Abstract:
The invention provides a gelatine-free jelly confectionery composition comprising a bulk sweetener, water and a mixture of oxidised starches. The oxidised starches may be selected from two or more of potato, tapioca, corn, wheat, rice, oat, barley, millet, pea, brassica, carrot, parsnip, pumpkin and sweet potato oxidised starches, such as potato and tapioca oxidised starches. Methods of making the products are also provided.
Confectionery and Manufacturing Method

Technical field of the invention

The invention relates to a jelly confectionery composition and methods of manufacturing jelly confectionery compositions, and in particular, but not necessarily exclusively, jelly confectionery compositions including mixtures of oxidised starches.

Conventionally, jelly confectioneries are provided in a form which, dependent on the final texture of the same, can be chewed and/or sucked when placed in the mouth by a consumer. Most commonly, the jelly confectionery includes a quantity of gelatine which, during manufacturing of the confectionery, is manipulated to define the final texture of the confectionery, via heating, pressure or other ingredient addition, for example. Gelatine is a product generally obtained from an animal source, and as such, means that many jelly confectioneries which include gelatine are deemed to contain animal products which therefore makes the same unable to be eaten by vegetarians or by consumers practising certain regions. Furthermore, gelatine can be expensive to use in confectionery items, and this may render the final cost of the jelly confectionery relatively expensive compared to other confectionery items.

There have been previous attempts to remove gelatine from jelly confectionery compositions, whilst at the same time ensuring that the final products are similar in texture, mouth feel and other organoleptic characteristics to gelatine-containing jelly confectioneries. However, to the best knowledge of the applicant, said attempts have been unsuccessful with respect to the final form of the confectionery which has been manufactured or such attempts have been too expensive due to the prohibitive cost of substitute ingredients or changes in manufacturing processes.

The use of starch in confectionary and the production of jelly candies is generally known. Conventionally starch produces a very different mouth feel to gelatine. Gelatine melts and dissolves in the mouth, whilst starch tends to require more chewing. A wide variety of starches are known. Naturally occurring starches are available from a number of different sources including corn (maize), wheat, potato, tapioca and rice. Such starches are complex carbohydrates. In their pure form they are substantially insoluble in water and are made of linear and helical amylose and branched amylopectin. During cooking starch becomes a paste with increased viscosity. Different starches from different plants have different properties, such as different gelling temperatures, granule size, solution clarity, stability, resistance to shear and freeze/thaw stability.

Starches have been modified, for example by enzymatic degradation with amylases, by treating with alkali, bleaches, acetylation or acid. Acid thinned starches, for example are
hydrolysed with acid such as sulphuric acid or hydrochloric acid. This lowers the paste viscosity of the starch, allowing more starch to be used in the product. Acid hydrolysed starch may also be repolymerised to form dextrinised starches having different properties.

A still further example of modified starches are oxidised starches. These use the hydrolysis and oxidation of starch using, for example, sodium hypochlorite below gelation temperature. This results in the partial degradation of the starch and the conversion of a number of alcohol and aldehyde groups to carboxylate groups. This produces still different properties, for example lower hot viscosity, reduced retrogradation and increased clarity. The carboxyl group of oxidised starches may be detected by, for example Fourier Transform Infra Red (FTIR)

EP 1,023,841A describes the production of confectionary products, such as a chewy sweet filled with a syrup centre. An oxidised starch may be used, typically in combination with gum arabic, to allow the amount of gelatine used in the product to be reduced. The reason for doing this is stated to be because gelatine is highly sensitive to thermal and acid environments causing loss of functional properties, reduced cooking efficiencies, loss of ingredient and possible fouling. There is no disclosure of the effect of the single starch used on mouth feel or other similar properties.

It is therefore an aim of embodiments of the present invention to provide a jelly confectionery which can be manufactured without gelatine, or with minimal gelatine content, yet still allow the final product to have a similar or identical mouth-feel, texture and organoleptic characteristics to equivalent gelatine-based products.

It is also an aim of embodiments of the invention to provide jelly confectioneries and manufacturing methods which do not use gelatine but which are equally or similarly cost effective as gelatine-based jelly confectioneries and processes for manufacturing the same.

