(19) ORGANISATION AFRICAINE DE LA PROPRIETE INTELLECTUELLE

ORGANISATION AFRICAINE DE LA PROPRIETE INTELLECTUELLE

(51) Inter. Cl.[8]
A23L 23/10 (2018.01)
A23L 27/40 (2018.01)
A23L 29/00 (2018.01)
A23L 29/212 (2018.01)
A23P 10/20 (2018.01)
A23P 10/25 (2018.01)
A23P 10/28 (2018.01)
A23P 30/10 (2018.01)

(11) N° 19846

FASCICULE DE BREVET D'INVENTION

(21) Numéro de dépôt : 1202000368
PCT/EP2019/058185

(22) Date de dépôt : 01/04/2019

(30) Priorité(s) :

EP n° 18166019.2 du 06/04/2018

(24) Délivré le : 10/03/2021

(45) Publié le : 26/05/2021

(73) Titulaire(s) :

SOCIETE DES PRODUITS NESTLE S.A.,
Entre-deux-villes,
1800 VEVEY (CH)

(72) Inventeur(s) :

BOBE, Ulrich (DE)
GADDIPATI, Sanyasi (DE)
PERDANA, Jimmy (DE)
KIM, Youngbin (DE)
SCHROEDER, Volker (DE)

(74) Mandataire : Cabinet CAZENAVE SARL,
B.P. 500, YAOUNDE (CM).

(54) Titre : Process for preparing a bouillon tablet.

(57) Abrégé :

The present invention relates to bouillon tablets, in particular to a process for preparing a bouillon tablet. The process comprises a co-processed salt-starch mass and mixing said co-processed salt-starch mass with at least one further ingredient selected from the group consisting of salt, sugar, MSG, flavourings, fillers, oil, fat, or any combination thereof to result in a dry mass and pressing the dry mass into a tablet.

Process for preparing a bouillon tablet

Field of the Invention

The present invention relates to bouillon tablets, in particular to a process for preparing a bouillon tablet. The process comprises a co-processed salt-starch mass and mixing said co-processed salt-starch mass with at least one further ingredient selected from the group consisting of salt, sugar, MSG, flavourings, fillers, oil, fat, or any combination thereof to result in a dry mass and pressing the dry mass into a tablet and packaging the tablet.

Background of the Invention

A bouillon tablet formed by compressing ingredients into a tablet shape, for example a cube, is widely used as a concentrate to prepare a bouillon, a broth or a soup. The bouillon tablet is normally added to a hot aqueous solution, allowing it to dissolve. In addition, a bouillon tablet may be used when preparing other dishes, as a seasoning product. The dissolution time of bouillon tablets highly depends on its degree of compaction which can be measured / expressed by the hardness of such a product. The reason to compact powders in a regular form presents several advantages for the commercialisation (e.g. reduction of volume, optimisation of packaging material usage, shelf life and convenience). A habit developed by users of bouillon tablets is the crumbling of the tablet or cube into the dish during preparation process either to ensure good distribution and or to accelerate its dissolution time in the cooking water. This crumbliness is one of the attributes that needs to be ensured during shelf life and therefore a post-hardening of the tablet or cube has to be avoided. A minimum hardness is necessary to allow a wrapping of the tablet. A maximum hardness ensures that a normal user can break the tablet within fingers without the use of additional tools or appliances. A typical bouillon tablet or bouillon cube comprises salts, taste enhancing compounds like monosodium glutamate (MSG), sugars, starch or flour, fat, flavouring components, vegetables, meat extracts, spices, colourants etc. The amounts of the respective compounds may vary depending on the specific purpose of the product, the market or taste of the consumer that is aimed at.

A conventional way of manufacturing bouillon tablets comprises mixing powdered bouillon components with fat and pressing the mix into a tablet. In this type of bouillon tablet the fat is the main ingredient holding the structure together.

Nowadays there is a nutritional trend to avoid or at least reduce the consumption of fats rich in saturated fatty acids and to preferably consume oils rich in monounsaturated fatty acids and/or polyunsaturated fatty acids. WO2004/049831 describes how it is possible to have very little solid fat entrapped in a hard bouillon tablet provided the tablet also comprises crystals, a filler and a sticking agent. The sticking agent may comprise ingredients the addition of which (combined with an adequate increase of the water activity) impart a glass transition temperature to the final mixture which may be relatively easily exceeded during tableting. Such ingredients include meat extract, processed flavours and/or vegetables extracts.

Sticking agents used to bind together bouillon cubes with low fat contents are typically hygroscopic amorphous ingredients. These are activated in the bouillon mixture by the addition of water. This process of water addition can be problematic, for example it is difficult to ensure homogenous distribution of the water and a storage time up to 24 hours is needed to reach a water activity equilibrium. Crust formation may occur which requires stopping the mixer for cleaning. Sometimes lumps are formed in the mixtures which causes quality defects in the finished pressed tablets. In addition post hardening of the bouillon tablet may occur.

Hence, there is a persisting need in the art to find improved processes for forming bouillon tablets, especially bouillon tablets which use a new binding system despite the well-known binding system of amorphous binding and/or fat binding.

Summary of the invention

An object of the present invention is to improve the state of the art and to provide an improved solution to overcome at least some of the inconveniences described above or at least to provide a useful alternative. The object of the present invention is achieved by the subject matter of the independent claims. The dependent claims further develop the idea of the present invention.

Accordingly, the present invention provides in a first aspect a process for the production of a bouillon tablet comprising salt and starch, the process comprising the steps of:

a) dissolving the salt or part of the salt in water;
b) mixing the starch and the water before, during or after dissolution of the salt or part of the salt in water;
c) drying the mixture of step b) to obtain a dry salt-starch mass;
d) optionally milling the dry salt-starch mass;

e) mixing the dry salt-starch mass with at least one further ingredient selected from the group consisting of salt, sugar, MSG, flavourings, filler, colourants, oil, fat, or any combination thereof, to result in a dry composition;

f) pressing the dry composition to a bouillon tablet;

wherein the bouillon tablet comprises at least 10wt% salt-starch mass; and wherein the salt-starch mass comprises 18 to 82wt% salt and 18 to 82wt% starch and wherein the salt is dissolved in the water at a ratio between 1:2.8 to 1:20.

