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(54) Titre : UTILISATION D'HYDROCOLLOIDES POUR L'ELABORATION ET LE TRAITEMENT DE PRODUITS DE CONFISERIE ET PROCEDE
(54) Title: USE OF HYDROCOLLOIDS FOR FORMULATING AND PROCESSING OF LOW FAT WATER ACTIVITY CONFECTIONERY PRODUCTS AND PROCESS

(57) **Abrégé/Abstract:**

A low or no fat confection is prepared containing 80% soluble solids wherein at least 70% of the solids are carbohydrates. The mixture containing carbohydrate, a cationic reactive and thermalsensitive hydrocolloid and an edible cation containing material is cooked or its solids concentration adjusted to 80% solids while hot. The molten mixture is then cooled to form a solid confection having a water activity being 0.30 to 0.65 Aw and a pH from 3.0 to 8.5.



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ABSTRACT OF THE DISCLOSURE

5 A low or no fat confection is prepared containing
80% soluble solids wherein at least 70% of the solids are
carbohydrates. The mixture containing carbohydrate, a
cationic reactive and thermalsensitive hydrocolloid and an
edible cation containing material is cooked or its solids
concentration adjusted to 80% solids while hot. The molten
mixture is then cooled to form a solid confection having a
10 water activity being 0.30 to 0.65 Aw and a pH from 3.0 to
8.5.

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USE OF HYDROCOLLOIDS FOR FORMULATING AND
PROCESSING OF LOW FAT LOW WATER ACTIVITY
CONFECTIONERY PRODUCTS AND PROCESS

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This invention relates to low or no fat confectionery and more particularly to such confectionery items having reduced water activity, an acid to neutral pH, good flavor and texture. The invention is particularly suitable for preparing low fat or no fat confections such as caramel.

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It is desirable to reduce the fat content of foods and to extend shelf life while retaining the full taste and texture thereof. Chocolate confectionery products often contain 20% or more fat while caramel and fruit flavored confectioneries often contain 10% or more fat. Shelf life of such products can be increased by increasing the soluble solids content of the food thus lowering the water activity (Aw) of the food. Numerous high sugar products have been formulated often including monosaccharides and polyols to reduce the water availability in the food to microorganisms.

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However, these products often suffer from flavor and texture problems. Polyhydric alcohols contribute undesirable tastes to the confection but are needed to suppress water activity. Often the sugar content produces excess sweetness, thickness, and rigidity to the product. A high level of fat in confectionery products in addition to being of concern to many diet conscious consumers also results in products having poor shelf stability. However, the fat content of confectionery products is often maintained at a high level because it imparts lubrication for machining and cutting during candy manufacture, provides excellent mouth feel, flavor and stand up body. In

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1 addition, when emulsified, fat tends to inhibit
crystallization and fat also imparts a sense of satiety
after the product has been consumed.

5 A caramel composition of good flavor and soft texture
is disclosed in US Patent 4,710,393 to Holmgren et al.,
issued Dec. 1, 1987 which employs a major amount of a blend
of dextrose and fructose in the caramel and a moisture
content of about 4% to about 10% which gives a water
activity of 0.2 to about 0.5 Aw. In UK 1,538,750 to
10 Jeffery, published Jan. 24, 1979, there is disclosed an over
20% fat containing chocolate product containing a gum
(gelatin or gum arabic) which is employed to prevent fat
separation from the product.

15 The hydrocolloids used herein are widely employed in
foodstuffs including confectionery products and jellies.
Gellan is used in fruit based bakery fillings, icings,
frostings, glazes, jams and jellies. Carrageenan is widely
used in milk and water desserts.