In the following specification the term "jelly confectionery" is used broadly to refer to those confectioneries known as jellies, gummies, jubes, pastilles, gelatines and similar. Jelly confectioneries generally comprise bulk sweetener and a gelling agent, the gelling agent being added to impart a setting or thickening property on the confectionery.

In the following specification the term "stoving" refers to the stage of conditioning during which time a liquid or semi-solid jelly confectionery solidifies to its final consistency and viscosity. This typically takes place in a drying room with controlled temperature and humidity conditions, the temperature and humidity generally being cycled to increase and decrease both depending on the conditioning required.
Summary of the invention

According to a first aspect of the invention there is provided a substantially gelatine-free jelly confectionery composition comprising a bulk sweetener, water and a mixture of oxidised starches.

The oxidised starches may be from different plant sources, such as potato, corn, wheat, rice, oat, barley, millet or tapioca. Tapioca starch typically comes from cassava. Different plants produce different properties. Other useful vegetable-based modified starches include pea, brassica, carrot, parsnip, pumpkin and sweet potato, for example.

The Applicant has found that mixing oxidised starches from different plants allows the beneficial properties of the two or more different types of starch to be combined and for gelatine to be replaced by the two or more starches whilst still producing a jelly-confectionary having similar mouth-feel, texture and organoleptic characteristics to equivalent gelatine-based products.

Two or more, or just two, different oxidised starches may be used. Mixtures of oxidised potato starch and oxidised tapioca starch has been found to produce particularly good properties.

The Applicant found that oxidised potato starch alone provided good cohesive elastic soft texture but had a high hot processing viscosity. This means it is unsuitable as a total replacement for gelatine on its own. Oxidised tapioca starch alone had less textural cohesiveness but still good soft elastic texture with lower hot processing viscosity. Combining the two types of oxidised starch allows the textural properties to be matched whilst at the same time allowing the hot processing viscosity to be controlled or limited for better manufacturing properties.

The oxidised potato starch may be obtained from, for example KMC, Denmark. An example of such a starch is their KMC 11-34 CS, No.3 or Gelamyl(tm) oxidised potato starch. An example of oxidised tapioca starch is obtained from Cargill and sold under the tradename Cargill 75505.

Replacing one or other of the oxidised starches with, for example an acid modified starch does not produce the same benefits.

Suitable bulk sweeteners may be one or more sweeteners selected from sugar-based bulk sweeteners, sugarless bulk sweeteners and mixtures thereof. Sugar-based bulk sweeteners include saccharides. Suitable saccharides include monosaccharaides, disaccharides and polysaccharides, and may be selected from sucrose, glucose, dextrose, fructose, maltose, dextrin, xylose, ridose, mannose, galactose, lactose, invert sugar, partially hydrolysed starch, fructooligosaccharides, corn syrup solids (such as high fructose corn syrup (HFCS) and high glucose corn syrup (HGCS), and any mixture thereof.
In some embodiments the bulk sweetener comprises a mixture of glucose and sucrose. The glucose and sucrose may be present in relative amounts by weight of glucose and sucrose of between 80:20 and 20:80, such as between 60:40 and 40:60, or between 55:45 and 45:55.

Sugarless bulk sweeteners include sugar alcohols (or "polyols") such as sorbitol, xylitol, erythritol, mannitol, maltitol, isomalt, galactitol, lactitol, hydrated starch hydrolysates, and the like, and any mixture thereof, for example.

In some embodiments the amount of bulk sweetener in the gelatine-free jelly confectionery composition is at least 30wt%, 35wt%, 40wt%, 45wt%, or 50wt% of the composition. In some embodiments the amount of bulk sweetener in the composition is no more than 95wt%, 90wt%, 85wt% or 80wt% of the composition. In some embodiments the amount of bulk sweetener is between 45wt% and 95wt%, 55wt% and 90wt% or between 60wt% and 85wt% of the gelatine-free jelly confectionery composition.

One or more additional modified starches such as, acid-treated starch, alkali-treated starch, monostarch phosphate, distarch phosphate, starch acetate, hydroxypropyi starch, acetylated distarch phosphate, or any combination thereof, may also be present, typically in 0-5wt%. This allows adjustments to the mouth feel to be made should alternative properties be needed.

Alternatively, further edible polymers such as gum arabic may be added. Alternatively, further polymers such as gum arabic edible gums may be excluded from being used.