In a second aspect, the invention relates to a bouillon tablet obtainable by the process of the invention.

It has been surprisingly found by the inventors that using a co-processed salt-starch mass has very good flow-ability values and provides an efficient new binding system in a bouillon tablet.

The use of the salt-starch mass increases the hardness of bouillon tablets/cubes after pressing. The obtained hardness can exceed the hardness that is commonly observed during pressing of bouillon cubes/tablets. At the same time, the produced bouillon products can still be crumbled. So far, such a behaviour has not been observed for comparable hardness values. This strongly indicates that a different and new binding mechanism is present. Due to this, cubes/tablets can be easily produced (high hardness advantageous for manufacturing) but at the same time show good crumbliness. Crumbliness is a key Driver of liking for consumers and is thus desired. In addition the bouillon tablets/cubes has a faster dissolution time compared to standard bouillon tablets/cubes. This is very surprising as due to the higher hardness a slower dissolution time is expected.

In addition the salt-starch mass is used to produce bouillon cubes with reduced salt content (e.g. between 10 to 50% reduction). It was surprisingly found that cubes/tablets could be pressed even though a high fibre content was used (fibres are elastic and can lead to capping/breakage after pressing). This behaviour might be explained by the entrapment of salt in starch. It enables the use of higher contents of starch in applications. It should also be mentioned that the flow-ability is positively influenced by using the salt-starch mass compared to pure fibres.

Detailed Description of the invention

Consequently the present invention relates to a process for the production of a bouillon tablet comprising salt and starch, the process comprising the steps of:

a) dissolving the salt or part of the salt in water;
b) mixing the starch and the water before, during or after dissolution of the salt or part of the salt in water;
c) drying the mixture of step b) to obtain a dry salt-starch mass;
d) optionally milling the dry salt-starch mass;
e) mixing the dry salt-starch mass with at least one further ingredient selected from the group consisting of salt, sugar, MSG, flavourings, colourants, fillers, oil, fat, or any combination thereof, to result in a dry composition;
f) pressing the dry composition to a bouillon tablet;

wherein the bouillon tablet comprises at least 10wt% salt-starch mass; and wherein the salt-starch mass comprises 18 to 82wt% salt and 18 to 82wt% starch and wherein the salt is dissolved in the water at a ratio between 1:2.8 to 1:20.

In an embodiment the present invention relates to a process for the production of a bouillon tablet comprising salt and starch, the process comprising the steps of:

a) dissolving the salt or part of the salt in water;
b) mixing the starch and the water before, during or after dissolution of the salt or part of the salt in water;
c) optionally heating the mixture to a temperature between 60-100°C for 0.5-15 min;
d) drying the mixture of step b) to obtain a dry salt-starch mass;
e) optionally milling the dry salt-starch mass;
f) mixing the dry salt-starch mass with at least one further ingredient selected from the group consisting of salt, sugar, MSG, flavourings, colourants, fillers, oil, fat, or any combination thereof, to result in a dry composition;
g) pressing the dry composition to a bouillon tablet;

wherein the bouillon tablet comprises at least 10wt% salt-starch mass; and wherein the salt-starch mass comprises 18 to 82wt% salt and 18 to 82wt% starch and wherein the salt is dissolved in the water at a ratio between 1:2.8 to 1:20.

An aspect of the invention provides a bouillon tablet obtained, for example obtainable, by the process of the invention.

"Bouillon tablet" means a tablet obtained by pressing a free flowing powder into a tablet. The tablet may be any shape that can be formed in a tabletting press; many commercial bouillon tablets are cubes. Bouillon tablets are sometimes referred to as broth tablets, stock tablets or seasoning tablets. In a cube form, they are referred to as bouillon cubes, broth cubes, stock cubes or seasoning cubes.

"Salt" according to this invention means edible salts capable of imparting or enhancing a salty taste perception. Salt is selected from the group consisting of sodium chloride, potassium chloride, ammonium chloride or a combination thereof, more preferably sodium chloride. In a further embodiment, the bouillon tablet comprises salt in an amount in the range of 10 to 65% (by weight of the composition), preferably between 15 to 65%, preferably between 20 to 60%, preferably between 25 to 60%, preferably between 30 to 60%, preferably between 35 to 60%, preferably between 35 to 50%, preferably between 40 to 60%, preferably between 45 to 60%, preferably between 45 to 55%, preferably between 40 to 50% (by weight of the composition).

The term "dissolving" according to this invention means that salt is dissolved within water. In an embodiment salt is dissolved in water at a ratio between 1:2.8 to 1:20, preferably 1:2.8 to 1:20, preferably 1:2.8 to 1:15, preferably 1:2.8 to 1:10, preferably 1:2.8 to 1:6, preferably 1:3 to 1:20, preferably 1:3 to 1:15, preferably 1:3 to 1:10, preferably 1:3 to 1:6, preferably 1:4 to 1:20, preferably 1:4 to 1:15, preferably 1:4 to 1:10, preferably 1:4 to 1:6. In a preferred embodiment a saturated water-salt solution is obtained. In an embodiment the starch and the water are mixed after dissolution of the salt or part of the salt in the water. The term "part of the salt" means that not the total amount of salt of the bouillon tablet is dissolved in water as salt can be also mixed as pure salt in the dry composition. At least 8% of the total amount of salt is dissolved in water, preferably at least 12%, preferably at least 20%, preferably at least 25%, preferably at least 30%, preferably at least 40%, preferably at least 50%, preferably at least 60%, preferably at least 75%, preferably at least 80%, preferably at least 90%, preferably between 8 to 100%, preferably between 12 to 100%, preferably between 20 to 100%, preferably between 30 to 100%, preferably between 40 to 100%, preferably between 50 to 100%, preferably between 75 to 100%, preferably 100% of the total amount of salt is dissolved in water.

In a further embodiment, the bouillon tablet comprises monosodium glutamate (MSG) in an amount in the range of 0 to 25% (by weight of the composition), preferably between 0 to

15%, preferably between 0.5 to 25%, preferably between 0.5 to 15%, preferably example between 5 to 10% (by weight of the composition).