20 We have discovered fast setting, temperature resistant,
acidic but particularly neutral pH confectionery products or
items having good flavor and soft texture even though the
fat content of these confectionery products or items has
been substantially lowered or eliminated. We have modified
the confection by reducing the fat content and by adding a
25 hydrocolloid which forms a gel which has cation and
temperature sensitive properties. We have further adjusted
the total solids content of the confection from 80% or more
solids. Carbohydrates comprise at least 70% of the total
solids. In many cases we employ high fructose corn syrup,
invert sugar or dry fructose so that the fructose
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1 concentration based on total solids is greater than 40%.
For low calorie confectionery products or items, up to 40%
of the carbohydrate can be low calorie bulking agents and at
least 30% of the carbohydrate can be monosacharides. This
5 adjustment of carbohydrate concentration and the type of
material employed provides a confection having the desired
calorie content and a water activity below 0.65 Aw.

We prepare a confection having a total solid content of
80% or more, preferably from 80% to 90% total solids and
10 most preferably from 84° to 89° brix or percent solids. The
carbohydrate content of the total solids is at least 70% of
the solids. The carbohydrates can be mono, di and poly
saccharides, sugar alcohols, cellulose and cellulose
derivatives and extracts, gums and the like. In making good
15 tasting low calorie confectionery products or items, we can
employ up to 40% preferably 10-40% of the carbohydrate
content of low calorie bulking agents such as polydextrose,
sugar alcohols, cellulose, cellulose derivatives and
extracts and gums with at least 30% of the carbohydrate
20 content being monosaccharides. Where calorie reduction is
accomplished using fat reduction primarily, we can employ
mono and disaccharides with fructose being at least 30% of
the carbohydrate content.

The particular carbohydrates employed can be any
25 combination that meets the caloric target and water activity
of 0.30 to 0.65 Aw and does not cause crystallization in the
final product.

When using monosaccharides, fructose is employed for
its sweetness and Aw lowering with the balance of the sugar
30 solids usually dextrose. We use high fructose corn syrup of

1 55% or 90% fructose content or invert sugar which is
commercially available to adjust the fructose
concentrations. 100% crystalline fructose can also be used.
Suitable sugars include sucrose, maltose, lactose and the
5 like can be employed as part of our sugar solids although we
prefer to employ fructose and dextrose. Suitable
monosaccharides include fructose, dextrose and various high
conversion corn syrups. Suitable disaccharides include
sucrose.

10 The low calorie bulking agents include suitable
polysaccharides including polydextrose sugar alcohols such
as sorbitol, manitol, xylitol and the like, cellulose such
as "Avicel" and other commercially refined edible products,
cellulose derivatives and extracts such as carboxymethyl
15 cellulose, methyl cellulose, hydroxy propyl methyl cellulose
hydroxypropyl cellulose and mixtures thereof, Solka-floc,
Curdlan, Oatrim, Fibersol #2, Fibercel and the like, and
gums such as xanthan, guar, pectin, locust bean gum,
alginates, agar-agar, carrageenans, gum acacia, tara gum,
20 karaya gum, furcelleran, traganth, ghatti and the like.

20 When using cellulose, we prefer to employ from 1-10%
and more preferably 1-5% as a means of reducing calories but
also for its fat mimetic properties when employed at small
particle sizes of 0.1 to 20 microns, preferably 0.1-3
25 microns. In fact any finely derived insoluble carbohydrate
or protein of 0.1-20 microns preferably 0.1-3 microns can
also be employed at up to 40% of the solids content of the
confectionery for its fat mimetic properties.

30 Up to 10% of the carbohydrate content of the
confectionery product can be substituted for by protein.
Proteins can be of an acceptable food source and can be
unmodified or modified through the use of processing,

1 enzymes or food grade chemicals. Particular proteins
include zein, caseins, egg albumin, whey proteins, soy
protein isolates, hydrolyzed proteins and the like.