In some embodiments the mixture of oxidised starches is present in an amount of at least 5wt%, 7wt%, 9wt% or 11wt% of the gelatine-free jelly confectionery composition. The mixture of oxidised starches may be present in an amount of up to 25wt%, 23wt%, 21wt%, 19wt% or 17wt% of the gelatine-free jelly confectionery composition. In some embodiments the mixture of oxidised starches is present between 9wt% and 21wt%, or between 11wt% and 19wt% of the gelatine-free confectionery composition. These ranges provide optimal viscosity for the final jelly confectionery composition, and help to deliver a texture and mouth-feed similar to equivalent gelatine-based and starch plus gelatine based jelly confectioneries.

In embodiments of a gelatine-free jelly confectionery composition of the invention comprising a mixture of two oxidised starches, such as oxidised potato and oxidised tapioca starches in a ratio of between 75:25 and 25:75, 70:30 to 30:70, 60:40 to 40:60 or 55:45 to 45:55.

The amount of water in the gelatine-free jelly confectionery composition may be at least 5wt%, 7wt% or 9wt% and may be no more than 27wt%, 25wt% or 23wt%. In some
embodiments the amount of water is between 7wt% and 25wt%, or between 9wt% and 23wt% of the jelly confectionery composition.

In some embodiments of the gelatine-free jelly confectionery compositions of the invention the composition comprises bulk sweetener in an amount of between 60wt% and 90wt%, water in an amount between 7wt% and 25wt%, and a mixture of oxidised starches in an amount of between 5wt% and 20wt%. The mixture of oxidised starches in these embodiments is suitably a mixture of two oxidised starches, such as potato and tapioca starches, in a ratio of 65:35 to 35:65 by weight.

The gelatine-free jelly confectionery composition may further comprise other ingredients such as acid, flavour, colour, high intensity sweetener, cooling agents, warming agents, fruit juice concentrate, medicaments, botanicals, health-promotion agents and the like.

Colours suitable for use in the inventive gelatine-free jelly confectionery compositions include food grade colours, pigments or visual effect agents, or any combination thereof. Colours may be natural or artificial, water soluble or oil soluble.

Suitable flavours include natural, artificial and nature-identical flavours, water soluble or oil soluble flavours. The choice of flavour is generally based on the desired flavour for the product, and the amount is generally based on the strength of the flavour itself, and the desired strength of flavour in the product. Suitable flavours include fruit flavours, floral and herbal flavours, tea-based flavours, mints, chocolate, vanilla, aniseed and any combination thereof. Suitable flavours include apricot, aniseed, apple, banana, blackcurrant, guava, grapefruit, green tea, honeydew, kiwi, lavender, lemon, lemon balm, lime, mandarin, spearmint, peppermint, sweet mint, menthol, orange, passion fruit, peach, pear, pineapple, raspberry, strawberry, vanilla, watermelon, and any combination thereof.

Suitable high-intensity sweeteners include, but are not limited to:

a) water-soluble sweetening agents such as dihydrochalcones, monellin, steviosides and stevia derived compounds including rebaudioside A, isomogroside V and the like, Io han quo and Io han quo derived compounds, glycyrrhizin, dihydroflavenol, and mixtures thereof;

b) water-soluble artificial sweeteners such as soluble saccharin salts, i.e., sodium or calcium saccharin salts, cyclamate salts, the sodium, ammonium or calcium salt of 3,4-dihydro-6-methyl-1, 2, 3-oxathiazine-4-one-2, 2- dioxide, the potassium salt of 3, 4-dihydro-6-methyl-1, 2, 3-oxathiazine-4-one-2, 2-dioxide (Acesulfame-K), the free acid form of saccharin, and mixtures thereof;

