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(54) Title: COOKING COMPOSITION COMPRISING A CHEMICAL LEAVENING AGENT SUBSTITUTE IN THE FORM OF POROUS PARTICLES

(57) Abstract: The present invention relates to chemical leavening agent substitutes consisting essentially of edible porous particles, compositions formed therefrom such as doughs and batters, as well as food products formed from such compositions. Also within the present inventions are methods of forming the compositions, precursor compositions and uses of the edible porous particles.

COOKING COMPOSITION COMPRISING A CHEMICAL LEAVENING AGENT SUBSTITUTE IN THE FORM OF POROUS PARTICLES

Technical Field

The present invention relates to a cooking composition comprising a leavening agent, and more particularly to those of the type comprising a chemical leavening agent.

Background of the Invention

Over the last decade within the food industry there has been a growing trend of consumers becoming increasingly conscious of the ingredients contained within food products. As part of this process a significant percentage of consumers have come to favour food products having fewer chemical ingredients. Such food products are commonly referred to as 'clean-label' products.

In particular, consumers are increasingly avoiding food products comprising, for example, artificial preservatives, artificial flavours, genetically modified ingredients and E-numbers. E-numbers signify the presence of a specific artificial additive, which in principle are permitted for use within the European Union.

In response to this, food manufactures are seeking to provide suitable alternatives, preferably based on natural ingredients and their derivatives.

Despite the fact that consumers are turning to clean-label products, quality, taste and/or shelf-life of a product are still highly important and consumers are generally unwilling to sacrifice these.

Accordingly, not only is it important to find suitable alternatives, but such alternatives must be able to produce similar properties to those containing, for example, artificial preservatives, artificial flavours, genetically modified ingredients and E-numbers.

The present invention is concerned with the provision of clean-label baked products. However, one particular issue associated with the formation of such clean-label baked products is maintaining the light, airy structure which consumers have come to expect from such products.

In general, the porous structure of baked products is produced by heterogeneous nuclei (small air bubbles) within a dough or batter before baking, and which are formed during the mixing process. Small gas bubbles only survive if they have a minimum radius 'r' (Laplace: $\Delta P = \gamma/2r$, where ΔP is the difference between inside and outside of a curvature and γ the surface tension of the liquid), and mass transport of gas from small to big bubbles is driven by this Laplace pressure. This is one of the mechanisms responsible for the number of air bubbles present within a dough or batter, which after baking can be reduced to less than 5% of the air bubbles present before baking. Such a significant reduction in air bubbles inevitably affects the texture of the resulting food product.

Traditionally, in order to overcome this effect, a leavening agent is added to the cooking composition.

Once activated, traditional leavening agents produce a gas, such as carbon dioxide. This gas, together with water vapour contained within the dough or batter, expands upon heating and thus creates the light, airy structure of baked goods.

The gas first dissolves into the dough or batter and is then released into the air bubbles which are already present in the dough or batter. By increasing the amount of gas present in each of the air bubbles, the size of the air bubble is increased and consequently the Laplace pressure is decreased. Thus, the leavening agent helps to increase the number of air bubbles remaining after baking.

The leavening agents which can be incorporated into a dough or batter fall into two categories, biological leavening agents and chemical leavening agent. Biological leavening agents, such as yeast, are living organisms which consume a portion of the sugars present in the mixture and produce carbon dioxide. Chemical leavening agents create a gas, such as carbon dioxide, as a result of a chemical reaction.

Suitable chemical leavening agents can react with an acid in the presence of moisture to form a gas, for example sodium bicarbonate (baking soda) will react with an acid in the presence of moisture to form carbon dioxide, a sodium salt and water, as shown in Equation 1.

$$NaHCO_3 + HX \rightarrow NaX + H_2O + CO_2\uparrow \quad \text{(Equation 1)}$$

Although sodium bicarbonate is one of the most commonly used leavening agents in baking compositions, it is classified by way of an E-number (specifically E 500), along with other commonly used chemical leavening agents, such as ammonium bicarbonate (E 503) and potassium carbonate (E 501), and therefore its use in food compositions is undesirable.

Furthermore, when sodium bicarbonate is heated to a temperature greater than 60 °C in the absence of an acidulant (also referred to as leavening acid), only some carbon dioxide is liberated and sodium carbonate remains – problems with respect to excess sodium carbonate are discussed below.

Due to this undesirable effect, manufactures ensure that sufficient amounts of acidulent are added to the food composition. However, most common acidulants are also classed by way of E-numbers (see Table 1 below).

Table 1.

Acidulent	E number
Calcium Phosphates	
Monocalciumphosphate	E 341
Dicalciumphosphate-Dihydrate	E 341
Monocalcium orthophosphate monohydrate	E 341
Calcium Acid PyroPhosphate	E 450
Sodium Phosphates	
Sodium Acid PyroPhosphate	E 450
Sodium Acid Aluminium Phosphate	E 541
Sodium Acid Aluminium Phosphate Hydrate	E 541
Organic Acids	
Gluconodeltalactone	E 575
Others	
Potassium Bitartrate	E 336

The presence of unreacted sodium bicarbonate results in a yellowish crumb, undesired surface colouring and an unpleasant taste ('soda bite') in the resulting food product.

Further, many of the chemical leavening agents traditionally used such as sodium bicarbonate, along with many commonly used acidulents, comprise sodium. It is well known that high dietary intake of sodium has been linked to numerous health risks and diseases, such as high blood pressure, heart attacks and strokes, and so for this additional reason, it is desirable to look at alternative leavening agents which can mimic the results of traditional chemical leavening agents.

In addition to concerns relating to chemicals present in food, consumers are also aware of the health risks associated with high sugar consumption. For example, regularly consuming high quantities of sugar can lead to excessive weight gain which, in turn, can lead to type two diabetes and/or heart disease. Thus, food products in which traditional sugar content can be reduced with healthier alternatives are also becoming increasingly appealing to consumers. National Governments are also taking an increasing interest in this aspect with food manufacturers being encouraged to produce healthier alternatives, with taxes specifically focussed on sugary foods being mooted.

