in sugar-free, hard-boiled confections, the base comprising from about 85 to about 97 wt% of a polydextrose which is essentially free of mono- and disaccharides, and from about 3 wt% to about 15 wt% of a sugar  
30 alcohol component comprising a predominant amount of mannitol, wherein wt% is based on the combination of the polydextrose and the sugar alcohol

component, wherein the base is essentially sugar-free, and wherein the base has a caloric content of less than or equal to 1.2 kcal/g.

The present invention also provides a stable, sugar-free, hard-boiled confection comprising this base (and residual moisture content from the preparation process) and, optionally, other additives and/or adjuvants well-known in the sugar-free confection field, as well as a syrup suitable for use in preparing these hard-boiled confections.

The polydextrose-containing products of the present invention have several advantages over traditional polydextrose-containing and other products. The polydextrose used in the polydextrose-containing products of the present invention is essentially free of mono- and disaccharides, such as free reducing sugars, and therefore is essentially sugar-free and may be marginally lower in calories than other types of polydextrose which contain such reducing sugars. Furthermore, the polydextrose-containing products of the present invention exhibit low-moisture absorption, are heat-stable, and have a satisfactory flavor, color and taste.

These and other features and advantages of the present invention will be more readily understood by those of ordinary skill in the art from a reading of the following detailed description.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Polydextrose is generally defined as a polymer of glucose (dextrose) containing predominantly 1-6 glucose-glucose linkages. Polydextrose is typically prepared by polymerizing, under anhydrous melt polymerization conditions, glucose (dextrose) and a minor amount of a polyol (normally sorbitol) in the presence of an edible acid catalyst such as citric and/or phosphoric acid. The resulting "crude" polydextrose may be neutralized to remove residual acidity, and/or may be treated with ion exchange to remove substantially all of the off-tasting components resulting from the production process. Polydextrose for the purposes of the present invention is water-soluble, with a reported number average molecular weight of between about 1,500 and

18,000. This polydextrose is extensively described in the literature, as exemplified by US3766165, US4948596, US5091015 and US5645647, all of which are incorporated by reference herein for all purposes as if fully set forth. The polydextrose disclosed in these references is generally considered to have a caloric value of 1 kcal/g.

As a result of the production process, the resulting polydextrose typically contains residual amounts of unreacted starting components, such as unreacted glucose (monosaccharide) and sorbitol, and other very low molecular weight components such as disaccharides. The oligomer and polymer polydextrose molecules may also contain glucose molecules bound at other than the 1 position (typically chain-terminating) that thus retains its reducing functionality.

The polydextrose suitable for use in the present invention is a modification of the aforementioned polydextrose in that it is essentially free of mono- and disaccharides, and preferably essentially free of reducing glucose groups. The phrase "essentially free of mono- and disaccharides" indicates a content of mono- and disaccharides of preferably less than about 0.5% by weight, more preferably less than about 0.25% by weight, and still more preferably less than about 0.15% by weight, based on the total weight of the polydextrose. The mono- and disaccharide content, and the content of reducing sugars, is expressed as glucose weight, relative to the dry weight of the product analyzed, and is measured by well-known liquid chromatography with refractive index techniques.

For the purposes of the present invention, a "monosaccharide" is a polyhydroxy aldehyde or ketone having 5-8 carbon atoms, such as a pentose or hexose. A "disaccharide" is a carbohydrate yielding two monosaccharides on hydrolysis.

The polydextrose used in the present invention can be prepared, for example, by subjecting a regular polydextrose to conventional fractionation and/or molecular sieving techniques such as reverse osmosis and/or size exclusion chromatography, as disclosed in US4956458 and WO92/12179, both of which are incorporated by reference here for all purposes as if fully set forth.

More preferred is polydextrose that is essentially free of reducing glucose groups, which can be prepared by hydrogenation and/or enzymatic treatment of a regular polydextrose. See, for example, US5601863 and US5573794, both of which are incorporated by reference for all purposes as if fully set forth. If  
5 desired, the polydextrose essentially free of reducing glucose groups can be further treated to remove essentially all of the low molecular weight components (such as sorbitol) by the techniques set forth in previously incorporated US4956458 and WO92/12179, as well as in US5424418 which is also incorporated by reference herein for all purposes as if fully set forth.

10 An example of a commercial polydextrose suitable for use in the present invention is a hydrogenated polydextrose available under the trade designation LITESSE® ULTRA from Cultor Food Science, Inc. (Ardsley, NY USA).