c) dipeptide based sweeteners, such as L- aspartic acid derived sweeteners, such as L-aspartyl-L- phenylalanine methyl ester (Aspartame), N- [N- (3,3- dimethylbutyl) -L-[alpha]-aspartyl] -L-phenylalanine 1-methyl ester (Neotame), and materials described
in U.S. Pat. No. 3,492,131, L-alphaaspartyl-N- (2,2,4,4-tetramethyl-3-thietanyl) -D-
alaninamide hydrate (Alitame), methyl esters of L-aspartyl-L-phenylglycerine and L-
aspartyl-L-2, 5-dihydrophenyl-glycine, L-aspartyl-2, 5-dihydro-L-phenylalanine ;
L-aspartyl-L- (1-cyclohexen) -alanine, and mixtures thereof;
d) water-soluble sweeteners derived from naturally occurring water-soluble sweeteners,
such as chlorinated derivatives of ordinary sugar (sucrose), e.g. chlorodeoxy sugar
derivatives such as derivatives of chlorodeoxysucrose or chlorodeoxygalactosucrose,
known, for example, under the product designation of Sucralose or Splenda(tm) ;
examples of chlorodeoxy sucrose and chlorodeoxygalactosucrose derivatives include
but are not limited to: 1-chloro $\alpha$ -deoxysucrose; 4-chloro-4-deoxy- alpha-D-
galactopyranosyl-alpha- D-fructofuranoside, or 4- chloro-4-deoxygalactosucrose; 4-
chloro-4-deoxy-alpha-D- galactopyranosyl - l-chloro- 1-deoxy-beta-D- fructose-
uranoside, or 4, $\Gamma$ -dichloro-4, $\Gamma$ -dideoxygalactosucrose,- $\Gamma$, 6'-dichlorol ; 6'-
dideoxy sucrose; 4-chloro-4-deoxy- alpha-D-galactopyranosyl-1, 6-dichloro-1, 6-
dideoxy-beta-D- fructofuranoside, or 4, $\Gamma$, 6'-trichloro-4, $\Gamma$, 6' -
trideoxygalactosucrose; 4, 6-dichloro-4, 6-dideoxy-alpha-D- galactopyranosyl-6-
chloro-6-deoxy-beta-D- fructofuranoside, or 4, 6, 6'- trichloro-4, 6, 6'-
trideoxygalactosucrose; 6,1', 6'-trichloro-6, $\Gamma$, 6' - trideoxy sucrose; 4, 6-dichloro-4, 6-
dideoxy-alpha-D-galacto-
yranosyl-1, 6-dichloro-1, 6-dideoxy beta-D-
fructofuranoside, or 4, 6, $\Gamma$, 6' -tetrachloro4 , 6, $\Gamma$, 6' - tetra-deoxygalacto-
sucrose; and
4, 6, $\Gamma$, 6' -tetra-deoxy- sucrose, and mixtures thereof;
e) protein based sweeteners such as miraculin, extracts and derivatives of extracts of
Synseplum dulcificum, mabinlin, curculin, monellin, brazzein, pentadin, extracts and
derivatives of extracts of Pentadiplandra brazzeana, thaumatin, thauaoccous danielli
(Thaumat I and II) and talin;
f) monatin (2-hydroxy-2-(indol-3-ylmethyl) -4-aminoglutaric acid) and its derivatives
or isomers; and
g) Lo han guo (sometimes also referred to as "Lo han kuo").

Suitable nutraceuticals, medicaments, botanicals and health-promoting agents include
minerals, vitamins, probiotics, prebiotics, calcium-containing compounds for oral care,
algesics, antibacterial agents, cough suppressants and herb or botanical extracts (such as
green tea extract).

According to a second aspect of the invention there is provided a method of
manufacturing a jelly confectionery composition the method comprising the steps of:
a) preparing a composition comprising a bulk sweetener, water and a mixture of
oxidised starches;
b) heating the composition; and optionally adding colours and/or flavours and;

c) conditioning the composition to remove a portion of the water.

The bulk sweetener and oxidised starches may be as described herein above for the first aspect of the invention.

In some embodiments the bulk sweetener is one or more of glucose, fructose, sucrose, corn syrup solids, maltitol, mannitol, sorbitol, isomalt, xylitol, erythritol and combinations thereof. In some embodiments the bulk sweetener is a mixture of glucose and sucrose, a polyol or mixture of polyols.

In some embodiments the mixture of oxidised starch comprises a mixture of oxidised potato starch and an oxidised cereal-based starch such as oxidised tapioca starch.

In one embodiment the method comprises, in step a), preparing a composition comprising glucose, sucrose, water and mixture of oxidised starches. In another embodiment step a) comprises preparing a composition comprising a polyol, water and a mixture of oxidised starches.

Step b) may comprise heating the composition for no more than 60 seconds, 45 seconds or 30 seconds at a temperature of between 110°C and 200°C, or between 110°C and 160°C.