In order to try and address one or more of the above mentioned issues, an alternative leavening agent is required which is not classified as an E-number but which, in use, results in food products having properties similar to those obtained using traditional chemical leavening agents. Such alternative leavening agents must be able to replace traditional chemical leavening agents in food products which traditionally comprise chemical leavening agents.

It will be noted that the use of porous particles is known within the food industry, however, to date, its use is very different to that of the present inventions. By way of example, WO2013/151931 teaches a fat system having reduced trans fatty acids and saturated fatty acids and which comprises porous edible particles. In particular, WO2013/151931 notes that although it is desirable to produce a fat system having low amounts of trans fatty acids and saturated fatty acids, lipids comprising low levels of trans fatty acids and saturated fatty acids do not have the necessary structure required to impart a specific texture in food applications, such as bakery

applications. To overcome this issue, porous edible particles are added to the lipids to act as a network builder and provide structure in order to produce a fat system that is suitable for use in baking applications. In addition, WO2013/151931 teaches that compositions using the fat system will further comprise raising agents such as baking powder and/or yeast.

Summary of Invention

In one aspect the present invention relates to a cooking composition comprising a leavening agent, wherein the leavening agent is a chemical leavening agent substitute and consists essentially of edible porous particles. For the avoidance of any doubt, the leavening agent of the present invention is used as a replacement for traditional chemical leavening agent in foods which, to date, have comprised such agents. The use of a leavening agent consisting essentially of edible porous particles thus allows removal of one or more E-numbers from the food product.

In a further aspect the present invention relates to a dough or a batter formed from the cooking composition according to any embodiment herein.

In still a further aspect, the present invention relates to a process of forming a cooking composition, a dough or a batter, said process comprising the steps of a) mixing wet components; b) mixing dry components, including a leavening agent consisting essentially of edible porous particles; and c) blending a) and b) until a dough or batter is formed.

In still a further embodiment, the present invention relates to a process of forming a cooking composition, dough or batter for use in producing cooked products, comprising the steps of: a) mixing wet components, including a leavening agent consisting essentially of edible porous particles; b) mixing dry components; and c) blending a) and b) until a dough or batter is formed.

Still further aspects relate to a cooked food product formed from a cooking composition, dough or batter according to any one of the embodiments of said dough or batter herein.

Even further aspects relate to a process of forming a cooked food product, comprising the steps of: a) forming a dough or batter, wherein the dough or batter

comprises the cooking composition according the any embodiments herein, and b) cooking the dough or batter.

Even still further aspects relate to a cooked food product produced by the process of any one of the embodiments herein.

Yet even still further aspects relate to use of edible porous particles as a leavening agent in a cooking composition, as a nucleating agent in a cooking composition and/or as a chemical leavening agent substitute in a cooking composition.

Disclosure of the Invention

In accordance with the present invention, there is provided a cooking composition comprising a leavening agent, wherein the leavening agent is a chemical leavening agent substitute and consists essentially of edible porous particles.

The term "cooking composition" is intended to include any composition which can be used to produce a food product, such as a biscuit, cake, muffin, donut, pastry, bread, pizza base or cracker. The cooking compositions of the present invention can be formulated into doughs, mixtures and/or batters depending on their intended use.

The edible porous particles of the present invention allow for the production of food products having similar properties to those produced by known chemical leavening agents in the art.

Without wishing to be bound by any particular theory, whilst biological and chemical leavening agents are only considered to increase the amount of gas present within the pre-existing nuclei (air bubbles) in the dough or batter, the edible porous particles of the present invention are believed to act as nucleating agents within the cooking composition. Thus, the presence of these edible porous particles results in an increase in the number of nuclei present in the cooking composition. The effect is most probably an early and more controlled expansion of water vapour within the cooking composition.

In addition, although not necessarily significant, the edible porous particles of the present invention (in contrast to traditionally used biological or chemical leavening agents) may provide an additional source of gas which is released from the edible porous particle itself.

The edible porous particles may be selected from starch, crystalline sugar, silica, carbon, emptied yeast cells or combinations thereof. Preferably, the edible porous particles are formed from starch.

The types of starch which are particularly suitable for use with the present invention are corn, pea, potato, sweet potato, sorghum, banana, barley, wheat, rice, sago, amaranth, tapioca, arrowroot, canna or a combination thereof. Preferably, the edible porous particles are produced from tapioca maltodextrin.

The edible porous particles may be present in an amount of from 0.1 to 10 wt%, preferably from 0.5 to 8 wt%, such as from 1 to 5 wt%. Thus, the edible porous particles may be present in an amount of less than 5 wt%, such as less than 4 wt%. As will be appreciated, the particles may be present in an amount of from 0.1 to 5 wt%, such as 1 to 5 wt%, 2 to 5 wt% or even 3 to 5 wt% (including 0.1 to 4 wt%, 1 to 4 wt%, 2 to 4 wt% and even 3 to 4 wt%).

For the avoidance of any doubt, it will be appreciated that all references to wt% are a reference to the wt% of the cooking composition as a whole.

It is readily apparent that there is a benefit to being able to use small edible porous particles to create equally light and fine pore structures in a baked product compared to the traditional use of chemical leavening agents.

However, as the edible porous particle remains within any cooked food product after it has been produced, they must also be small enough not to significantly affect the texture or consistency of the food product, as well as mouth feel.

The edible porous particles may have a mean particle size of less than 100μm, preferably less than 50 μm, and more preferably less than 20 μm.

The particle size of the edible porous particles can be determined by measuring their Brownian motion. This can be achieved using Dynamic Light Scattering (DLS), wherein the fluctuations of scattered light caused by a solution or suspension of particles are measured. Any suitable DLS instrument can be used to measure the Brownian motion of particles. It is considered to be within the abilities of a person of skill in the art to select a suitable solvent in which the selected edible porous particle of the present invention would form a solution or suspension. Alternatively, the

particle size of the edible porous particles can be determined using microscopic techniques, for example Scanning Electron Microscope (SEM) techniques, wherein the surface of the sample to be analysed is bombarded with a focused beam of electrons. The signals subsequently produced by the electron-sample interactions are detected for each position by an electron detector. The intensity of the emitted electron signal is displayed as brightness on a display monitor thereby imaging the sample. From this image the particle size of the porous particles can be determined. A further option is laser diffraction, which measures particle size distributions by measuring the angular variation in intensity of light scattered as a laser beam passes through a dispersed particulate sample. Large particles scatter light at small angles relative to the laser beam and small particles scatter light at large angles, as illustrated below. The angular scattering intensity data is then analysed to calculate the size of the particles responsible for creating the scattering pattern, using the Mie theory of light scattering. The particle size is reported as a volume equivalent sphere diameter.