The sugar alcohol component comprises at least a predominant portion of mannitol (caloric value of 1.6 kcal/g), but may also contain one or more other  
15 monomeric, dimeric or polymeric sugar alcohols, such as xylitol (caloric value of 2.4 kcal/g), lactitol (caloric value of 2.0 kcal/g), sorbitol (caloric value of 2.6 kcal/g), erythritol (caloric value of 0.4 kcal/g), maltitol (caloric value of 3.0 kcal/g) and isomalt (caloric value of 2.0 kcal/g). By predominant portion is it meant greater than 50 wt% based on the weight of the sugar alcohol component.

20 Preferably, the sugar alcohol component is at least 75 wt% mannitol, more preferably at least 90 wt% mannitol, and especially essentially all mannitol.

The base of the present invention comprises from about 85 to about 97 wt%, more preferably from about 85 to about 95 wt%, still more preferably from about 87 to about 93 wt%, of the polydextrose; and from about 3 to about  
25 15 wt%, more preferably from about 5 to about 15 wt%, still more preferably from about 7 to about 13 wt%, of the sugar alcohol component. Wt% here is based on the combined weight of the polydextrose and sugar alcohol component.

The hard-boiled confections in accordance with the present invention  
30 may only comprise the above-described base (and residual water left over from the production process), but typically also contains one or more other additives



and/or adjuvants (other than sugar alcohols and bulking agents such as polydextrose, which are comprised within the base) well-known in the sugar-free confection art, such as flavors; acidulants; cloudifiers; therapeutic and/or active medicaments such as menthol, pectin, eucalyptus oil or other conventional materials that are known to provide therapeutic or medicinal value; and/or intense sweeteners such as aspartame, acesulfame K, sucralose and/or Alitame®. These types of additives and adjuvants are typically used in minor amounts, usually combined less than 5 wt% of the total hard-boiled confection weight, although certain flavors may be used in greater amounts, and, with a few exceptions, should preferably add minimally to the overall caloric value of the final product. In some preferred embodiments, these additives and/or adjuvants in and of themselves do not add significantly to the caloric value of the final product, thus the sugar-free, hard-boiled confections containing these components will be low-calorie in the context of the present invention.

The sugar-free, hard-boiled confections in accordance with the present invention are prepared by conventional and well-known procedures that involve preparation and boiling of syrups, such as described in previously incorporated US5629042.

The syrups in accordance with one aspect of the present invention can be prepared by any suitable method known in the art.

The initial polydextrose solution (prior to the addition of the sugar alcohol and other optional components) should preferably comprise from about 55 wt% to about 75 wt% of the polydextrose which is essentially free of mono- and disaccharides, and from about 25 wt% to about 45 wt% of water. The sugar alcohol and other components are then added to this initial polydextrose solution to result in a solids content of from about 60 wt% to about 90 wt%, more preferably from about 65 wt% to about 85 wt%, and still more preferably from about 70 wt% to about 80 wt%, and conversely a water content of from about 10 wt% to about 40 wt%, more preferably from about 15 wt% to about 35 wt%, and still more preferably from about 20 wt% to about 30 wt%, based on the combined weight of the solids and water contents.

The resulting syrup is essentially sugar-free, and the syrup base (polydextrose plus sugar alcohol component) has a caloric content of less than or equal to 1.2 kcal/g (based on solids). In some preferred embodiments, the syrup itself (and the resulting hard-boiled confection) has a caloric content of less than or equal to 1.2 kcal/g (based on solids).

A suitable hard-boiled confection in accordance with the present invention can be manufactured by boiling this syrup in a cooking kettle under atmospheric or vacuum boost conditions to remove water, to a point where a desired moisture content (and/or moisture reduction, viscosity or other factor well known to those of ordinary skill in the relevant art) is achieved. The resulting hot mass is cooled to a point where it is still flowable, then deposited into a mold or fed through a drop former to form the desired confection product.

Alternatively, an initial syrup can be prepared from only some of the components, such as the components of the base, then the remainder added to the kettle during the cooking or initial cooling stage, or all of the components can be mixed *in situ* in the kettle and processed from that point. As indicated above, these methods are conventional and well-known to those of ordinary skill in the art, and need not be discussed in further detail here.