The bulk sweetener, oxidised starches and water may be combined in a batching tank or mixing tank before heating. In some embodiments any further ingredients, such as acid, colours, flavours, cooling agents, warming agents, medicaments and the like, are also added to the composition before heating. In other embodiments one or more of these further ingredients may be added after heating in step b) but before conditioning in step c). This may be especially useful for ingredients that may be heat-sensitive or volatile, for example, where heating may destroy or degrade the ingredients.

The method may comprise heating the composition in a batching or mixing tank, in step b), or may comprise depositing the composition in one or more moulds before heating in step b).

The method may comprise a step between step b) and step c) of depositing the heated composition into one or more moulds, which may have one or more cavities deforming the shape of a confectionery product.

In one embodiment step b) may also comprise, in addition to heating, addition of moisture to the composition during the heating process. In some embodiments, step b) comprises heating the composition using steam, which effects addition of moisture to the composition. In some embodiments the steam is applied at a temperature of between 110°C and 160°C, for between 0.5 and 60 seconds, or between 1 second and 30 seconds.
In some embodiments heating in step b) is applied using a jet cooker. In other embodiments, heating in step b) may be applied using alternative forms of apparatus such as a microwave, or any apparatus which allows heat to be applied throughout the composition within 2 hours, and in some embodiments, the heating apparatus allows heat to be applied to the composition without the need for the composition to flow through a complex path to heat the same.

Typically the heating effect is such as to increase the viscosity of the composition.

Conditioning of the composition in step c) may comprise drying the composition in a controlled environment to remove a portion of the moisture present in the composition.

The conditioning may comprise controlling the temperature and/or humidity of the environment in which the composition is located. The temperature may be increased and/or decreased in cycles. The humidity may be increased and/or decreased in cycles.

Conditioning of the composition may be performed to remove moisture from the composition until the composition comprises between 5wt% and 25wt% water, or between 9wt% and 21wt% water.

Conditioning may comprise stoving for a period of time from between 12 and 108 hours, at a temperature of between 20°C and 75°C.

According to a third aspect of the invention there is provided a gelatine-free jelly confectionery composition of the first aspect of the invention, manufactured by the method of the second aspect of the invention.

In a fourth aspect of the invention there is provided a method of manufacturing a jelly confectionery composition comprising the steps of heating a composition comprising a bulk sweetener, water and a mixture of starches with a jet cooker, and conditioning the heated compositions to remove a portion of the water.

The jelly confectionery composition may be a gelatine-free jelly confectionery composition and the bulk sweetener may be as described for the first aspect of the invention. The starches may be oxidised starches, as described for the first aspect of the invention.

Detailed description of the invention

Specific embodiments of the invention will now be described by way of example only.

Oxidised starches are generally known in the art and may be commercially obtained.
Example 1

A gelatine-free jelly confectionery composition of the invention was prepared using the following ingredients, as shown in Table 1:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount Added</th>
<th>Percentage Solids</th>
<th>Dry Weight</th>
<th>Percentage Weight of Composition before Heating and Conditioning</th>
<th>Percentage Weight in the Final Confectionery Composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>10.00kg</td>
<td>0.0%</td>
<td>0.0kg</td>
<td>19.75%</td>
<td>8.05%</td>
</tr>
<tr>
<td>Glucose 52DE</td>
<td>17.00kg</td>
<td>81.5%</td>
<td>13.86kg</td>
<td>33.58%</td>
<td>38.47%</td>
</tr>
<tr>
<td>Sucrose</td>
<td>17.05kg</td>
<td>100%</td>
<td>17.05kg</td>
<td>33.68%</td>
<td>38.58%</td>
</tr>
<tr>
<td>Oxidised Potato starch</td>
<td>3.50kg</td>
<td>81.00%</td>
<td>2.84kg</td>
<td>6.91%</td>
<td>7.92%</td>
</tr>
<tr>
<td>Oxidised tapioca starch</td>
<td>3.08kg</td>
<td>81.00%</td>
<td>2.49kg</td>
<td>6.08%</td>
<td>6.97%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>50.63kg</strong></td>
<td><strong>36.23kg</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>100.00%</strong></td>
<td></td>
</tr>
</tbody>
</table>

Theoretical premix total solids 71.57%

Final moisture percentage after heating and conditioning 18.00%

The gelatine-free jelly confectionery composition premix was first prepared by mixing all of the ingredients from Table 1 in a batching tank/mixing vessel at a temperature of 50°C to 60°C.