The edible porous particles may have a density of less than less than 1 g/cm^3, preferably less than 0.5 g/cm^3, and more preferably less than 0.2 g/cm^3.

Any known method of measuring the density of solid materials can be used, for example the density of the particles can be determined using a gas pycnometer. In this method, a solid material is added to a chamber containing a gas, wherein the measured volume of gas displaced by the solid material can be used to calculate the density of the material.

The edible porous particles may comprise a network of pores present within the body of the particle. The edible porous particles may be formed as a hollow shell.

The mean pore size of the edible porous particle may be less than 98 μm, preferably less than 48 μm, more preferably less than 18 μm.

Well known techniques, such as Barrett-Joyner-Halenda (BJH) pore size analysis, can be used to analyse the pore size of the edible porous particles. This technique uses a modified Kelvin equation to relate the amount of adsorbate is removed from the pores as the relative pressure applied is decreased, to the pore size within the material.

The cooking composition may further comprise an additive to delay starch gelatinisation. During a cooking process, such as baking, the structure of the food product becomes set due to starch gelatinisation, protein denaturation and moisture loss. As starch is heated it gelatinises causing the viscosity of the dough or batter to increase, thereby stabilising the structure of the baked food product. Due to this process, the volume expansion of the product stops. Typically, gelatinisation takes place at a temperature between 52 °C and 99 °C. In industrial process, such as for the manufacture of cookies and biscuits, a temperature increase to within this range can be achieved within 30 seconds, and so the creation of volume within a baked product can be complete within the first few minutes. The additive slows down this process thus allowing more time for gas to be incorporated into the air bubbles and thus increase the volume created within the cooked product.

Suitable additives that can be used to delay starch gelatinisation include inulin, sugar, salt, a high molecular weight carbohydrate, an edible acid and monoglyceride, or a combination thereof. Preferably inulin is used to delay starch gelatinisation.

Although delaying starch gelatinisation can increase the pore size of the resulting baked food, significant delays relating to the onset of starch gelatinisation decreases the efficiency at which the baked goods are produced. Consequently, when such products are produced on a mass scale, these delays can reduce cost efficiency of the process. Accordingly, the amount used must be carefully controlled.

The cooking composition of the present invention may comprise from 0.1 to 10 wt% of starch gelatinisation additive, preferably from 0.5 to 8 wt%, and more preferably from 1 to 5 wt%.

The cooking composition of the present invention may further comprise a biological leavening agent. Biological leavening agents are generally used when the cooking composition is intended for the production of bread-like products, including bread, pizza and doughnuts. It will of course be understood that compositions of the present invention may not further comprise a biological leavening agent.

Preferably, the biological leavening agent is selected from yeast and sour dough.

Where present, the biological leavening agent may be used in an amount of from 0.1 to 5 wt%, preferably from 0.5 to 3 wt%, and more preferably from 1 to 2 wt%.

Where a biological leavening agent is used in addition to the edible process particles, the total amount of leavening agent i.e. the combination of both the biological leavening agent and the edible porous particles is generally from 0.2 to 10 wt%, preferably from 1 to 8 wt%, and more preferably from 2 to 5 wt%.

The cooking composition may comprise one or more of flour (generally in an amount of 20 to 70 wt%), milk powder (where present generally in amount of up to 10 wt%), sugar (where present generally in amount of up to 50 wt%), sugar substitutes (where present generally in amount of up to 50 wt%), protein (where present generally in amount of up to 5 wt%), powdered emulsifiers (where present generally in amount of up to 5 wt%), starch (where present generally in amount of up to 20 wt%), salt (where present generally in amount of up to 5 wt%), spices (where present generally in amount of up to 5 wt%), flavour components (where present generally in amount of up to 5 wt%), colourants (where present generally in amount of up to 5 wt%), cocoa (where present generally in amount of up to 5 wt%), thickening and gelling agents (where present generally in amount of up to 5 wt%), egg powder (where present generally in amount of up to 10 wt%), enzymes (where present generally in amount of up to 2 wt%), gluten (where present generally in amount of up to 5 wt%), preservatives (where present generally in amount of up to 2 wt%), sweeteners (where present generally in amount of up to 30 wt%), oxidising agents (where present generally in amount of up to 2 wt%), reducing agents (where present generally in amount of up to 2 wt%), anti-oxidants (where present generally in amount of up to 2 wt%) and acidity regulators (where present generally in amount of up to 2 wt%). Such components are in general added in dry form, and may be known collectively as ‘dry components’.

In the cooking compositions of the present invention, at least part of the sugar present in a traditional recipe may be replaced with a sugar substitute. Such sugar substitutes can replace up to 25 wt%, preferably up to 50 wt%, more preferably up to 75 wt%, and most preferably 100 wt% of the sugar.

The sugar substitute may be selected from acesulfame potassium, agave nectar, aspartame, neotame, stevia leaf extract, saccharin, sucralose, and inulin or a combination thereof. Preferably, the sugar substitute is inulin.

The cooking composition may comprise one or more of eggs (where present generally in an amount of up to 40 wt%), water (generally in an amount of 1 to 50 wt%), liquid emulsifier (where present generally in an amount of up to 5 wt%), liquid sugar and syrups (where present generally in an amount of up to 25 wt%), milk (where present generally in amount of up to 40 wt%), liquid flavours (where present generally in amount of up to 5 wt%), alcohols (where present generally in amount of up to 5 wt%), humectants (where present generally in amount of up to 5 wt%), honey (where present generally in amount of up to 10 wt%), liquid preservatives (where present generally in amount of up to 2 wt%), liquid sweeteners (where present generally in amount of up to 30 wt%), liquid oxidising agents (where present generally in amount of up to 2 wt%), liquid reducing agents (where present generally in amount of up to 2 wt%), liquid anti-oxidants (where present generally in amount of up to 2 wt%), liquid acidity regulators (where present generally in amount of up to 2 wt%) and liquid enzymes (where present generally in amount of up to 2 wt%). Such components are in general added in wet form, and may be known collectively as 'wet components'.