In a further embodiment, the bouillon tablet comprises sugar (for example sucrose) in an amount in the range of 0 to 20% (by weight of the composition), preferably between 0 to 15%, preferably between 0.5 to 15%, preferably between 5 to 15%, preferably between 2 to 10% (by weight of the composition). The sugar according to this invention is white sugar or brown sugar.

"Starch" according to this invention has two main polysaccharides amylose and amylopectin. Starches granules can be isolated from a wide variety of plant sources, consisting of tuberous root, tuber and seeds. Based on the botanical origin, starch granules come in different shapes, sizes and have varying ratios of amylose/amylopectin. Starch according to this invention is a native starch, flour, pre-gelatinized starch or cold swelling starch or combination thereof. The starch according to the invention is selected from the group consisting of maize, waxy maize, high amylose maize, wheat, tapioca, rice, potato, cassava or combinations of these. Corresponding flours can also be used as a source of starch. The person skilled in the art is calculating based on the amount of starch how much flour has to be used to fall within this invention. Native starch is defined as a starch granule in its native form in the nature; isolated using the extraction processes, or commercially sourced as native starch occurs naturally is insoluble in cold water. Native starch granule is in a semi-crystalline form and have a crystallinity varying from 15 to 45%. Other prominent feature of a native starch granule is its presence of Maltese cross when observed under polarized light. Due to the presence of the order in the native starch, it exhibits birefringence under polarized light. Gelatinized starch is the native starch, which undergoes gelatinisation process. The gelatinization process, occurs when the native starch granules are heated progressively to higher temperatures in the presence of excess of water, the granules begin to irreversibly swell and there is a point at which the Maltese cross of the native granules disappears. During gelatinisation several events occur simultaneously. There are three distinct stages that occur in the gelatinization process: (i) granular swelling by slow water absorption; (ii) followed by a rapid loss of birefringence via the absorption of large amounts of water by the granules; and (iii) finally, leaching of the soluble portion into the solution, transforming the granules into formless sacs. Size, shape of the granule and the loss of birefringence are the distinctive feature of the gelatinized starch. Gelatinized starch can be sourced commercially as pre-gelatinized starch. Swollen starch granule or partly gelatinized is produced when the native

starch granules are heated progressively to higher temperatures in the presence of excess of water; the granules begin to irreversibly swell and Swollen starch granule or partly gelatinized is an intermediate stage between the native starch granule form and gelatinisation. The granules in the swollen form have a larger granular size than the native starch granule and could have a partial or complete loss of birefringence.

The term "flavourings" according to this invention means ingredients selected from the group consisting of yeast extract, vegetable powder, animal extract, bacterial extract, vegetable extract, animal powder, reaction flavour, hydrolysed plant protein, acid, garnishes, herbs, spices or combinations of these. The bouillon tablet according to the invention comprise 0 to 40 % flavourings, preferably 0.5 to 40 %, preferably 1 to 40 %, preferably 2 to 40 %, preferably 1 to 35 %, preferably 2 to 35 %, preferably 3 to 35 %, preferably 5 to 35 %, preferably 9 to 35 %, preferably 10 to 30 %, preferably 10 to 25 %, preferably 10 to 20 %, preferably 5 to 25 %, for further example 5 to 15 % (by weight of the composition). In an embodiment, the flavourings are selected from the group comprising yeast extract, chicken extract, onion powder, garlic powder, celery root powder, tomato powder, bacterial extract, reaction flavour or combinations of these. A bacterial extract is described within WO2009040150 or WO2010105842. A vegetable extract is described within WO2013092296. Vegetable powder means at least one ingredient of onion powder, garlic powder, tomato powder, celery root powder or a combination thereof. Garnishes, herbs, spices or a combination thereof are selected from the group comprising pieces of parsley, celery, fenugreek, lovage, rosemary, marjoram, dill, tarragon, coriander, ginger, lemongrass, curcuma, chili, ginger, paprika, mustard, garlic, onion, turmeric, tomato, coconut milk, cheese, oregano, thyme, basil, chillies, paprika, pimento, jalapeno pepper, white pepper powder and black pepper or combinations of these. Animal powder means at least one ingredient of meat powder, fish powder, crustacean powder or combination thereof. Meat powder means chicken powder or beef powder. Animal extract means at least one ingredient of meat extract, fish extract, crustacean extract or combination thereof.

In a further embodiment, the bouillon tablet comprises yeast extract in an amount in the range of 0 to 15 % (by weight of the composition), preferably between 1 to 15 %, preferably between 1 to 10 %, preferably between 1 to 7 %, for further example between 2 to 6 % (by weight of the composition). In a further embodiment, the bouillon tablet comprises vegetable powder in an amount in the range of 0 to 15 % (by weight of the composition), preferably between 0.1 to 15 %, preferably between 0.1 to 10 %, preferably between 1 to 10 %, for further