5 We use a hydrocolloid which is both cationic reactive
and thermosensitive; that is the hydrocolloid forms a gel
which has cation and temperature sensitive properties.
These cationic reactive thermosensitive hydrocolloids
include linear, high molecular weight polysaccharides
10 particularly the anionic variety such as carrageenan,
furcellarin, gellan and the like. These materials are
capable of being dispersed and hydrated in hot 80% soluble
solids confectionery products or items having acidic or
neutral pH ranging from pH 3.0 to 8.5. Acid confectionery
products or items would be the fruit flavor variety. We
15 prefer to make neutral products such as caramels and
chocolates having pH from 5.5 to 8.5. The thermosensitive
hydrocolloid on cooling solidifies. By using the linear,
high molecular weight polysaccharides such as gellan and
carrageenan, we are able to form gels with an appropriate
20 cation containing edible material which on cooling set or
gel into the desired high solids confectionery texture. It
is the cationic reactivity and thermosensitivity of our
hydrocolloid gels which develop the desired confectionery
texture when employed at 80% or greater soluble solids
25 content and fat contents below 7%. The hydrocolloid used in
this invention is also set or solidified in less than 30
minutes preferably in 20 minutes or less and often almost
instantaneously as with carrageenan, when the high solids
confectionery temperature is lowered.

30 Suitable hydrocolloids include the various carrageenans
such as kappa carrageenan, iota carrageenan and lamda
carrageenan and mixtures thereof, mixtures of carrageenan

1 and locust bean gum, furcellarin and gellan. From 0.25% to
3.5%, preferably 0.4% to 0.8% by weight of the carrageenans
both kappa and iota and mixtures thereof are employed with a
5 suitable cation containing edible material such as milk
solids, cocoa, potassium or calcium salts or other cation
source. From 0.5% to 5%, preferably 0.75% to 3% by weight
gellan is employed with from 0.1% to 0.5% citrate or other
organic acid salt.

10 Gellan is useful for its brittle gel, clean flavor
release and is stable over a broad pH range while
carrageenan is useful for its chewable gel texture and very
quick setting properties. Carrageenan also offers a wide
range of viscosity at various temperatures. The
15 hydrocolloids used herein are heat dispersible and resulting
gels may be pumpable and/or shear reversible. The gels
immediately set or gel within 20 minutes below 180°F and can
produce textures ranging from a very firm gel to a soft
spreadable gel suitable for molding, enrobing or
incorporating into a confection such as a multi-component
20 candy bar. Suitable cationic reactive and thermosensitive
hydrocolloids can be employed. The texture of the gel can
be adjusted by changing the concentration of the
hydrocolloid, by selection of the appropriate individual
mixtures of hydrocolloid, by changing the concentration of
25 the cation containing edible material or by using one or
more cations in the formula, and by adjusting pH of the
formula.

30 We believe we are the first to discover that high
solids 80% or more confectionery products or items can be
chemically set particularly at neutral pH of 5.5 to 8.5.
Where desired, non-cationic reactive hydrocolloids may be
employed in minor amount (less 30%) to further modify the
texture of the confectionery.

1 The fat content of the confectionery can vary from
0-20% for chocolate products, and 0-7% for fruit flavored
and caramel products. However, in most cases we prefer to
employ less than 7% fat in our products. We employ those
5 fats including oils normally employed in confectionery
products or items such as milk fat, cocoa butter,
hydrogenated vegetable oil and butter.

Minor additives are employed such as emulsifiers like
lecithin, mono and diglycerides and polysorbates at a
10 concentration of from 0% to 10%; salt at from 0% to 2.5%,
flavors and colors. We also can employ normal texturizing
agents combined with our confectionery such as nuts,
nougats, marshmallow, chocolate bits, coconut and the like.

We may also employ crispy bakery products and cereals
like rice, puffed cereal, cookies, crackers and the like.
15 The Aw of our confection reduces transfer of moisture to the
drier baked or cereal items. With little or no moisture
transfer between the various components of the confection
there is little or no change in the texture of any
20 components of the confection. Aw control provides for chewy
and crisp components in the confection having good texture
for a long period of storage. There is also less tendency
for the confection to dry out during storage. The low water
activity also reduces the ratio of formation of off colors
and flavors, reduces undesired browning, nutrient
25 degradation, rancidity of fats and enzymatic reactions.