The cooking composition may also comprise a fat or an oil, or emulsions thereof with water. Examples of such emulsions include margarine and butter. For the purposes of this invention, the fat component may be considered a wet component.

Such fats or oils may be animal or vegetable derived.

The composition of the fat phase is not considered to be critical. Typically fats and oils that are employed include highly unsaturated liquid oils (e.g. sunflower oil, soybean oil and/or rapeseed oil), lauric fats (e.g. coconut oil and/or palmkernel oil), palm oil and milk fat, all with fractions thereof, such as olein and/or stearin fractions, as well as interesterified and/or hydrogentated fats or oils thereof that may suitably be used. Lard and tallow may also be used. Thus, blends of oils, fats and fractions thereof may also be employed, in hydrogenated and/or interesterified forms.

It will be appreciated that the types of wet and dry components to be used are dependent on the type of cooking composition desired. A person of skill in the art in this field is able to select the necessary components, and their relative amounts, according to the desired final product, for example, biscuit, cake, muffin, cookie, donut, pastry, bread, pizza base or cracker.

In general, in the cooking compositions of the present invention, flour may be present in an amount of 20 to 70 wt%.

In general, in the cooking compositions of the present invention, water may be present in an amount of 1 to 50 wt%.

Where present in the cooking compositions of the present invention, sugar may be present in an amount of up to 50 wt%. However, as noted above, at least a portion of this sugar content may be replaced by a sugar substitute.

Where present in the cooking compositions of the present invention, salt may be present in an amount of up to 5 wt%.

In general, in the cooking compositions of the present invention, fat may be present in an amount of up to 40 wt%.

The cooking compositions of the present invention may be mixed so as to produce doughs or batters.

By a dough, reference may be made to a soft or stiff dough, which types of dough are well known in this field. Such dough compositions generally comprise flour, water, sugar, salt, fat and the edible porous particles.

A preferred dough composition, for forming a baked food product, may comprise:

- 20 to 70 wt% (preferably 40 to 65 wt%) Flour
- 1 to 50 wt% (preferably 5 to 20 wt%) Water
- up to 50 wt% (preferably 5 to 30 wt%) Sugar
- up to 5 wt% (preferably up to 2 wt%) Salt
- 1 to 5 wt% Leavening agent in accordance with the present invention
- up to 40 wt% (preferably 5 to 30 wt%) Fat

By a batter, reference may be made to a drop or pour batter, which types of batter are well known in this field.

It will be understood that the components forming the cooking composition can be combined using known techniques in the art. Suitable mixing devices are well known in the art and include those, for example, sold by Hobart, Fimar, GAM, Sirman and Sammic.

The length of time required to mix the cooking composition is dependent on, amongst other things, the number of dry and wet components to be combined, the weight and/or volume of each of the components as well as the viscosity of the composition formed. In general, suitable mixing times can include from 10 seconds to 1 hour, such as from 1 to 45 minutes, and including from 5 to 30 minutes.

In addition, in principle, the components of the cooking composition can be combined in any order.

The edible porous particles may be combined with other components of the cooking composition so as to form an admixture of dry particles, a blend, a suspension or a solution.

By way of example, the cooking composition of the present invention (and therefore also a dough and/or batter) may be produced by a method comprising the steps of:

a. mixing the wet components;

b. mixing the dry components, along with a leavening agent consisting essentially of edible porous particles; and

c. blending a. and b. until a dough or batter is formed.

By way of further example, the cooking composition of the present invention (and therefore also a dough and/or batter) may be produced by a method comprising the steps of:

a. mixing wet components, along with a leavening agent consisting essentially of edible porous particles;

b. mixing dry components; and

c. blending a. and b. until a dough or batter is formed.

In preparing the wet components of step a., the method preferably comprises the step of mixing the edible porous particles with a fat or an oil, or emulsions thereof with water. By way of example, the edible porous particles may be blended with a fat or an oil, or emulsions thereof with water, such that the edible porous particles are homogeneously distributed throughout the fat.

It will be appreciated that the step of mixing helps to create air bubbles within the cooking composition. The method may therefore further include additional physical leavening steps. By way of example, such as step may include whisking or beating one or more of the wet components during the process for producing the cooking composition.

Preferably, where a dough is formed from the cooking composition, the method may further comprise the step of kneading the dough once it has been formed.

The present invention is also directed to precursor compositions which can be used in the production of cooking compositions, doughs and/or batters in accordance with the present invention.

Such precursor compositions may comprise a limited number of components which are pre-blended and suitable for use in producing a cooking composition, dough and/or batter in accordance with the present invention.

A preferred precursor composition comprises a mixture of at least edible porous particles and inulin. It will be understood that the relative amounts of edible porous particles and inulin in the mixture will be selected such that they are able to form a cooking composition, dough and/or batter such as described above.

In another preferred precursor composition, the mixture of edible porous particle and inulin further comprises a fat. Again, the relative amounts of edible porous particles, inulin and fat in the precursor composition will be selected such that they are able to form a cooking composition, dough and/or batter such as described above. For the precursor compositions, the weight ratio by parts of porous particles to inulin, relative to the precursor compositions as a whole, may be in the range of 5:1 to 1:5, such as 3:1 to 1:3, and including 2:1 to 1:2.

The cooking composition, dough and/or batter of the present invention is suitable for producing cooked food products. Such products can be formed by baking, microwaving, shallow frying and/or deep-fat frying.

The present invention further provides a method of forming a cooked food product, wherein the method of forming a cooked food product comprises the steps of:

a. forming a cooking composition, dough or batter according to the present invention; and
b. cooking the cooking composition, dough or batter.

The cooked food product may be a biscuit, cake, muffin, cookie, donut, pastry, bread, pizza base or cracker.