example between 1 to 7 % (by weight of the composition). In a further embodiment, the bouillon tablet comprises animal extract in an amount in the range of 0 to 15 % (by weight of the composition), preferably between 0.1 to 15 %, preferably between 0.1 to 10%, for further example between 0.1 to 5% (by weight of the composition). In a further embodiment, the bouillon tablet comprises bacterial extract in an amount in the range of 0 to 20 % (by weight of the composition), preferably between 0.1 to 20 %, preferably between 0.1 to 15 %, preferably between 0.1 to 10 %, preferably between 1 to 20 %, preferably between 1 to 10 %, preferably between 2 to 8 % (by weight of the composition). In a further embodiment, the bouillon tablet comprises vegetable extract in an amount in the range of 0 to 15 % (by weight of the composition), preferably between 0.1 to 15 %, preferably between 0.1 to 10 %, preferably between 0.1 to 5 % (by weight of the composition). In a further embodiment, the bouillon tablet comprises meat powder, fish powder or crustacean powder in an amount in the range of 0 to 15 % (by weight of the composition), preferably between 0.1 to 15 %, preferably between 0.1 to 10 %, for further example between 0.1 to 5 % (by weight of the composition). In a further embodiment, the bouillon tablet comprises reaction flavour in an amount in the range of 0 to 15 % (by weight of the composition), preferably between 0.1 to 15 %, preferably between 0.1 to 10 %, for further example between 0.1 to 5 % (by weight of the composition). Reaction flavours may preferably be amino acids and reducing sugars which react together on the application of heat via the Maillard reaction. In a further embodiment, the bouillon tablet comprises hydrolysed plant protein in an amount in the range of 0 to 20 % (by weight of the composition), preferably between 0.1 to 20 %, preferably between 0.1 to 15 %, preferably between 0.1 to 10 %, preferably between 1 to 20 %, preferably between 1 to 15 %, preferably between 5 to 15 % (by weight of the composition). In a further embodiment, the bouillon tablet comprises chicken extract, beef extract, fish extract or crustacean extract in an amount in the range of 0 to 5 % (by weight of the composition), preferably between 0.5 to 5 %, for further example between 1 to 3 % (by weight of the composition). In a further embodiment, the bouillon tablet comprises onion powder in an amount in the range of 0 to 10 % (by weight of the composition), preferably between 0.1 to 10 %, preferably between 0.1 to 5 %, for further example between 1 to 5 % (by weight of the composition). In a further embodiment, the bouillon tablet comprises celery root powder in an amount in the range of 0 to 10 % (by weight of the composition), preferably between 0.1 to 10 %, preferably between 0.1 to 5 %, preferably between 1 to 5 % (by weight of the composition). In a further embodiment, the bouillon tablet comprises tomato powder in an amount in the range of 0 to 10 % (by weight of the composition), preferably between 0.1 to 10 %, preferably between 0.1 to 5 %, for further example between 1 to 5 % (by weight of the composition). In a further embodiment, the bouillon

tablet comprises acid in an amount in the range of 0 to 5% (by weight of the composition), preferably between 0.1 to 3%, for further example between 0.1 to 2% (by weight of the composition). Acid is citric acid, vinegar, vinegar powder or a combination thereof. In a further embodiment, the bouillon tablet comprises garnishes, herbs or spices or a combination thereof in an amount in the range of 0 to 25% (by weight of the composition), preferably between 0.1 to 25%, preferably between 0.1 to 20%, preferably between 0.1 to 15%, preferably between 0.1 to 10%, preferably between 1 to 10%, preferably between 0.1 to 5%, preferably between 1 to 5% (by weight of the composition).

In the context of the present invention, the term "fat" refers to triglycerides solid at a temperature of 20°C, preferably solid at a temperature of 25°C. The term "solid at a temperature of 20°C" means that the fat, stored at this temperature, maintains its shape. Fats and oils are the chief component of animal adipose tissue and many plant seeds. The fat according to this invention have a solid fat content greater than 2% at 30 °C, preferably it have a solid fat content greater than 5% at a temperature of 30°C, preferably it have a solid fat content greater than 10% at a temperature of 30°C. The solid fat content of a fat for example be measured by pulsed NMR. Fat according to this invention means a vegetable and/or animal fat. In a further embodiment fat according to this invention means at least one ingredient of tropical fat, fractionated tropical fat, fractionated beef fat, fractionated chicken fat, algae fat or shea butter, interesterified shea butter. In a further embodiment, the bouillon tablet comprises fat in an amount of less than 14% (by weight of the composition), preferably less than 10%, preferably less than 7%, preferably in the range of 0 to 14% (by weight of the composition), preferably between 0.5 to 14%, preferably between 0.5 to 10%, preferably between 0.5 to 8%, preferably between 1 to 8%, preferably between 1 to 6%, preferably between 2 to 6% (by weight of the composition). Nowadays there is a nutritional trend to avoid or at least reduce consumption of fats rich in trans fatty acids and saturated fatty acids and to preferably consume healthy oils rich in polyunsaturated fatty acids. It is advantageous to provide a hard bouillon tablet which only or mainly contains oil that is liquid at ambient temperatures in local conditions and no or only little amounts of solid fat. In an embodiment, the bouillon tablet contains less than 5% saturated fat; preferably no fat (0 wt% fat).

In an embodiment, the bouillon tablet further comprises oil, for example up to 15% oil, for further example up to 10% oil, preferably the composition comprises oil in an amount in the range of 0 to 15% (by weight of the composition), preferably between 0.5 to 10% (by weight of the composition), preferably between 0.5 to 7%, preferably between 0.5 to 5%, preferably

between 0.5 to 3% (by weight of the composition). In a preferred embodiment, the oil is a vegetable oil. Preferably, the oil is selected from the group consisting of sunflower oil, rape seed oil, cotton seed oil, peanut oil, soya oil, olive oil, coconut oil, algal oil, safflower oil, corn oil, rice bran oil, sesame oil, hazelnut oil, avocado oil, almond oil, walnut oil or a combination thereof; more preferably sunflower oil. The term sunflower oil includes also high oleic sunflower oil. In the context of the present invention the term "oil" refers to triglycerides which are liquid or pourable at a room temperature of 20°C, for example liquid or pourable at a room temperature of 25°C. The oil have a solid fat content of less than 10 % at 20 °C, preferably less than 5 % at 20 °C, preferably less than 2 % at 20 °C, preferably 0 % at 20 °C. The oil may be rich in monounsaturated and polyunsaturated fatty acids.

The term "filler" according to this invention means maltodextrin, glucose syrup, starch, flour or a combination thereof. In an embodiment, the bouillon tablet according to process of the invention comprises fillers in an amount in the range of 0 to 30% (by weight of the composition), preferably between 0.5 to 30% (by weight of the composition), preferably between 0.5 to 25%, preferably between 0.5 to 20%, preferably between 0.5 to 15%, preferably between 5 to 20%, preferably between 5 to 15%, preferably between 5 to 10% (by weight of the composition). In an embodiment, the bouillon tablet according to process of the invention comprises less than 10% maltodextrin and/or glucose syrup, preferably less than 5%, preferably less than 1% (by weight of the composition) for example it may be free from maltodextrin and/or glucose syrup. The bouillon tablet is free from maltodextrin. The bouillon tablet is free from glucose syrup. Replacing maltodextrin with humid native starch was found to decrease undesirable texture changes such as post-hardening. Maltodextrin, and to a lesser extent glucose syrup are not a common ingredients in domestic kitchens and so may be viewed with suspicion by some consumers. In this context, glucose syrup and maltodextrin are mixtures of D-glucose units connected in chains of variable length, produced from starch by hydrolysis. Glucose syrups and maltodextrins are classified by DE (dextrose equivalent). Typically maltodextrins have a DE between 3 and 20 while glucose syrups have a DE above 20. The term "starch" according to this invention means a native starch or flour. Native starch is typically obtained from cereals and tubers by physical extraction, purification and drying of starch milk. The starch according to the invention is selected from the group consisting of maize, waxy maize, high amylose maize, wheat, tapioca, potato, rice, cassava or combinations of these. The starch is selected from the group consisting of native wheat starch, native maize starch, native rice starch, native potato starch, native cassava starch and combinations of these. The starch according to the invention comprises between 3 and 25 % moisture by