The cation containing edible material can be dairy
products or other conventional confectionery ingredients
which contain sufficient cations to react with the anionic
30 polysaccharide and form a gel. Cation containing edible
material include from 5% to 15% milk solids, 0 to 10% cocoa,
0 to 30% fruit juice, 0 to 20% fruit solids or any food

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1 grade potassium or calcium salts such as potassium chloride,
calcium lactate, calcium chloride or the like at 0-5%
concentration preferably less than 2.5%.

5 The confectionery of this invention is stable because
of its low fat content and high solid gel. Excellent
chocolate and caramel low fat, neutral pH, fillings are
possible for use in candy bars or per se.

10 The confection of this invention can be prepared in a
number of ways. A concentrated solution of gelling agent
and water can be prepared at a temperature high enough to
prevent gelling. The gelling solution can be added into a
hot mixture (180°F) of the remaining ingredients with
through mixing, often cooked to the desired solids content
and cooled in molds or slabs until set. Alternatively, a
15 blend of liquified corn syrup and dry sugars can be prepared
and heated to 140°F. The dry gelling agent and further
sugar is blended into the hot corn syrup. This hot mixture
is transferred to a blender and the other ingredients such
as milk solid, cocoa, salt and fat are added. The resulting
mixture may be cooked to adjust solids content if necessary
20 and is cast in molds or as a slab and allowed to cool and
set. Alternatively, the gelling agents can be dispersed in
water or a low solid liquid dairy product such as evaporated
skim milk using shear at room temperature. The remaining
25 ingredients are mixed into the dispersion and the mixture
cooked and evaporated to the desired solids and flavor. The
cooked mixture can be poured into molds or slabs and allowed
to cool until set.

30 In general the hydrocolloid is dispersed in a hot state
and mixed with other ingredients including an edible cation
source and the solids content adjusted by addition of solids
or removal of water until the desired taste and solids
content is reached. At that time the mixture is cast and
cooled to form the finished confectionery.

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1 The confectionery may be used with other food
 ingredients in making enrobed candy products such as
 chocolate, caramel or fruit flavored bars. For example a
 layer of a baked wafer of high solids, low sugar content in
 5 rectangular form may be covered with a layer of nougat or
 fruit jam, another baked wafer, a caramel layer using the
 product of this invention, nuts mixed in the caramel or as a
 separate layer and a final baked wafer. The layered food is
 then enrobed with chocolate. The caramel or chocolate of
 10 this invention may comprise from 15-70% and preferably
 20-50% of the bar.

The confectionery may also be shaped to make
 conventional caramel products and other attractive candies.

15 EXAMPLE 1

A typical caramel product is prepared from the
 following ingredients:

20	<u>Ingredient</u>	<u>Chocolate, Caramel %</u>	<u>Regular Caramel %</u>
	Non-fat milk solids	7.1 (5-10%)	7.5 (5-10%)
	High fructose corn syrup (23% H ₂ O; 55% fructose)	58.0 (28%-70%)	58.0 (28%-70%)
25	Carrageenan	0.4 (.25-2.5%)	0.45 (.25-2.5%)
	Salt	0.35	0.35
	Cocoa	4.0 (2.0-7%)	0
	Water	27.65 (0-45%)	31.2 (0-45%)
30	Fat (butter)	2.0 (0-6.9%)	2.0 (0-6.9%)
	Emulsifier	<u>0.5</u> (0-10%)	<u>0.5</u> (0-10%)
	Total	100.00	100.00

1 The carrageenan is hydrated and dispersed in a solution
of the non-fat milk solids and water using vigorous
agitation at room temperature. The remaining ingredients
are added and the mixture heated to cook and evaporate water
5 until a solids content of 85% is reached at a temperature of
242°F. The hot mixture is then combined with other
ingredients and cooled to form a confectionery. The caramel
is characterized by a desirable chewy texture, low water
activity of 0.30 to 0.65 Aw, a solids content of at least
10 80°brix and a pH of 5.5 to 8.5.