The time period necessary for cooking can be easily selected by a person of skill in the art and having regard the consistency of the cooking composition, dough or batter, the thickness of the food product being prepared and/or the type of food product being formed.

It will also be appreciated that the food product may also be par-cooked, such that a fully cooked food product can be prepared at a later time. Once par-cooked, the food product may be stored, packaged and/or frozen.

Having regard to the disclosure above, the present invention also comprises the use of edible porous particles as a leavening agent in a baking composition. Such use preferably comprises mixing the edible porous particle with inulin. In a further preferred embodiment, such use comprises mixing the edible porous particles with a fat or an oil, or emulsions thereof with water. In yet a further preferred embodiment, such use comprises mixing the edible porous particles with both inulin and a fat or an oil, or emulsions thereof with water.

The present invention further provides the use of an edible porous particle as a nucleating agent. Preferred blends include those described above, and include those for the use as a leavening agent.

Finally, it will be appreciated that yet a further aspect of the present invention is the use of edible porous particles as a substitute for chemical leavening agents.

The present inventions will now be described by way of example.

Examples

Example 1

Example 1 illustrates the impact of traditional leavening agents on baking compositions. In this example hard sweet biscuits (type Marie, Petit Beurre) were made with and without baking powder.

The following ingredients were blended for 1 minute at first speed in a Diosna spiral kneader.

Components (g)	Test 1	Test 2
Extruded shortening	500	500
Lecithin	10	10
Sugar	900	900
Invert sugar	100	100
Water (40°C)	750	750
Salt	30	30
Sodium bicarbonate	25	0
Ammonium bicarbonate	20	0

Then the following ingredients were added and blended for 2 minutes at speed 1.

Wheat flour	3000	3000
Skimmed milk powder	60	60

Then the following ingredients were added and blended for 30 minutes at speed 2.

SAPP28	25	0
Proteinase Stern BK5020	1	0

The dough subsequently formed was sheeted with a Fritsch lamination table to 20 mm thickness, turned 90° and rolled out to 1.3 mm (gap opening between the rolls). The sheeted dough was given a resting time of 5 minutes and was then pinned heavily. Circles of dough were cut with a diameter of 50 mm and baked for 7 minutes on a perforated baking plate at 240°C (up) / 170°C (down) in a deck oven (Wachtel Stamm).

The results of the baked biscuits are shown in the following Table:

	Test 1	Test 2
Average thickness of baked biscuit / weight of biscuit (mm/g)	1.16	1.01
Specific volume of baked biscuit (ml/g)	2.16	1.78

The specific volume of the baked biscuit was measured using the rapeseed displacement technique, which is well known in the art of bakery evaluation.

As shown from Example 1, both the thickness and the specific volume of the biscuit produced is increased due to the presence of a leavening agent.

Example 2

Hard sweet biscuits (type Marie, Petit Beurre) were made without a leavening agent (Test 3) and, in accordance with the present invention, with a chemical leavening agent substitute in the form of porous starch particles (N-Zorbit M) (Test 4).

Accordingly, the following ingredients were blended first 1 minute at first speed in a Diosna spiral kneader.

Components (g)	Test 3	Test 4
Extruded shortening	500	500
Lecithin	10	10
Sugar	900	900
Invert sugar	100	100
Water (40°C)	750	750
Salt	30	30

The following ingredients were then added and blended for 2 minutes at speed 1 and 30 minutes at speed 2.

Wheat flour	3000	3000
Skimmed milk powder	60	60
N-Zorbit M	0	200

The resulting dough was sheeted with a Fritsch lamination table to 20 mm thickness, turned 90° and rolled out to 1.3 mm (gap opening between the rolls). The sheeted dough was given a resting time of 5 minutes, and was then pinned heavily. Circles of dough were cut with a diameter of 50 mm and baked for 7 minutes on a perforated baking plate at 240°C (up) / 170°C (down) in a deck oven (Wachtel Stamm).

The results of the baked biscuits are shown in the Table below:

	Test 3	Test 4
Average thickness of baked biscuit / weight of biscuit (mm/g)	1.10	1.25
Specific volume of baked biscuit (ml/g)	1.74	2.03

The results clearly demonstrate an increase in both the thickness and specific volume of the biscuit formed, and so illustrates that edible porous particles of the present invention act as a leavening agent.

Example 3

Hard sweet biscuits (type Marie, Petit Beurre) were made comprising the components shown in the table below. The following ingredients were blended for 1 minute at first speed in a Diosna spiral kneader. Inulin with a molecular weight of about 1314g/mol (Frutafit CLR) was incorporated into the biscuits of Test 6 and Test 7.

Components (g)	Test 5	Test 6	Test 7
Extruded shortening	500	500	500
Lecithin	10	10	10
Sugar	900	700	700
Frutafit CLR	0	200	200
Invert sugar	100	100	100
Water (40°C)	750	750	750
Salt	30	30	30

The following ingredients were then added and blended for 2 minutes at speed 1 and 30 minutes at speed 2.

Wheat flour	3000	3000	3000
Skimmed milk powder	60	60	60
N-Zorbit M	0	0	200

The resulting dough was sheeted with a Fritsch lamination table to 20 mm thickness, turned 90° and rolled out to 1.3 mm (gap opening between the rolls). The sheeted dough was given a resting time of 5 minutes, and was then pinned heavily. Circles of dough were cut with a diameter of 50 mm and baked for 7 minutes on a perforated baking plate at 240°C (up) / 170°C (down) in a deck oven (Wachtel Stamm).

The results of the baked biscuits are shown in the Table below:

	Test 5	Test 6	Test 7
Average thickness of baked biscuit / weight of biscuit (mm/g)	1.16	1.13	1.43
Specific volume of baked biscuit (ml/g)	1.68	1.95	2.15

As discussed above, long chain carbohydrates such as inulin delay the gelatinisation of starch which leads to a delay in the setting of the structure during baking. This provides an increased length of time in which water vapor can be incorporated into the air bubbles within the dough. This effect, in combination with the effect of additional microporous edible structures according to the invention (Test 7), gives a specific volume of the baked biscuit which is similar to biscuits made with baking powder (Test 1).