After the premix was homogeneously blended the premix material was passed in a liquid form to a jet cooker. Jet cookers have been found to be particularly useful as they are less prone than coil cookers to being clogged by the blend of material during the cooking process. A jet cooker is a well-known form of apparatus in which heat is applied during a relatively short period of time and thereby substantially instantaneously, by applying jets of steam to the blended material in order to increase the viscosity of the same, but preferably in a manner to avoid the viscosity of the blend reaching a peak viscosity and then declining as would be the case when using conventional heating apparatus over a longer period of time. It is believed that the use of this heat process, or indeed any other heat process which can apply
heat rapidly, is of significant advantage and, due to the viscosity of the liquid blend, the material could not practically be heated using other forms of heat apparatus such as coil heaters or heat plate exchangers as in these forms of apparatus the material is required to pass through the heating apparatus and the viscosity of the liquid blend would be such as to block the heating apparatus. Furthermore, by providing the heating effect using steam in a jet cooker, then in addition to a provision of heat, the application of the steam also adds moisture to the blend.

The premix of Example 1 was heated in a jet cooker for between 1 and 20 seconds at a temperature of 128°C to 133°C.

After heating, the premix blend was transferred to a depositor, and deposited directly into cavities in a starch mould, the cavities having the desired shape to which the items of gelatine-free jelly confectionery are to be formed.

After the mould cavities were filled, the mould containing the gelatine-free liquid jelly confectionery composition was passed to a drying room consisting of a temperature and humidity controlled room, in which the environment within the room is controlled in terms of temperature and humidity, with cycling of heating and cooling being controlled over a predetermined period of time in order to allow the required level of moisture in the items of confectionery to be achieved by removing a proportion of the moisture from the same. The moulds in Example 1 were placed in drying rooms for a period of time between 12 and 108 hours and the temperature controlled between 20°C and 75°C.

The texture of the confectionery composition once conditioned is dependent on both the ingredient composition and the conditioning parameters. For example, if the texture is intended to be relatively soft, then a lesser amount of moisture is removed, which typically will mean that the duration of time of the confectionery composition in the drying room during conditioning will be at the shorter end of the range, whereas if the items are confectionery are to be relative hard then a greater amount of moisture is required to be removed, in which case, the items of confectionery will be held in the drying room for a greater period of time for conditioning. In the embodiment described for Example 1, the premix blend material entered the stove with a moisture level of approximately 27.5wt%, and after conditioning, in the drying room, the moisture content was reduced to 18wt%. This gave a gelatine-free jelly confectionery with a medium-soft texture which had a texture, viscosity and organoleptic properties comparable to an equivalent gelatine containing jelly confectionery.

The thus, formed gelatine-free jelly confectionery composition of Example 1 was then cooled to ambient temperature, removed from the mould cavities and packaged ready for consumption.
In Example 1, the ratio of modified potato (vegetable) starch to modified tapioca starch was approximately 55:45 and by changing the proportion of oxidised potato starch to oxidised tapioca starch, different textures and organoleptic characteristics can be imparted to the gelatine-free jelly confectioneries of the invention.

Example 2

A second embodiment of a gelatine-free jelly confectionery composition of the invention as manufactured using the ingredients shown in Table 2 below:

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>Amount Added</th>
<th>Percentage Solids</th>
<th>Dry weight</th>
<th>Percentage weight of composition before heating and conditioning</th>
<th>Percentage weight in the final confectionery composition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Water</td>
<td>10.5kg</td>
<td>0.00%</td>
<td>0.00kg</td>
<td>20.29%</td>
<td>7.93%</td>
</tr>
<tr>
<td>Glucose DE</td>
<td>17kg</td>
<td>81.5%</td>
<td>13.86kg</td>
<td>32.85%</td>
<td>37.95%</td>
</tr>
<tr>
<td>Sucrose</td>
<td>17.05kg</td>
<td>100.00%</td>
<td>17.05kg</td>
<td>32.95%</td>
<td>38.06%</td>
</tr>
<tr>
<td>Oxidised Potato starch</td>
<td>4.12kg</td>
<td>82.00%</td>
<td>3.34kg</td>
<td>7.96%</td>
<td>9.20%</td>
</tr>
<tr>
<td>Oxidised Tapioca starch</td>
<td>3.08kg</td>
<td>82.00%</td>
<td>2.49kg</td>
<td>5.95%</td>
<td>6.87%</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>51.75kg</strong></td>
<td><strong>36.74kg</strong></td>
<td><strong>100.00%</strong></td>
<td><strong>100.00%</strong></td>
<td></td>
</tr>
</tbody>
</table>