The candy bar is prepared by baking high solids, low
sugar wafers. A rectangular wafer is covered by a layer of
nougat, another wafer, a layer of caramel prepared as in
Example 1, a layer of ground nuts, and a wafer. The entire
15 layer mass is enrobed with chocolate to form a candy bar
containing 20-35% caramel.

Peanuts are finely ground and mixed into the caramel of
Example 1 to make a variant candy bar. The nougat can be
replaced by fruit filling or jam. The wafers can be spiced
and coated with white chocolate. Numerous variations are
20 possible.

The carrageenan employed above can be replaced with 3%
gellan (0.5 to 5%) with from 0.1-0.5% organic acid salt such
as sodium citrate to give excellent products.

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EXAMPLE 2

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	%
HFCS 55%	34.3
Sucrose Solution 60%	16.0
Dextrose	48.25
Gellan	0.12
Calcium Lactate	<u>1.33</u>
	100.00

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EXAMPLE 5

	Caramel
	<u>%</u>
5	
Corn Syrup	20.37
Invert or HFCS	33.35
Sweet Condensed Whole Milk	31.57
Margarine	2.73
10	
Vegetable fat flakes	5.70
Lecithin	0.12
Sugar	5.14
Salt	0.24
Gellan	0.75
15	
Sodium citrate	<u>0.30</u>
	100.00

20 Dry blend the gellan and sugar. Add that mixture to the corn syrup and milk. Next add lecithin and the vegetable fat. Cook to about 254°F. The final cooked material, 83° brix, pH 5.95 gelled to a good texture on cooling. The confectionery was useful for enrobing and attachment of food particles. For example, an apple was 25 dipped into the caramel which was then rolled in nuts which adhered to the caramel coating to make a tasty caramel candied apple.

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EXAMPLE 6

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	%
Corn Syrup (42DE)	10.37
5 Invert Sugar	43.30
Condensed Milk	33.35
Butter	2.73
Fat-flakes (Paramont brand)	5.70
Lecithin	0.12
10 Sugar	5.14
Salt	0.24
Gellan	0.75
Sodium citrate	<u>0.30</u>
	100.00

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Heat the corn syrup, invert sugar, and condensed milk to 140°F. Add the dry ingredients as a blend and heat to boiling. Add the fat flakes and lecithin and boil for one minute. Add the butter and boil for one minute. The mixture (86° brix, pH 5.86) was cooled to form a good gel with a shorter slight sticky texture and a good color.

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EXAMPLE 7

"No" Fat Caramel

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		%
5	Evaporated Skim Milk	36.55
	Disodium phosphate	0.06
	High fructose corn syrup (55% fructose)	61.04
10	Avicel cellulose	1.0
	Iota-kappa blend of carrageenan)	0.2
	Butter Flavor	0.15
	Salt	0.5
	Lecithin	0.2
15	Atmul	<u>0.3</u>
		100.00

Disperse the cellulose in corn syrup (adjusted to pH 7.06). Hydrate the carrageenan in milk. Mix the corn syrup and milk mixtures together and blend in the cocoa using a blender by adding in small amounts. Heat to boiling in a steam kettle. Add butter, lecithin and Atmul to the boiling mixture. Cook until 245.5°F, 87% solids.

Residual fat in the skim milk, butter base, lecithin and Atmul resulted in 0.7% fat in the 57% solids mixture.

The product was a very good "no" butter caramel. It is difficult to tell the differences between this product and a 10% fat containing caramel.