Example 4

In this example, the porous starch particles (N-Zorbit M) and inulin (Frutafit CLR) were first combined with the fat phase and mixed to form a homogenous paste.

Paste 1 was prepared by blending 500g palm oil (40°C) with 200g N-Zorbit M in a Hobart 1 minute at speed 1 with a flat beater.

Paste 2 was prepared by blending 500g palm oil (40°C) with 200g N-Zorbit M and 200g Frutafit CLR in a Hobart 1 minute at speed 1 with a flat beater.

Paste 3 was prepared by blending 500g rapeseed oil (25°C) with 200g N-Zorbit M in a Hobart 1 minute at speed 1 with a flat beater.

Paste 4 was prepared by blending 500g rapeseed oil (25°C) with 200g N-Zorbit M and 200g Frutafit CLR in a Hobart 1 minute at speed 1 with a flat beater.

After 1 day the pastes were used to make biscuits according to below recipe and procedure:

The following ingredients were blended for 1 minute at speed 1 in Diosna kneader:

Components (g)	Test 8	Test 9	Test 10	Test 11	Test 12	Test 13
Rapeseed oil				500		
Votated palm oil	500					
Paste 1		700				
Paste 2			900			
Paste 3					700	
Paste 4						900
Lecithin	10	10	10	10	10	10
Sugar	700	700	700	700	700	700
Frutafit CLR	200	200	0	200	200	0
Invert sugar	100	100	100	100	100	100
Water (40°C)	750	750	750	750	750	750
Salt	30	30	30	30	30	30

The following ingredients were then blended 2 minutes speed 1 and 30 minutes speed 2 in Diosna kneader:

Wheat flour	3000	3000	3000	3000	3000	3000
Skimmed milk powder	60	60	60	60	60	60
N-Zorbit M	200	0	0	200	0	0

The resulting dough was sheeted with a Fritsch lamination table to 20 mm thickness, turned 90° and rolled out to 1.3 mm (gap opening between the rolls). The sheeted dough was given a resting time of 5 minutes, and was then pinned heavily. Circles of dough were cut with a diameter of 50 mm and baked for 7 minutes on a perforated baking plate at 240°C (up) / 170°C (down) in a deck oven (Wachtel Stamm).

The results of the baked biscuits are shown in the Table below:

Average unbaked weight (g/piece)	5,05	4,85	4,85	4,45	4,85	4,8
Average baked weight (g/piece)	4,18	3,98	4,02	3,68	3,96	3,98
Moisture loss (%)	17	18	17	17	18	17
Average thickness / baked weight (mm/g)	1,29	1,25	1,29	1,31	1,29	1,32
Average diameter / baked weight (mm/g)	11,92	12,63	12,48	13,6	12,77	12,64
Specific volume (ml/g baked weight)	2,34	2,26	2,34	2,28	2,40	2,39

These results are in line with the results shown in Test 7. This illustrates that the porous starch (N-Zorbit M) and inulin (Frutafit CLR) can first be introduced in the fat phase without loss of functionality in the end application. No significant differences were observed between using palm oil or rapeseed oil in this trial set up.

Example 5

In this example, an undeveloped dough (characterized by an absence of long and intensive mixing) was used to produce a biscuit.

Accordingly, shortening, sugar and Frutafit CLR were blended for 1 minute speed 1 and 0.5 minute speed 2 in Hobart with flat beater.

The other ingredients were then blended for 1.5 minute at speed 1.

The dough was rolled out in stages with Fritsch lamination table. The dough was allowed to rest for 2 minutes at 4.5 mm (turn 90°). The dough was allowed to rest for 2 minutes at 2.5 mm (turn 90°). The dough was allowed to rest for 5 minutes at 1.8 mm.

Circles of dough were cut with a diameter of 50 mm and baked for 12 minutes at 180°C (up) / 160°C (down) on a regular baking plate (not perforated).

Components (g)	Test 14	Test 15	Test 16	Test 17	Test 18
Flour	100	100	100	100	100
Corn starch	25	25	25	25	25
Icing sugar	35	35	17,5	35	17,5
Frutafit CLR			17,5		17,5
Shortening	20	20	20	20	20
Milk	30	30	30	30	30
Eggs	10	10	10	10	10
sodium bicarbonate	0,45				
ammonium bicarbonate	0,67				
Salt	1	1	1	1	1
N-Zorbit M				10	10
Average unbaked weight (g/piece)	6,2	7,2	6,8	6,9	6,6
Average baked weight (g/piece)	5	5,9	5,5	5,7	5,4
Moisture loss (%)	19	19	19	18	18
Average thickness / baked weight (mm/g)	0,96	0,78	0,81	0,79	0,84

Average diameter / baked weight (mm/g)	9,09	8,09	8,80	8,59	9,07
Specific volume (ml/g baked weight)	1,66	1,25	1,38	1,38	1,49

Test 17 above demonstrates again that the use of edible porous particles in accordance with the present invention (i.e. N-Zorbit M) causes an increase in the specific volume of the biscuits formed, and thus contributes to the rising of the dough composition. When used together with inulin, the increase in specific volume produces a result comparable with that of traditional chemical leavening agents.

Example 6

In this example Lincoln biscuits were made according to the following recipe and procedure:

	Test 19	**Test 20**	**Test 21**
Flour	500	500	500
Icing sugar	147,5	147,5	114,7
Votated palm	130	130	130
SMP	9	9	9
Salt	5,5	5,5	5,5
Lecithin	3	3	3
Sodium bicarbonate	2,5		
Ammonium bicarbonate	1,5		
SAPP28	2		
Water	68	68	68
Frutafit CLR			32,8
N-Zorbit M			33

The fat, sugar, inulin (in the form of Frutafit CLR), salt, lecitin, water (40°C), sodium bicarbonate and ammonium bicarbonate (first dissolved in water) were mixed for 2 minutes speed 1 and 2 minutes speed 2 in Hobart with flat beater.

The flour and porous starch particles (in the form of N-Zorbit M) along with disodium diphosphate and the above composition were blended for another minute at speed 1.