The gelatine-free jelly confectionery composition premix was prepared in an identical manner to that described for Example 1 above, and heating and conditioning were performed under identical conditions.

The resultant gelatine-free jelly confectionery composition of Example 2 had a similar eat and elasticity to Example 1 but was slightly firmer.

For both of the products described for Example 1 and Example 2 above, the oxidised starch mixture contained oxidised tapioca starch and oxidised potato starch. By changing the
starches used in the oxidised starch mix, different properties can be imparted to the final gelatine-free jelly confectionery composition. Furthermore, mixtures of more than two starches may be used in embodiments of the invention. In other examples, after the heating step, colours, flavours, fruit juices, acids and other ingredients are added before the hot, liquid mixture is deposited into starch moulds. In some embodiments, at least one of these other ingredients may be added to the premix before heating, if a specific ingredient is required to be added during that stage in order to achieve a desired texture of organoleptic property.

The above examples, and numerous modifications thereof, indicate that the products and methods of the invention no longer require any animal products within the ingredients, which in turn means that the products formed in accordance with the current invention can be consumed by vegetarians, whilst at the same time the items of confectionery obtained have the required consistency and texture to match conventional items of confectionery which are being manufactured using gelatine.

The above embodiments are described by way of example only. Many variations are possible without departing from the scope of the invention as defined in the amended claims.
Claims

1. A gelatine-free jelly confectionery composition comprising a bulk sweetener, water and a mixture of oxidised starches.

2. A gelatine-free jelly confectionery composition according to claim 1 wherein the oxidised starches are selected from two or more of potato, tapioca, corn, wheat, rice, oat, barley, millet, pea, brassica, carrot, parsnip, pumpkin and sweet potato oxidised starches.

3. A gelatine-free jelly confectionery composition according to claims 1 or 2 wherein the oxidised starches are potato and tapioca oxidised starches.

4. A gelatine-free jelly confectionery composition as claimed in any preceding claim wherein the bulk sweetener is selected from a saccharide and a sugar alcohol or a mixture thereof.

5. A gelatine-free jelly confectionery composition as claimed in claim 4 wherein the bulk sweetener comprises a mixture of glucose and sucrose.

6. A gelatine-free jelly confectionery composition as claimed in any one of claims 1 to 5 wherein the bulk-sweetener comprises between 30wt% and 95wt% of the composition.

7. A gelatine-free jelly confectionery composition as claimed in any preceding claim additionally comprising one or more modified starches independently selected from an acid-treated starch, alkali-treated starch, monostarch phosphate, distarch phosphate, starch acetate, hydroxypropyl starch, acetylated distarch phosphate or any combination thereof.

8. A gelatine-free jelly confectionery composition as claimed in any preceding claim wherein the mixture of oxidised starches is present in an amount of between 5wt% and 25wt% of the composition.

9. A gelatine-free jelly confectionery composition as claimed in any preceding claim wherein water is present in an amount of between 7wt% and 25wt% of the composition.

10. A method of manufacturing a jelly confectionery composition, the method comprising the steps of:

   a) preparing a composition comprising a bulk sweetener, water and a mixture of oxidised starches;

   b) heating the composition; and optionally adding colours and/or flavours and;

   c) conditioning the composition to remove a portion of the water.
11. A method as claimed in claimed 10 wherein the bulk sweetener and oxidised starches are as claimed in any one of claims 1-9.

12. A method as claimed in any one of claims 10 or 11 wherein the method comprises, in step a) preparing a composition comprising glucose, sucrose, water and a mixture of oxidised starches.

13. A method as claimed in any one of claims 10-12 wherein step b) comprises heating the composition for no more than 60 seconds at a temperature of between 110°C and 200°C.

14. A method as claimed in any one of claims 10-13 wherein step b) further comprises in addition to heating, addition of moisture to the composition during heating.