The bases of the present invention are essentially clear and exhibit long term storage stability. In addition, once formed into confections, there is substantially no cold flow, product streaking or recrystallization. Further, the bases are essentially sugar-free and low-calorie, contributing no more than 1.2 kcal/gram, preferably no more than 1.15 kcal/g, and especially no more than 1.1 kcal/g, to the final hard-boiled confection.

Particularly preferred is a low-calorie, hard-boiled confection, in which case the optional additives and/or adjuvants do not add significantly to the overall caloric value of the product.

The invention will be further described with reference to the following illustrative examples of embodiments thereof.

EXAMPLES 1-2 - POLYDEXTROSE-CONTAINING BASE SYRUPS

A mixture (100 grams) of 86.4 grams of LITESSE® ULTRA (liquid polydextrose with a solids content of 67.50 wt %), 9.6 grams of powdered mannitol, and 4.0 grams of water was heated with stirring to a temperature of 150° F until the powdered mannitol was dissolved. The temperature was then increased to 185-190° F and stirring was continued until the resulting syrup attained a solids content of 73 wt % to thereby provide a first polydextrose-containing syrup.

Likewise, another batch of polydextrose-containing syrup was made by heating a mixture (500 grams) of 432.0 grams of LITESSE® ULTRA (liquid polydextrose with a solids content of 67.50 wt %), 48.0 grams of powdered mannitol, and 20.0 grams of water with stirring to a temperature of 150° F until the powdered mannitol was dissolved. The temperature was then decreased to 130-140° F and stirring was continued for 25 minutes until the resulting syrup attained a solids content of 73 wt %.

EXAMPLES 3-4 - MOISTURE ADSORPTION STUDY

Polydextrose-containing blends were incorporated into hard-boiled confectionery products and stored for up to 12 weeks to determine the moisture adsorption characteristics of the hard-boiled confections. Two sets of hard-boiled confections were evaluated, one set wherein the hard-boiled confections were wrapped (Example 3), and one set wherein the hard-boiled confections were unwrapped (Example 4). Both sets of hard-boiled confections were observed upon manufacture, after two weeks of storage, and after four weeks of storage, and in some cases after 8 and 12 weeks of storage, under storage conditions generally encountered in actual practice. All percentages are weight percentages, all weights are in grams, and LU indicates LITESSE® ULTRA.

The moisture gain represents the percent moisture uptake during the holding period.

Wrapped Hard-Boiled Confections (Example 3):

<u>Blend Composition</u>	<u>Initial Weight</u>	<u>2 Weeks</u>	<u>Moisture Gain</u>	<u>4 Weeks</u>	<u>Moisture Gain</u>	<u>8 Weeks</u>	<u>Moisture Gain</u>	<u>12 Weeks</u>	<u>Moisture Gain</u>
90 % LU / 10 % Xylitol	6.24	6.33	1.44 %	6.37	2.08 %	6.44	3.11 %	6.50	4.00 %
	5.70	8.80	1.75 %	5.84	2.46 %	5.91	3.39 %	5.98	4.68 %
90 % LU / 10 % Lactitol	6.40	6.47	1.09 %	6.51	1.72 %	6.55	2.29 %	6.58	2.74 %
	5.81	5.89	1.38 %	5.91	1.72 %	5.95	2.35 %	5.98	2.84 %
90 % LU / 10 % Mannitol	5.41	5.45	0.74 %	5.47	1.11 %	5.50	1.64 %	5.51	1.82 %
	4.84	4.89	1.03 %	4.89	1.03 %	4.91	1.43 %	4.93	1.83 %
90 % LU / 10 % Sorbitol	5.90	5.96	1.02 %	5.99	1.53 %	6.05	2.48 %	6.07	2.80 %
	5.78	5.86	1.38 %	5.89	1.90 %	5.96	3.02 %	5.99	3.51 %
90 % LU / 10 % Erythritol	6.58	6.69	1.67 %	6.76	2.74 %	6.82	3.52 %	6.84	3.80 %
	5.98	5.18	1.97 %	5.23	2.95 %	5.26	3.42 %	5.28	3.79 %
90 % LU / 10 % Maltitol	5.88	5.93	0.85 %	5.95	1.19 %	5.99	1.84 %	6.03	2.49 %
	6.97	7.05	1.15 %	7.09	1.72 %	7.15	2.52 %	7.19	3.06 %
90 % LU / 10 % Isomalt	5.63	5.68	0.89 %	5.72	1.60 %	5.79	2.76 %	5.81	3.10 %