The dough was rolled out by hand to approximately 1 cm and then further rolled out to 4 mm with Fritsch lamination table.

Circles of dough were cut with a diameter of 50 mm and baked for 15 minutes at 180°C (up) / 180°C (down) on a regular baking plate (not perforated).

The final properties of the biscuits produced are shown below.

Average unbaked weight (g/piece)	10,4	10,6	10,6
Average baked weight (g/piece)	8,9	9,2	9,2
Moisture loss (%)	15	13	13
Average thickness / baked weight (mm/g)	0,89	0,70	0,72
Average diameter / baked weight (mm/g)	5,99	5,46	5,58
Specific volume (ml/g baked weight)	1,75	1,27	1,37

Test 21 once again shows that edible porous particles according to the present invention can be used as a substitute for traditional chemical leavening agents.

5

Claims

1. A cooking composition comprising a leavening agent, wherein the leavening agent is a chemical leavening agent substitute and consists essentially of edible porous particles.

2. A cooking composition according to claim 1, wherein the edible porous particles are selected from starch, crystalline sugar, silica, carbon and/or emptied yeast cells.

3. A cooking composition according to claim 2, wherein the edible porous starch is selected from one or more of corn, pea, potato, sweet potato, sorghum, banana, barley, wheat, rice, sago, amaranth, tapioca, arrowroot, and canna.

4. A cooking composition according to claim 2 or 3, wherein the edible porous starch is tapioca maltodextrin.

5. A cooking composition according to any one of the preceding claims, wherein the edible porous particles are present in an amount of 0.1 to 10 wt%.

6. A cooking composition according to any one of the preceding claims, wherein the edible porous particles are present in an amount of 0.1 to 5 wt%.

7. A cooking composition according to any one of the preceding claims, wherein the mean particle size of the edible porous particles is less than 100µm, preferably less than 50 µm, and more preferably less than 20 µm.

8. A cooking composition according to any one of the preceding claims, wherein the density of the edible porous particles is less than 1 g/cm^3, preferably less than 0.5 g/cm^3, and more preferably less than 0.2 g/cm^3.

9. A cooking composition according to any one of the preceding claims, wherein the mean pore size of the edible porous particles is less than 98µm, preferably less than 48 µm, and more preferably less than 18 µm.

10. A cooking composition according to any one of the preceding claims, wherein the composition further comprises an additive to delay starch gelatinization.

11. A cooking composition according to claim 10, wherein the additive to delay starch gelatinization is selected from inulin, sugar, salt, a high molecular weight carbohydrate, an edible acid and/or a monoglyceride.

12. A cooking composition according to claim 10 or 11, wherein the additive to delay starch gelatinization is inulin.

13. A cooking composition according to any one of claims 10 to 12, wherein the additive to delay starch gelatinization is present in an amount of from 0.1 to 10 wt%.

14. A cooking composition according to any one of the preceding claims, wherein the composition does not comprise a biological leavening agent.

15. A cooking composition according to any one of the preceding claims, wherein the composition further comprises one or more of flour, milk powder, sugar, sugar substitutes, protein, emulsifiers, starch, salt, spices, flavour components, colourants, cocoa, thickening and gelling agents, egg powder, enzymes, gluten, preservatives, sweeteners, oxidising agents, reducing agents, anti-oxidants and acidity regulators.

16. A cooking composition according to claim 15, wherein at least part of the sugar is substituted with inulin.

17. A cooking composition according to claim 16, wherein inulin replaces up to 50 wt% of the sugar present in a baking composition without inulin.

18. A cooking composition according any one of the preceding claims, wherein the composition further comprises one or more of eggs, water, liquid emulsifier, liquid sugar and syrups, milk flavours, alcohols, humectants, honey, liquid preservatives, liquid sweeteners, liquid oxidising agents, liquid reducing agents, liquid anti-oxidants, liquid acidity regulators and liquid enzymes.

19. A cooking composition according to any one of the preceding claims, wherein the composition further comprises a fat or an oil, or emulsions thereof with water.

20. A cooking composition according to claim 19, wherein the composition further comprises margarine or butter.

21. A cooking composition according to claim 19 or claim 20, wherein the fat is vegetable or animal derived, and blends thereof.

22. A dough formed from the cooking composition according to any one of claims 1 to 21.

23. A dough according to claim 22, wherein the dough comprises:

20 to 70%	Flour
1 to 50%	Water
0 to 50%	Sugar
0 to 5%	Salt
1 to 5%	Leavening agent according to the claims
0 to 40%	Fat

24. A dough according to claim 22, wherein the leavening agent comprises a biological leavening agent.

25. A batter formed from the cooking composition according to any one of claims 1 to 21.

26. A process of forming a dough or batter, comprising the steps of:

a. mixing wet components;

b. mixing dry components, including a leavening agent consisting essentially of edible porous particles; and

c. blending a. and b. until a dough or batter is formed.

27. A process of forming a dough or batter for use in producing cooked products, comprising the steps of:

a. mixing wet components, including a leavening agent consisting essentially of edible porous particles;

b. mixing dry components; and

c. blending a. and b. until a dough or batter is formed.

28. A process according to claim 27, wherein the mixing of wet components comprises mixing a fat component, such as described in any one of claims 19 to 21, with the leavening agent consisting essentially of edible porous particles, such as described in any one of claims 1 to 8.

29. A process according to claim 28, further comprising adding inulin.

30. A process according to any one of claims 26 to 29, wherein the wet components are as described in any one of claims 18 to 21 and/or the dry components are as described in any one of claims 9 to 17 and/or the leavening agent is as described in any one of claims 1 to 8.

31. A cooked food product formed from a dough or batter according to any one of claims 22 to 30.

32. A process of forming a cooked food product, comprising the steps of:

a. forming a dough or batter, wherein the dough or batter comprises the cooking composition according the any one of claims 1 to 21.

b. cooking the dough or batter.

33. A process according to claim 32, wherein cooking includes baking, frying and/or microwaving.

34. A process according to claim 32 or claim 33, wherein cooking includes full and par-cooking.

35. A cooked food product produced by the process of any one of claims 32 to 34.

36. A cooked food product according to any of claims 31 to 35, wherein the product is a biscuit, cake, muffin, donut, pastry, bread, pizza base or cracker.