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EXAMPLE 8

Chocolate Caramel

		%
5	Evaporated skim milk	34.69
	Disodium phosphate	.01
	High fructose corn syrup	57.16
	Butter	2.0
10	Cocoa	4.0
	Avicel	1.0
	Water	0.3
	Viscarin GP 328 carrageenan	0.35
	Lecithin	0.19
15	Atmul (emulsifier)	<u>0.3</u>
		100.00

20 Disperse the Avicel in the corn syrup and disperse and hydrate carrageenan in the milk. Add the mixtures together. Next dissolve disodium phosphate in water and add to the dispersion. Blend in cocoa solids to the dispersion and add lecithin and atmul. Heat the mixture to 110°F to melt the lecithin and atmul. Cook mixture to 245°F, 87.85% solids, water activity 0.49.

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EXAMPLE 9

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	%
Evaporated skim milk	34.86
5 Disodium phosphate	0.01
High fructose Corn Syrup	58.24
Butter	4.0
Avicel	1.0
Water	0.3
10 Kappa-iota carrageenan blend	0.6
Salt	0.5
Lecithin	0.19
Atmul (emulsifier)	0.3

15

Cook in a kettle as previously to 89.3% solids, 5.7% fat. The hot mix is very fast gelling (less than 1 minute) and was molded into the shape of bears and beans.

Chocolate and lemon bars were made following the layering procedure set forth in Example 1.

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While we have described our confection in terms of caramel and chocolate caramel, the advantages of this invention can be applied to other normally fat containing confectionary material such as fudges, nougats, toffee, creams, gums, jellies and other water based confections.

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THE EMBODIMENTS OF THE INVENTION IN WHICH AN EXCLUSIVE PROPERTY OR PRIVILEGE IS CLAIMED ARE DEFINED AS FOLLOWS:

1. A water and sugar based high solids confectionery having good flavor and texture comprising at least 80% total solids wherein the carbohydrate content is at least 70% of the total solids, a cationic reactive and thermosensitive hydrocolloid; a cation containing edible material; and up to 20% fat, said confectionery having a water activity below 0.65 Aw and a pH from 3.0 to 8.5.

2. The confectionary of claim 1 which comprises up to 90% total solids and in which the carbohydrate is of mono, di and polysaccharides, sugar alcohols, cellulose, cellulose derivatives and extracts, gums or mixtures thereof.

3. The confectionary of claim 1 or 2 in which the cation containing edible material is a dairy product, cocoa, fruit juice, fruit solids, edible potassium and calcium containing salts or mixtures thereof.

4. The confectionary of claim 1, 2 or 3 wherein the fat content is below 7% and the hydrocolloid comprises an anionic, linear, high molecular weight polysaccharide, the pH is from 5.5 to 8.5 and the water activity is 0.30 to 0.65 Aw.

5. The confectionary of any one of claims 1 to 4 in which the hydrocolloid is carrageenan, gellan gum or mixtures thereof.

6. A low calorie and low fat confectionery according to any one of claims 1 to 5 in which the carbohydrate comprising from 10 to 40% low calorie bulking agent and less than 5% fat.

7. A low calorie and low fat confectionary of any one of claims 1 to 6 in which the carbohydrate comprises up to 40% low calorie bulking agent selected from polydextrose, sugar alcohols, cellulose, cellulose derivatives, extracts or gums and at least 30% monosaccharides.

8. A low calorie and low fat confectionery of any one of claims 1 to 7 in which the carbohydrate comprises at least 30% fructose.

9. A caramel confectionery of claim 7 in which the cation containing material comprises dairy products or cocoa, the carbohydrates comprise at least 30% monosaccharide and the fat content is below 5%.