weight. For example the starch comprise between 4 and 22 % moisture by weight, preferably between 7 and 21 % moisture, preferably the starch comprise between 19 and 21 % moisture by weight (humid starch). In an embodiment, the humid native starch has a water activity of between 0.4 and 0.6 at 20 °C, preferably between 0.45 and 0.55 at 20 °C. Humid native starch of an appropriate moisture content may be obtained by blending humid and non-humid starches and allowing them to equilibrate. Humid native starches are often available commercially at a lower price than the dry native starch as water needs to be removed from starch in the manufacturing process, humid native starch being effectively a part-finished ingredient. In a further embodiment, the bouillon tablet comprises starch in an amount in the range of 0 to 20% (by weight of the composition), preferably between 0.1 to 20%, preferably between 0.1 to 15%, preferably between 0.1 to 10%, preferably between 1 to 10%, preferably between 3 to 10% (by weight of the composition). Flour according to this invention is wheat flour, cassava flour, corn flour or a combination thereof. In a further embodiment, the bouillon tablet comprises flour in an amount in the range of 0 to 20% (by weight of the composition), preferably between 0.1 to 20%, preferably between 0.1 to 15%, preferably between 0.1 to 10%, preferably between 1 to 10%, preferably between 3 to 10% (by weight of the composition).

"Salt-starch mass" according to this invention is an aggregation of starch, wherein the salt crystallizes in, on and through the aggregated starch having a surface protrusion of salt with a particle size of salt between 0.5-50µm, preferably 0.5-30µm, preferably 0.5-10µm, preferably 1-50µm, preferably 1-30µm, preferably 1-10µm, preferably 1.5-50µm, preferably 1.5-30µm, preferably 1.5-10µm, preferably 2-50 µm, preferably 2-30µm, preferably 2-10µm. The salt-starch mass is not hallow. The dry salt-starch mass has particle size distribution with a median diameter Dv50 in the range of 20 to 1500µm, preferably in the range of 50 to 1000µm, preferably in the range of 50 to 500µm, preferably in the range of 100-450µm, preferably in the range of 200-450µm, preferably in the range of 300-450µm. In a further embodiment, the salt-starch mass comprises 18 to 82% of salt (by weight of the salt-starch mass) and 18 to 82% of starch (by weight of the salt-starch mass), preferable 20 to 80% of salt and 20 to 80% of starch, preferable 25 to 75% of salt and 25 to 75% of starch, preferable 30 to 70% of salt and 30 to 70% of starch, preferable 40 to 60% of salt and 40 to 60% of starch, preferable 50% of salt and 50% of starch (by weight of the salt-starch mass). In a further embodiment, the bouillon tablet comprises salt-starch mass of at least 10% (by weight of the composition), preferably at least 15%, preferably at least 20%, preferably in an amount in the range of 10 to 100% (by weight of the composition), preferably between 10 to 90%, preferably between 10 to 80%, preferably between 10 to 70%, preferably between 15 to 100%, preferably between 15 to 90%,

preferably between 15 to 75%, preferably between 20 to 100%, preferably between 20 to 90%, preferably between 20 to 80%, preferably between 20 to 75%, preferably between 20 to 70%, preferably between 25 to 100%, preferably between 20 to 70%, preferably between 25 to 65% (by weight of the composition). In a further embodiment, the salt-starch mass does not contain added acid, added gum, added hydrocolloid or combination thereof. Gum according to this invention is xanthan gum, carrageenan, locust bean gum, agar, alginates, guar gum, arabic gum, gellan or combination thereof. In case a native starch is used it can be beneficial if the mixture of native starch, salt and water is heated (cooked) to a temperature between 60-100°C for at least 30 sec, preferably between 0.5-15min. This heating (cooking) leads the native starch starting material to be a swollen starch granule or partly gelatinized starch resulting in an even harder tablet/cube.

The particle size Dv50 is used in the conventional sense as the median of the particle size distribution. Median values are defined as the value where half of the population reside above this point, and half resides below this point. The Dv50 is the size in micrometer that splits the volume distribution with half above and half below this diameter. The particle size distribution may be measured by laser light scattering, microscopy or microscopy combined with image analysis. For example, the particle size distribution may be measured by laser light scattering. Since the primary result from laser diffraction is a volume distribution, the Dv50 cited is the volume median.

The drying step can be carried out by any commonly known drying technique such as air drying, oven drying, drum drying, vacuum drying, bed drying, microwave-vacuum drying, infrared radiation drying or combinations thereof. The drying step does not include spray drying. In an embodiment of the invention the drying is done at a temperature between 50 to 150°C, preferably between 50 to 120°C, preferably between 60 to 120°C, preferably between 60 to 100°C, preferably between 65 to 120°C, preferably between 65 to 100°C, preferably between 65 to 90°C, preferably between 65 to 80°C. Before drying the salt-starch mass has a viscosity of at least 600mPa.s, preferably at least 800mPa.s, preferably at least 1000mPa.s. For spray drying a viscosity of below 350mPa.s is used. In the presence of particles in the slurry, further considerable reduction of the maximum viscosity in the spray drying feed is usually essential to avoid clogging of the spray dryer atomiser. Viscosity is measured with Rheometer at shear rate of 10 s^{-1} using MCR300 rheometer with measuring cylinder CC27 and TEZ150P Peltier thermostatting unit (Anton Paar GmbH, Germany).