15. A method as claimed in any one of claims 10-14 wherein step b) comprises heating using a jet cooker.

16. A method as claimed in any one of claims 10-15 wherein step c) comprises conditioning the composition by drying the composition in a controlled environment to remove a portion of the moisture present in the composition.

17. A method as claimed in claim 16 wherein conditioning comprises controlling the temperature and/or humidity of the environment in which the composition is located.

18. A gelatine-free jelly confectionery composition of any one of claims 1-9 manufactured by the method of any one of claims 10-17.

19. A method of manufacturing a jelly confectionery composition comprising the steps of heating a composition comprising a bulk sweetener, water and a mixture of starches with a jet cooker, and conditioning the heated composition to remove a portion of the water.

20. A gelatine-free jelly confectionery composition, method of manufacturing a gelatine-free jelly confectionery composition or method of manufacturing a jelly confectionery composition substantially as described herein with reference to the examples.
### INTERNATIONAL SEARCH REPORT

**International application No**: PCT/GB2013/051182

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**A. CLASSIFICATION OF SUBJECT MATTER**

**INV.** A23G3/42  A23L1/0522

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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)

A23G  A23L  C08B

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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal  WPI  Data,  FSTA

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**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<th>Relevant to claim No.</th>
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<td>ZUBREV N I ET AL: &quot;Use of oxidized starch in fruit jelly manufacture&quot; , INTERNATIONAL FOOD I, 1973, XP002131916, abstract</td>
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<td>US 2 173 878 A (FULLER ARTHUR D) 26 September 1939 (1939-09-26) page 3, lines 16-17; claims 1-4</td>
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<td>DE 21 20 859 A1 (MAIZENA GMBH, HAMBURG) 16 November 1972 (1972-11-16) page 3; claims 1-5; example 1-3</td>
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[X] Further documents are listed in the continuation of Box C.  
[X] See patent family annex.

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* 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

  "Z" document member of the same patent family

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Date of the actual completion of the international search: 12 March 2014

Date of mailing of the international search report: 16/06/2014

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: Gøhr, Bjørn
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<td>US 2006/134311 A1 (MUELLER ROLF [CH] ET AL) 22 June 2006 (2006-06-22) paragraph [0044]; claims 1,10,11; table 1</td>
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</table>
### INTERNATIONAL SEARCH REPORT

**Box No. II**  
**Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)**

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

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

2. X Claims Nos.:  
   because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
   see FURTHER INFORMATION sheet PCT/ISA/21Q

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

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

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

   see additional sheet

1. ☐ All required additional search fees were timely paid by the applicant, this international search report covers all searchable items.

2. ☐ All searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.

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

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

   1-18

**Remark on Protest**

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

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

☐ No protest accompanied the payment of additional search fees.
Continuation of Box 11.2

Claims Nos.: 19-22

There are no claims with the numbering 19 or 20, so these claims can not be searched.

Due to a non-unity objection, the second invention (claim 21) was not searched.

Claim 22 is defined by the feature "substantially as described herein with reference to the examples" which is so unclear as to the extend of the claims, that it can not be searched. The claimed subject matter must be defined by the claims, which must be self-contained.

The applicant's attention is drawn to the fact that claims relating to inventions in respect of which no international search report has been established need not be the subject of an international preliminary examination (Rule 66.1(e) PCT). The applicant is advised that the EPO policy when acting as an International Preliminary Examination Authority is normally not to carry out a preliminary examination on matter which has not been searched. This is the case irrespective of whether or not the claims are amended following receipt of the search report or during any Chapter II procedure. If the application proceeds into the regional phase before the EPO, the applicant is reminded that a search may be carried out during examination before the EPO (see EPO Guidelines C-IV, 7.2), should the problems which led to the Article 17(2) declaration be overcome.
FURTHER INFORMATION CONTINUED FROM PCT/ISA/210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-18
   gelatin-free jelly comprising a mixture of oxidized starches according to claim 1 or a corresponding manufacture method of claim 10.

2. claim: 21
   a method of manufacturing a jelly confectionery composition comprising the steps of heating a composition comprising a bulk sweetener, water and a mixture of starches with a jet cooker, and conditioning the heated composition to remove a portion of the water.
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<td>US 2173878</td>
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