10. A method of preparing a low fat, high solids confection comprising:

a) mixing and heating to an elevated temperature a cationic reactive and thermosensitive hydrocolloid and water to disperse the hydrocolloid;

b) mixing the water hydrocolloid mixture with a cation containing edible material, carbohydrate and less than 7% fat;

c) cooking or otherwise heat treating the mixture of (b) to develop flavor and to reduce or adjust the solids content of the mixture to at least 80%; and

d) cooling the mixture to cause solidification of the mixture in less than 20 minutes to yield a softness, flavor and texture mimicking the full fat equivalent confection, said confectionery having a water activity below 0.65 Aw and a pH from 3.0 to 8.5.

11. The method of claim 10 in which the hydrocolloid is selected from gellan, carrageenan or mixtures thereof; the cation containing edible material is selected from dairy

products, cocoa, fruit juice, fruit solids, edible potassium or calcium containing salts or mixtures thereof; the fat content is less than 5% and the pH is from 5.5 to 8.5.

12. The method of claim 11 or 12 in which the confectionery contains cocoa or dairy solids, 0% to 4% fat and the hydrocolloid is carrageenan or gellan gum.

13. A water and sugar based high solids confectionery having good flavor and texture comprising (a) at least 80% to 90% total solids, by weight wherein the carbohydrate content is at least 70% by weight of the total solids, (b) a cation containing edible material selected from the group consisting of dairy products, cocoa, fruit juice, fruit solids, edible salts of organic and inorganic acids and mixtures thereof, (c) a cationic and thermosensitive hydrocolloid being present in sufficient quantities to form a thermoreversible gel with said cation edible matter and (d) up to 7% fat by weight, said confectionery having a water activity below 0.65 and a pH from 3.0 to 8.5.

14. The confectionery of claim 13 in which the carbohydrate is mono, di or polysaccharide, sugar alcohols or mixtures thereof.

15. The confectionery of claims 13 or 14 wherein the pH is from 5.5 to 8.5 and the water activity is 0.35 to 0.65 Aw.

16. The confectionery of any one of claims 13 to 15 in which the hydrocolloid is carrageenan.

17. The confectionery of claim 16 wherein the carrageenan is kappa carrageenan.

18. The confectionery of claim 16 wherein the carrageenan is iota carrageenan.

19. The confectionery of claim 16 wherein the carrageenan is a mixture of kappa carrageenan, iota carrageenan and lambda carrageenan.

20. The confectionery of any one of claims 13 to 15 wherein the thermosensitive hydrocolloid is furcellaran.

21. The confectionery of any one of claims 13 to 15 wherein the thermosensitive hydrocolloid is agar.

22. The confectionery of any one of claims 13 to 15 in which the thermosensitive hydrocolloid is gellan gum.

23. The confectionery of claim 16 wherein the carrageenan is present in amounts ranging from 0.25% to 3.5% by weight.

24. The confectionery of claim 22 wherein the gellan gum is present in amounts ranging from 0.5% to 5% by weight.

25. The confectionery product of claim 20 wherein the furcellaran is present in amounts ranging from 0.25% to 3.5% by weight.

26. A low calorie and low fat confectionery of any one of claims 13 to 25 in which the confectionery comprises a cation containing edible material, a cationic and thermosensitive hydrocolloid, at least 84% to 89% total solids by weight, the carbohydrate comprises up to 40% by weight low calorie bulking agent selected from the group consisting of polydextrose, sugar alcohols, cellulose, and gums and at least 30% monosaccharides, the pH is from 5.5 to 8.5 and the water activity is 0.30 to 0.65.

27. A low calorie and low fat confectionery of claim 26 in which fructose comprises at least 30% by weight of the carbohydrates.

28. A caramel confectionery of claim 26 or 27 in which the cation containing material comprises milk products, and the fat content is below 5% by weight.

29. A chocolate confectionery of claim 26 or 27 in which the cation containing material comprises cocoa, and the fat content is below 5% by weight.

30. The confectionery of any one of claims 26 to 29 in which the hydrocolloid is carrageenan, gellan, furcellaran, agar or mixtures thereof, and fructose comprise at least 30% of the carbohydrates.