Unwrapped Hard-Boiled Confections (Example 4):

<u>Blend Composition</u>	<u>Initial Weight</u>	<u>2 Weeks</u>	<u>Moisture Gain</u>	<u>4 Weeks</u>	<u>Moisture Gain</u>	<u>8 Weeks</u>	<u>Moisture Gain</u>	<u>12 Weeks</u>	<u>Moisture Gain</u>
90 % LU / 10 % Xylitol	6.31	6.49	2.85 %	6.65	5.39 %	fail	fail	fail	fail
	6.04	6.20	2.65 %	6.36	5.30 %	fail	fail	fail	fail
90 % LU / 10 % Lactitol	5.55	5.60	0.90 %	5.66	1.98 %	fail	fail	fail	fail
	4.66	4.71	1.07 %	4.77	2.36 %	fail	fail	fail	fail
90 % LU / 10 % Mannitol	4.98	5.04	1.20 %	5.04	1.20 %	4.98	1.58 %	5.12	2.73 %
	5.17	5.23	1.16 %	5.24	1.35 %	5.27	1.89 %	5.30	2.45 %
90 % LU / 10 % Sorbitol	5.86	6.01	2.56 %	6.11	4.27 %	fail	fail	fail	fail
	4.83	4.91	1.66 %	5.03	4.14 %	fail	fail	fail	fail
90 % LU / 10 % Erythritol	5.61	5.77	2.85 %	5.82	3.74 %	5.83	3.77 %	5.87	4.43 %
	5.47	5.65	3.29 %	5.72	4.57 %	5.72	4.37 %	5.75	5.36 %
90 % LU / 10 % Maltitol	6.73	6.84	1.63 %	6.88	2.23 %	fail	fail	fail	fail
	5.89	5.97	1.36 %	6.01	2.04 %	6.05	2.64 %	6.13	3.92 %
90 % LU / 10 % Isomalt	5.47	5.58	2.01 %	5.60	2.38 %	5.99	8.68 %	6.06	9.74 %

As can be seen from the above results, the polydextrose/mannitol combinations in accordance with the present invention gave the best results in terms of minimal moisture gain and overall stability.

EXAMPLE 5 - POLYDEXTROSE-CONTAINING MEDICATED LOZENGES

- 5 Polydextrose-containing medicated lozenges in accordance with the present invention were prepared from a syrup including the following ingredients (all expressed in grams). Additionally, Red # 40 and Blue #1 were included as coloring agents.

<u>Ingredient</u>	<u>Sample 1</u>	<u>Sample 2</u>
LITESSE® ULTRA	454.96	454.96
Mannitol (powdered)	40.00	40.00
Menthol	0.59	0.76
Eucalyptus Oil	0.18	0.13
Citric Acid	2.80	2.80
Acesulfame-K (0.27)	1.00	1.10
Cherry Flavoring	0.37	0.40
Water	50.00	50.00

- 10 The invention has been described in general terms and in connection with the preferred embodiments. These embodiments, however, are merely illustrative and the invention is not restricted thereto. It will be understood by those skilled in the art that other variations and modification can easily be made which are within the scope of the invention and that the scope of the invention is
- 15 to be determined from the claims appended hereto.

What is claimed is:

1. A base suitable for use in sugar-free, hard-boiled confections, the base comprising from about 85 to about 97 wt% of a polydextrose which is essentially free of mono- and disaccharides, and from about 3 wt% to about 15  
5 wt% of a sugar alcohol component comprising a predominant amount of mannitol, wherein wt% is based on the combination of the polydextrose and the sugar alcohol component, wherein the base is essentially sugar-free, and wherein the base has a caloric content of less than or equal to 1.2 kcal/g.
2. The base of claim 1, wherein the polydextrose is essentially free of  
10 reducing glucose groups.
3. The base of claim 1, wherein the sugar alcohol component is at least 75 wt% mannitol, based on the weight of the sugar alcohol component.
4. The base of claim 3, wherein the sugar alcohol component is at least 90 wt% mannitol, based on the weight of the sugar alcohol component.
- 15 5. The base of claim 1, comprising from about 85 to about 95 wt% of the polydextrose, and from about 5 wt% to about 15 wt% of the sugar alcohol component.
6. The base of claim 5, comprising from about 87 to about 93 wt% of the polydextrose, and from about 7 wt% to about 13 wt% of the sugar alcohol  
20 component.
7. The base of claim 1, having a caloric content of no greater than 1.1 kcal/g.
8. A stable, hard-boiled confection comprising a base comprising from about 85 to about 97 wt% of a polydextrose which is essentially free of mono-  
25 and disaccharides, and from about 3 wt% to about 15 wt% of a sugar alcohol component comprising a predominant amount of mannitol, wherein wt% is based on the combination of the polydextrose and the sugar alcohol component, wherein the confection is essentially sugar-free, and wherein the base has a caloric content of less than or equal to 1.2 kcal/g (solids).
- 30 9. The stable, hard-boiled confection of claim 8, wherein the polydextrose is essentially free of reducing glucose groups.