Milling according to this invention is a process that breaks solid materials into smaller pieces by grinding, crushing, or cutting. Milling can be carried out by any commonly known milling techniques such as roll mill, hammer mill, chopper mill, ball mill, SAG mil, rod mil or combinations thereof.

In a further embodiment "dry salt-starch mass" according to this invention has a water activity below 0.35, preferably below 0.30, preferably between 0.01-0.35, preferably between 0.01-0.3. Wetted starch or gelatinized starch has a water activity of at least 0.6, preferably at least 0.7. The salt-starch mass is in powdered form and not in form of a gel.

"Flow-ability" means flow properties on how easily a powder flows. Flow-ability (ff_c) is quantified as the ratio of consolidation stress σ_1 to unconfined yield strength σ_c according to "Schulze, D. (2006). Flow properties of powders and bulk solids. Braunschweig/Wolfenbuttel, Germany: University of Applied Sciences." In an embodiment flow-ability (ff_c) of the dry salt-starch mass is at least 3 at 23°C, preferably between the range of 3 to 30 at 23°C, preferably at least 4 at 23°C, preferably between the range of 4 to 25 at 23°C. In an embodiment flow-ability (ff_c) of the dry composition is at least 2.5 at 23°C, preferably between the range of 2.5 to 12 at 23°C, preferably between the range of 2.7 to 10 at 23°C, preferably at least 3 at 23°C, preferably between the range of 3 to 10 at 23°C, preferably between the range of 3.2 to 10 at 23°C, preferably between the range of 3.2 to 7 at 23°C. Flow-ability was measured using a Schulze Ring Shear Tester RST-01.pc according to ASTM D6467. Flow-ability measurements were carried out with pre-shear normal stress set to 2600 Pa and shear normal stress to 390, 1235, and 2080 Pa.

In an embodiment the bouillon tablet is shelf-stable over 12 months and therefore has a water activity of below 0.55, preferably between 0.10 to 0.55, preferably below 0.5, preferably between 0.1 to 0.5.

In an embodiment, the bouillon tablet has a tablet hardness of at least 90 N, preferably at least 95N, preferably at least 100N, preferably at least 110N, preferably at least 120N, preferably between 90 to 700N, preferably between 90 to 500N, preferably between 90 to 300N, preferably between 100 to 700N, preferably between 100 to 500N, preferably between 100 to 300N.

Those skilled in the art will understand that they can freely combine all features of the present invention disclosed herein. In particular, features described for different embodiments of the present invention may be combined. Where known equivalents exist to specific features, such equivalents are incorporated as if specifically referred to in this specification.

Examples

Example 1: Process

The general procedure for preparing powders with improved bulking and tabletting properties of the invention is as follows:

1. Dissolving salt ingredients in water
2. Add starch to the solution obtained from step 1.
3. Followed by mixing
4. Drying
5. Milling (optional)

Water was placed in Thermomix TM5 (Vorwerk &Co. KG, Germany). Salt powder was weighed in PG5002S balance (Mettler-Toledo GmbH, Switzerland) and added to Thermomix. Mixing was carried out at speed setting of 3 for 3 minute at room temperature until all salt crystals were dissolved. Starch was weighed in PG5002S balance (Mettler-Toledo GmbH, Switzerland) and added to Thermomix. Mixing was again carried out at speed setting of 3 for 3 minute at room temperature until all starch were wetted and slurry was obtained. The slurry was then spread onto a baking pan; slurry thickness was maintained between 5 and 10 mm, then dried in Rational Self Cooking Centre Electric Combination Oven SCC202E (Rational AG, Germany). Drying was carried out for 12 h at 70 °C with 30% fan speed. The resulting cake was milled with FREWITT mill with sieve mesh size of 2 mm.

Pressing of bouillon tablet/cube

Pressing of bouillon cube was carried out with Flexitab Tablet Pressing equipment (Röltgen GmbH, Germany). Approximately 3 gram of bouillon powder was fed to tableting mould (14 mm in length and 14 mm in width) and pressed with force between 5.0 and 6.0 kN.

Hardness measurement of tablet/cube

Hardness measurement was carried out using Texture Analyser TA-HDplus (Stable Micro System, UK) equipped with 250 kg load cell and P/75 compression platen. Texture Analyser test mode was set to "Compression" with pre-test speed of 1 mm/s, test speed of 0.5 mm/s, post-test speed of 10 mm/s, target mode of "Distance", distance of 4 mm, halt time was set to "No", way back of 10 mm, trigger type to "Auto(Force)", and trigger force of 50 gram. Hardness is measured not in the orientation where the tablet/cube were originally pressed in Flexitab; but from the side. Hardness measurement was carried out in 10 replication.

Example 2-4: Comp. Process

In case the starch or flour and salt are dry-mixed (without any further processing step), the resulting mixes cannot be tableted upon compaction using our tableting system.

	Comp Ex. 2	Comp. Ex 3	Comp. Ex. 4
Starch type	Pre-gelatinised potato starch	Pre-gelatinised corn starch	Wheat flour
Starch [gram]	50	50	50
Salt NaCl [gram]	50	50	50
Water activity [-]	0,31	0,25	0,27
FFC at 23 °C	2.8	2.7	
Tablet hardness	n.a.	n.a.	n.a.
Remarks	Remain powder upon compaction	Remain powder upon compaction	Remain powder upon compaction

Example 5-7: Comp. Process

Comp. examples 5 to 7 were processed according to the process of example 1 by replacing a salt-water solution with pure water. This means, that starch has been mixed with pure water only and dried again. The resulting starch has been mixed with dry salt (no salt-water solution) and the resulting dry mixes cannot be tableted upon compaction and remain as powder using our tableting system. This shows, that a compaction can only be achieved with the process of our invention (starch added to a water-salt solution, further mixed and afterwards dried the resulting mixes can be tableted upon compaction using our tableting system).