31. The confectionery of claim 30 wherein the hydrocolloid is carrageenan, gellan, furcellaran or mixtures thereof.

32. The confectionery of claim 30 in which the hydrocolloid comprises carrageenan.

33. The confectionery of claim 32 in which the carrageenan is kappa carrageenan.

34. The confectionery of claim 32 in which the carrageenan is iota carrageenan.

35. The confectionery of claim 32 in which the carrageenan is a mixture of kappa carrageenan, iota carrageenan and lambda carrageenan.

36. The confectionery of claim 28 in which the fat content

is up to 4%.

37. A method of preparing a low fat, high solids confection comprising:

a) mixing and heating water with a cationic reactive and thermosensitive hydrocolloid present in sufficient quantities to form a thermoreversible gel with a cation containing edible material when added thereto, said water being present in sufficient quantities to disperse said hydrocolloid;

b) mixing the mixture of (a) with fat present in amounts of less than 7% by weight, solids comprising carbohydrates and with a cation containing edible material selected from the group consisting of milk products, cocoa, fruit solids and edible salts of organic and inorganic acids and mixtures thereof;

c) heat treating the mixture of (b) to develop flavor and to adjust the solids content of the mixture to at least 80% to 90% total solids by weight and the carbohydrate content to at least 70% by weight of the total solids;

d) cooling the mixture to cause solidification of the mixture to yield a softness, flavor and texture mimicking a full, fat equivalent confection, said confectionery having a water activity below 0.65 Aw and a pH from 3.0 to 8.5.

38. The method of claim 37 in which the fat content is less than 5% and the pH is from 5.5 to 8.5.

39. The method of claims 37 or 38 in which the confectionery contains milk solids, 0% to 4% fat and the hydrocolloid is carrageenan.

40. The method of claim 37 or 38 in which the confectionery comprises 84 to 89% total solids and the cation containing edible material is cocoa and the fat content is 0

to 4%.

41. The method of any one of claims 37 to 40 in which the hydrocolloid is carrageenan.

42. The method of claim 37 or 38 in which the hydrocolloid is gellan gum.

43. The method of claim 37 or 38 in which the hydrocolloid is furcellaran.

44. The method of claim 37 or 38 in which the thermosensitive hydrocolloid is agar.

45. The method of claim 39 or 41 in which the carrageenan is kappa carrageenan.

46. The method of claim 39 or 41 in which the carrageenan is iota carrageenan.

47. The method of claim 39 or 41 in which the carrageenan is a mixture of kappa carrageenan, iota carrageenan and lambda carrageenan.

48. A low or no fat, reduced calorie high solids confectionery comprising (a) at least 80% to 90% solids by weight wherein the carbohydrate content is at least 70% by weight of the total solids and wherein the carbohydrate comprises from 10% to 40% by weight low calorie bulking agent and at least 30% monosaccharides; (b) a cationic reactive and thermosensitive hydrocolloid being present in sufficient quantities to form a thermoreversible gel with the cation containing edible material; (c) a cation containing edible material; and (d) fat in amounts less than 5% by weight, said

confectionery having a water activity of 0.3 to 0.65 A_w and a pH from 3.0 to 8.5.

49. The reduced calorie confectionery of claim 48 wherein the pH is 5.5-8.5.

50. The reduced caloric confectionery of claim 48 wherein the pH is 3.0 to 5.5.

51. The confectionery of claim 13 or 14 wherein the water activity is 0.30 to 0.45, inclusive.

52. The confectionery of any one of claims 26 or 27 wherein the water activity is 0.30 to 0.45, inclusive.

53. The confectionery of claim 51 additionally comprising a wafer.

54. The confectionery of claim 52 additionally comprising a wafer.

55. The chocolate confectionery of claim 29 having a water activity of 0.30 to 0.45, inclusive.

56. The chocolate confectionery of claim 55 which additionally comprises a wafer.