37. A precursor composition for forming the cooking composition of any one of claims 1 to 21, a dough according to any one of claims 22 to 24 or a batter according to claim 25, comprising a mixture of edible porous particles and inulin.

38. A precursor composition according to claim 37, wherein the edible porous particles are as described in any one of claims 2 to 9.

39. A precursor composition according to claim 37 or claim 38, further comprising a fat.

40. A precursor composition according to claim 39, wherein the fat is as described in any one of claims 19 to 21.

41. Use of an edible porous particle as a leavening agent in a cooking composition.

42. Use of a composition consisting of an edible porous particle and inulin as a leavening agent in a cooking composition.

43. Use of a leavening agent according to claim 41 or 42, wherein the leavening agent is pre-blended with a fat composition.

44. Use of an edible porous particle as a nucleating agent in a cooking composition.

45. Use of an edible porous particle as a chemical leavening agent substitute in a cooking composition.

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2017/058862

A. CLASSIFICATION OF SUBJECT MATTER
INV. A21D2/18 A21D2/36 A21D8/02 A21D10/00
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
A21D

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2002/064586 A1 (MCPHERSON ANDREW E [US] ET AL) 30 May 2002 (2002-05-30) paragraphs [0003] - [0005], [0009], [0010], [0013], [0027] - [0031] claims 1,16	1-6,10, 11, 13-15, 18-23, 26-28, 30-36, 41,43,45

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[X] Further documents are listed in the continuation of Box C.

[X] See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
14 June 2017	25/08/2017

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Piret-Viprey, E

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2009/147297 A2 (RAISIO NUTRITION LTD [FI]; LAHTINEN RITVA [FI]; EKBLOM JARI [FI]; FRIL) 10 December 2009 (2009-12-10) page 3, lines 11-13 page 4, lines 11-29 page 5, lines 1-13,17-25,33-34 page 6, lines 13-22 examples 1-8	1-6,14, 15,18, 19, 22-24, 26,30-36
X	WO 2009/149947 A1 (NESTEC SA [CH]; ARRACHID ABDESSAMAD [GB]) 17 December 2009 (2009-12-17) page 4, lines 9-32 page 5, lines 10-14 page 6, paragraph 16-27 page 8, lines 13-22 page 9, lines 24-29 page 10, lines 8-14	1-7, 10-12, 14-19, 21,25, 26, 31-35, 37-40
X	EP 1 817 964 A1 (SWEETWELL NV [BE]) 15 August 2007 (2007-08-15) paragraphs [0137], [0139], [0140], [0146] - [0153], [0187]	1-3,5,6, 10-23, 25-43,45
X	WO 2010/015554 A1 (DSM IP ASSETS BV [NL]; BUWALDA PIETER LYKLE [NL]; MELENHORST VINCENTIU) 11 February 2010 (2010-02-11) page 2, line 30 - page 3, line 8 page 4, lines 6-8,30-32 page 5, line 4 page 7, lines 17-25 page 10, line 20 - page 11, line 28 example 1	1-6,10, 11, 13-15, 18-21, 25, 31-36, 41,45
X	CN 101 579 073 A (JIQIU GUO [CN]) 18 November 2009 (2009-11-18) the whole document	1-3,5, 15,22, 31,41,45

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C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2013/151931 A1 (CARGILL INC [US]; METIN SERPIL [US]; SMITH PAUL RAYMOND [BE]; VEELAERT) 10 October 2013 (2013-10-10) cited in the application the whole document	1-4,7-9, 14, 19-22, 24, 31-36, 41,43,45
X	WO 89/04842 A1 (WHISTLER ROY L [US]) 1 June 1989 (1989-06-01) the whole document	1-3,14
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X	FR 2 474 506 A1 (HOUSE FOOD INDUSTRIAL CO [JP]) 31 July 1981 (1981-07-31) page 1, line 24 - page 2, line 26 page 3, line 25 - page 4, line 16	1,2,11, 14,18, 19,21
X	US 5 679 877 A (ERILLI RITA [BE] ET AL) 21 October 1997 (1997-10-21) column 5, lines 26-29	1,2,8
X	US 5 527 556 A (FRIPPIAT ANNE [BE] ET AL) 18 June 1996 (1996-06-18) example 14	37-40

1

INTERNATIONAL SEARCH REPORT

International application No.
PCT/EP2017/058862

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. ☒ Claims Nos.: 1-45(partially)
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/210

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. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.

2. ☐ As 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. ☒ 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.:

1-43, 45

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.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

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

1. claims: 1-43, 45

Claim 1: A cooking composition comprising a leavening agent, wherein the leavening agent is a chemical leavening agent substitute and consists essentially of edible porous particles.
Claims 22 and 25: Dough and batter from the cooking composition.
Claims 26 and 27: Process of forming a dough or batter wherein the leavening agent is a chemical leavening agent substitute and consists essentially of edible porous particles.
Claim 32: Process of forming a cooked food product.
Claims 31 and 35: Cooked food product.
Claims 41, 42 and 45: Use of an edible porous particle (and inulin) as a (chemical) leavening agent (substitute).

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2. claim: 44

Use of an edible porous particle as a nucleating agent in a cooking composition.

Continuation of Box II.2

Claims Nos.: 1-45(partially)

The term "edible porous particles" relates to an extremely large number of possible compounds. Support and disclosure in the sense of Article 6 and 5 PCT is to be found however for only a very small proportion of the compounds claimed, see description on page 7, lines 1-3 and claim 2: "the edible porous particles are selected from starch, crystalline sugar, silica, carbon and/or emptied yeast cells".
The examples of the description are performed with N-Zorbit M, i.e. tapioca maltodextrin (claim 4).
The search of claims 1-45 was restricted to those claimed compounds which appear to be supported, i.e. starch (e.g. tapioca maltodextrin), crystalline sugar, silica, carbon and/or emptied yeast cells.

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 Examining 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.

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2017/058862

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2002064586 A1	30-05-2002	AT 397862 T	15-07-2008
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