	Comp Ex. 5	Comp. Ex 6	Comp. Ex. 7
Starch type	Pre-gelatinised potato starch	Pre-gelatinised corn starch	Wheat flour
Starch [gram]	50	50	50
Salt NaCl [gram]	50	50	50
Water [gram]	200	200	200
Water activity [-]	0,25	0,24	0,26
Tablet hardness	n.a.	n.a.	n.a.
Remarks	Remain powder upon compaction	Remain powder upon compaction	Remain powder upon compaction

Examples 8-10: Different origin of starch

Different kind of starches have been tested according to the process of example 1. In case the starch has been added to a water-salt solution, further mixed and afterwards dried the resulting mixes can be tableted upon compaction using our tableting system. In example 10, in between mixing and drying, the slurry was subjected to heating. When slurry temperature reaches 85 °C, the temperature is maintained for 5 minute. Then the resulting slurry was subjected to drying.

	Ex. 8	Ex. 9	Ex. 10
Starch type	Pre-gelatinised potato starch	Pre-gelatinised corn starch	Wheat flour
Starch [gram]	50	50	50
Salt NaCl [gram]	50	50	50
Water [gram]	200	200	200
Water activity [-]	0,30	0,28	0,30
FFC at 23 °C	17	16	
Tablet hardness [N]	734	850	762
Remarks	Good tablet, sharp (not brittle) edge,	Good tablet, sharp (not brittle) edge,	Good tablet, sharp (not brittle) edge,

	good crumbliness	good crumbliness	good crumbliness

Within examples 8-9 it is shown that the flow-ability of the dry salt-starch mass has a value between 16-17 and is much higher as shown within comparison examples 2-3 having a flow-ability value between 2.7-2.8.

The dissolution time of the tablet of example 8 is only 23 sec. This is surprising as the tablet is much harder compared to a normal bouillon tablet of approximately 150-200N and a dissolution time between 30-45 sec.

Examples 11-14: Different ratio starch-salt

Different starch-salt ratios have been tested according to the process of example 1. Comparative example 11 shows the result if pure salt is used. Comparative example 14 shows the result if only starch is mixed with pure water (without water-salt solution), dried and pressed afterwards. This shows, that a compaction can only be achieved with the process of our invention (starch added to a water-salt solution, further mixed and afterwards dried the resulting mixes can be tableted upon compaction using our tableting system).

	Comp Ex. 11	Ex. 12	Ex. 13	Comp. Ex. 14
Pre-gelatinised potato starch [gram]	0	20	80	100
Salt NaCl [gram]	100	80	20	0
Water [gram]	n.a.	200	200	200
Water activity [-]	n.a.	0,28	0,26	0,28
Tablet hardness [N]	n.a.	1454	272	n.a.
Remarks	Remain powder upon compaction	good crumbliness	good crumbliness	Remain powder upon compaction

Examples 15-16: Different ratio of water

	Ex. 15	Ex. 16

Pre-gelatinised potato starch [gram]	50	50
Salt NaCl [gram]	50	50
Water [gram]	400	700
Water activity [-]	0,25	0,27
Tablet hardness [N]	702	812
Remarks		

The minimum of ration of salt to water is 1:2.8 to obtain a saturated water-salt-solution. Examples 15 and 16 shows that higher amount of water can be used without having a significant influence on the obtained salt-starch mass and obtained hardness. During the drying step a saturated water-salt-solution will be obtained anyway.

Example 17-18: Process of starch cooking

In example 17 native starch was processed according to Example 1. Within example 18, in between mixing and drying, the slurry was subjected to heating. When slurry temperature reaches 85 °C, the temperature is maintained for 5 minute. Then the resulting slurry was subjected to drying.

	Ex. 17	Ex. 18
Native potato starch [gram]	50	50
Salt NaCl [gram]	50	50
Water [gram]	200	200
Water activity [-]	0,28	0,28
Tablet hardness [N]	406	873
Remarks		

Example 19: Different salt origin

	Ex. 19
Pre-gelatinised potato starch [gram]	50
Salt KCl [gram]	50
Water [gram]	250

Water activity [-]	0,30
Tablet hardness [N]	752
Remarks	Similar behaviour to NaCl

Examples 20-31: Application in bouillon cubes

Preparation of bouillon powder

All bouillon powder ingredients were weighted in PG5002S balance (Mettler-Toledo, USA) and then mixed in Thermomix TM5 (Vorwerk &Co. KG, Germany). Mixing was carried out at speed setting of 3 for 30 s with propeller rotation was set to reverse direction. The resulting powder was then stored in a climate chamber ICH-110 (Memmert GmbH, Germany) at 25 °C with 48 % relative humidity with fan speed of 40 % for 24 h at prior to pressing.

Water activity measurement

Water activity was measured with Hygrolab HC2-aw-USB (Rotronic AG, Switzerland) connected to PC with HW4-P-QUICK-Vx software (Rotronic AG, Switzerland). Measurement were carried out at 25.0 ±0.5 °C according to AOAC 978.18-1978, Water activity of canned vegetables.

Flow-ability

Flow-ability was measured using a Schulze Ring Shear Tester RST-01.pc according to ASTM D6467. Flow-ability measurements were carried out with pre-shear normal stress set to 2600 Pa and shear normal stress to 390, 1235, and 2080 Pa.

Pressing of bouillon tablet/cube and hardness measurement of tablet/cube

Pressing of bouillon cube and hardness measurement was carried out as described above.

Recipe	**Comp. Ex. 20**	**Comp. Ex. 21**
Salt [g]	58	29
Pre-gelatinised potato starch [gram]	0	29
Sugar [g]	11	11
MSG [g]	9	9

Filler (Native potato starch [g])	8	8
Flavour [g]	9	9
Oil [g]	4	4
Spices [g]	1	1
FFC at 23 °C	2,6	2,4
Water activity [-]	0,48	0,49
Average Hardness [N]	74	39
Tablet breakage [%]	10	70

Recipe	**Ex. 22**	**Ex. 23**	**Ex. 24**
Type of starch	Pre-gelatinised potato starch	Pre-gelatinised corn starch	Wheat flour
Co processed starch-salt [g]	58	58	58
Ratio of starch : salt [wt%]	50:50	50:50	50:50
Salt [g]	0	0	0
Sugar [g]	11	11	11
MSG [g]	9	9	9
Filler (Native potato starch [g])	8	8	8
Flavour [g]	9	9	9
Oil [g]	4	4	4
Spices [g]	1	1	1
FFC at 23 °C	4,1	3,8	4,0
Water activity	0,46	0,46	0,46
Average Hardness [N]	210	198	239
Tablet breakage [%]	<2	<2	<2