10. The stable, hard-boiled confection of claim 8, wherein the sugar alcohol component is at least 75 wt% mannitol, based on the weight of the sugar alcohol component.

5 11. The stable, hard-boiled confection of claim 10, wherein the sugar alcohol component is at least 90 wt% mannitol, based on the weight of the sugar alcohol component.

12. The stable, hard-boiled confection of claim 8, wherein the base comprises from about 85 to about 95 wt% of the polydextrose, and from about 5 wt% to about 15 wt% of the sugar alcohol component.

10 13. The stable, hard-boiled confection of claim 12, wherein the base comprises from about 87 to about 93 wt% of the polydextrose, and from about 7 wt% to about 13 wt% of the sugar alcohol component.

14. The stable, hard-boiled confection of claim 8, having a caloric content of no greater than 1.2 kcal/g (solids).

15 15. The stable, hard-boiled confection of claim 14, having a caloric content of no greater than 1.1 kcal/g (solids).

16. An aqueous syrup suitable for use in preparing a hard-boiled confection, comprising a water content of from about 20 wt% to about 40 wt%; and a solids content of from about 60 wt% to about 80 wt%, wherein wt% is based on the total weight of the syrup, and wherein the solids content comprises a base comprising from about 85 to about 97 wt% of a polydextrose which is essentially free of mono- and disaccharides, and from about 3 wt% to about 15 wt% of a sugar alcohol component comprising a predominant amount of mannitol, wherein wt% is based on the combination of the polydextrose and the sugar alcohol component, wherein the syrup is essentially sugar-free, and wherein the base has a caloric content of less than or equal to 1.2 kcal/g solids.

17. The aqueous syrup of claim 16, comprising a water content of from about 25 wt% to about 35 wt%; and a solids content of from about 65 wt% to about 75 wt%

30 18. The aqueous syrup of claim 16, wherein the polydextrose is essentially free of reducing glucose groups.



19. The aqueous syrup of claim 16, wherein the sugar alcohol component is at least 75 wt% mannitol, based on the weight of the sugar alcohol component.

5       20. The aqueous syrup of claim 19, wherein the sugar alcohol component is at least 90 wt% mannitol, based on the weight of the sugar alcohol component.

21. The aqueous syrup of claim 16, wherein the solids content comprises from about 85 to about 95 wt% of the polydextrose, and from about 5 wt% to about 15 wt% of the sugar alcohol component.

10       22. The aqueous syrup of claim 21, wherein the solids content comprises from about 87 to about 93 wt% of the polydextrose, and from about 7 wt% to about 13 wt% of the sugar alcohol component.

23. The aqueous syrup of claim 16, having a caloric content of no greater than 1.2 kcal/g (solids).

15       24. The aqueous syrup of claim 23, having a caloric content of no greater than 1.1 kcal/g solids (solids).

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/US00/10653

**A. CLASSIFICATION OF SUBJECT MATTER**

IPC(7) :A23L 1/236

US CL :426/548

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)

U.S. : 426/548, 658, 660

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)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5,629,042 A (SERPELLONI ET AL.) 13 May 1997, entire patent, especially claims 1-22.	1-24
Y	US 4,948,596 A (BUNICK ET AL) 14 August 1990, entire document, especially claims 22-32.	1-24
Y	US 3,766,165 A (RENNHARD) 16 October 1973, entire patent, especially Example XIX.	1-24

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:		"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
"A"	document defining the general state of the art which is not considered to be of particular relevance	"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
"E"	earlier document published on or after the international filing date	"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
"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)	"&"	document member of the same patent family
"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

28 JUNE 2000

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