5

Recipe	**Ex. 25**	**Ex. 26**	**Comp.Ex. 27**
Salt [g]	0	0	0
Sugar [g]	11	11	11
MSG [g]	9	9	9
Filler (Native potato starch [g])	8	8	8

Flavour [g]	9	9	9
Oil [g]	4	4	4
Spices [g]	1	1	1
Co processed pre-gelatinised potato starch-salt [g]	58	58	58
Ratio of pre-gelatinised potato starch : salt [wt%]	20:80	80:20	100:0
FFC at 23 °C	4,1	3,6	3,1
Water activity	0,46	0,47	0,46
Average Hardness [N]	354	109	66
Tablet breakage [%]	<2	<3	45

Recipe	**Ex. 28**	**Ex. 29**	**Ex. 30**	**Ex. 31**
Salt [g]	29	29	29	46
Sugar [g]	11	11	11	11
MSG [g]	9	9	9	9
Filler (Native potato starch [g])	8	8	8	8
Flavour [g]	9	9	9	9
Oil [g]	4	4	4	0
Palm fat [g]	0	0	0	6
Spices [g]	1	1	1	1
Co processed pre-gelatinised potato starch-salt [g]	29	29	29	10
Ratio of pre-gelatinised potato starch : salt [wt%]	20:80	50:50	80:20	50:50
FFC at 23 °C	4,4	4,0	3,9	3,4
Water activity	0,48	0,46	0,46	0,40
Average Hardness [N]	149	118	94	108
Tablet breakage [%]	<2	<2	5	<3

Comparative example 20 shows a tablet using pure salt without using a co-processed salt-starch mass. Comparative example 21 shows a tablet using a dry mix of salt and starch without using a co-processed salt-starch mass. Compared to pure salt the hardness of the tablet is reduced by using a dry starch-salt mix instead of pure salt. Comparative example 27 shows a tablet using only starch without using a co-processed salt-starch mass. Example 22 shows the effect of a co-processed salt-starch mass according to the invention compared to comparison example 21 using only a dry mix of salt and starch without using a co-processed salt-starch mass. The flow-ability of the bouillon powder is higher and the tablet hardness is much higher, which shows that the co-processed salt-starch mass according to the invention leads to a new binding system. Examples 22 to 26 and examples 28 to 31 shows that the invention works with different starches, at different salt-starch ratios and different amount of the salt-starch-mass. All tablets from examples 22 to 26 and examples 28 to 31 have a good crumbliness. Examples 28 to 31 have in addition to the co-processed salt-starch mass providing the binding of the bouillon tablet also standard sodium chloride in the recipe.

Claims

1. A process for the production of a bouillon tablet comprising salt and starch, the process comprising the steps of:
   a) dissolving the salt or part of the salt in water;
   b) mixing the starch and the water before, during or after dissolution of the salt or part of the salt in water;
   c) drying the mixture of step b) to obtain a dry salt-starch mass;
   d) optionally milling the dry salt-starch mass;
   e) mixing the dry salt-starch mass with at least one further ingredient selected from the group consisting of salt, sugar, MSG, flavourings, colourants, fillers, oil, fat, or any combination thereof, to result in a dry composition;
   f) pressing the dry composition to a bouillon tablet;

   wherein the bouillon tablet comprises at least 10wt% salt-starch mass; and
   wherein the salt-starch mass comprises 18 to 82wt% salt and 18 to 82wt% starch and
   wherein the salt is dissolved in the water at a ratio between 1:2.8 to 1:20.

2. A process for the production of a bouillon tablet as claimed in claim 1, wherein the starch in step b) is a native or pre-gelatinized starch or cold swelling starch or combination thereof.

3. A process for the production of a bouillon tablet as claimed in any one of claims 1 to 2, wherein the starch is selected from at least one of from the group consisting of maize, waxy maize, high amylose maize, wheat, tapioca, rice, potato, cassava or combination thereof.

4. A process for the production of a bouillon tablet as claimed in any one of claims 1 to 3, wherein the dry salt-starch mass has a water activity below 0.35.

5. A process for the production of a bouillon tablet as claimed in any one of claims 1 to 4, wherein the bouillon tablet comprises between 10 to 65wt% of the salt.

6. A process for the production of a bouillon tablet as claimed in any one of claims 1 to 5, wherein part of the salt in step a) is at least 8wt% of the total amount of salt comprised in the bouillon tablet, preferably at least 12wt%.

7. A process for the production of a bouillon tablet as claimed in any one of claims 1 to 6, wherein the salt-starch mass comprises 20 to 80wt% salt and 20 to 80wt% starch.

8. A process for the production of a bouillon tablet as claimed in any one of claims 1 to 7, wherein the bouillon tablet comprises between 20 to 75wt% of the salt-starch mass.

9. A process for the production of a bouillon tablet as claimed in any one of claims 1 to 8, wherein the drying is done at a temperature between 50 to 150°C.

10. A process for the production of a bouillon tablet as claimed in any one of claims 1 to 9, wherein the drying is done by oven drying, air drying, drum drying, vacuum drying, bed drying, microwave-vacuum drying, infrared radiation drying or combination thereof.

11. A process for the production of a bouillon tablet as claimed in any one of claims 1 to 10, wherein the dry composition has a flow-ability of at least 2.5 at 23°C.

12. A process for the production of a bouillon tablet as claimed in any one of claims 1 to 11, wherein the bouillon tablet has a tablet hardness of at least 90N.

13. A bouillon tablet obtainable by the process of one of the claims 1 to 12.

14. The use of a bouillon tablet as claimed in claim 13 for preparing a food product.

ABSTRACT

The present invention relates to bouillon tablets, in particular to a process for preparing a bouillon tablet. The process comprises a co-processed salt-starch mass and mixing said co-processed salt-starch mass with at least one further ingredient selected from the group consisting of salt, sugar, MSG, flavourings, fillers, oil, fat, or any combination thereof to result in a dry mass and pressing the dry mass into a tablet.