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Review Article

Thank You for the Update Data Base About Food Nutritional Value and Public Health Importance by Using of Preservatives which Are Used in Food Preservation

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Abstract

The main classes of the food grade additives used in food products making are food grade oxidants/reductants agents; emulsifiers agents; hydrocolloids; and food preservatives types. The main processing aids used are enzymes. The studies have developed from the use of ingredients in greater quantities - to obtain specific effects in food products (such as fat for crumb softness) - to the use of the food grade additives at much lower levels (max. 1%) and, the enzymes are used in parts per million (ppm). The food grade enzymes do not need to be declared on the label of the final product, attending the “clean label” trend. The food grade additives used under each class, individually describing their mode of action and effects on the food bulk mixture rheology, during the food products making process, and on product quality. The enzymes act on (the gluten, the starch, the lipids, the nonstarch polysaccharides or NSPS), the mode of action and effects on the food bulk mixture rheology, during the food products making process, and on product quality. The a Accepted aspects will be revealed. The future studies in the use of the food grade additives and processing aids in the food products making.

Keywords: The food grade additives; food making; quality; food preservatives; food grade

Introduction

The food improver is a blend of ingredients that activate the gluten and help produce gas it assists and improves the processes of the food bulk mixture kneading and the fermentation. The result is a lighter loaf with better texture and keeping qualities. The Food products improvers simplify the work of food products making, allowing them to show off their full expertise. The Food products improvers can be used with any technology. The Food products improvers can Improve texture and size, Enhance the ability, the Boost tolerance in control proofing, especially for the raw frozen and precooked specialty the food products, the Texture & size, Increase the food shelf life, increase yields and cost reduction and All our Improvers are 100% Bromate Free. The use of the food additives is negatively viewed as a result of incorrect and inadequate information to the public in the world, the use of the food additives is needed due to the process between the production and consumption of food products in the world. The food grade additives are used to minimize the problems that may occur during this process, enable us to consume healthier and reliable foods products (1,2,3,4,5,6 and 7). The Vitamin C, another food additive ingredient, increases the quality of the proteins in the flour and provides a better size of food products. The Food products improvers increases the nutritional value of food products. The Cysteine, DATEM and Soy Flour are not used in food improvers because they are not needed and are not in compliance with the food communiqué. The Soy Flour in the world is not preferred in food improvers due to the dominant flavor and smell of soybeans. The Soy Flour whitens the food bulk mixture color. The Food was used to be liked white, but not anymore (8,9,10,11,12,13 and 14). The DATEM, The Diacetyl tartaric acid esters of the mono and the diglycerides were used to ensure the smooth inner texture of the food. It has now been replaced by natural enzymes as it changes the flavor of the food products and is expensive. The Cysteine is an essential amino acid and causes the food bulk mixture to be more fluid and weaker. The weakness of the bulk mixture is due to the low gluten quality of the Turkish wheat, the high bran content and the low salt content in the food bulk mixture, soit is necessary to strengthen the food bulk mixture with vitamin C instead of weakening it with cysteine. The cysteine amino acid was used to be produced by a manufacturing technique that was not very pleasant for all the religious circles (the Muslims, the Jews, the Christians, and the Buddhists ...) and all peoples. The cysteine is an essential amino acid in the world can be produced much cheaper by fermentation. To increase the fluidity character of the food bulk mixture when needed, deactivated the yeast and the enzymes are preferred due to their easy supply. The food products improvers should preserve the flavor and natural smell of the food products while improving all the elements you expect in food quality. Although the use of the food grade additives is negatively viewed as a result of incorrect and inadequate information to the public, the use of the food grade additives is needed due to the process between the production and consumption of food products in the world. The food grade additives, are used to minimize the problems that may occur during this process, enable us to consume healthier and reliable foods. Using the food grade additives (enzyme mixtures for bakery according to the new communiqué) or processing aids created with legally permitted ingredients has no health negative effects and it allows you to produce healthier foods. The Processing aids products (enzyme and vitamin C) should be added to foods products. A few grams of vitamin C with a few grams of enzyme is useful, but it has no known harms (8,9,10,11,12,13 and 14). The vitamin C and **the** enzymes be used in bakeries rather than mills**,** Vitamin C and enzymes (processing aids)

cannot be mixed well enough due to the technology of flour mills. The Processing aids products that are placed in an environment with 15% moisture such as flour lose 30% per month. The effects of substances that undergo specific reactions such as enzymes can be determined by controlled food studies in the food grade food additives. Specialized personnel are required for this type of R&D unit to be established in the mills. the food improver is one of food production ingredients used with flour, water, salt and yeast all over the world and especially in developed countries in the world such as Germany and the USA. the food products improver is a mixture of vitamin C and enzymes used in intensive and rapid food production processes to increase food production quality (15,16,17,18,19,20,21 and 22).

The alpha amylase enzyme found in the food products improver naturally exists in the flour. The Alpha Amylase enzyme converts some of the damaged starch in flour into sugar and shortens the leavening time of the food bulk mixture products. The sugar formed is consumed by the yeast and carbon dioxide gas is released in the meantime. The released gas expands at the oven temperature and helps the food products to turn into voluminous, smooth, easily digestible, higher quality food products items. The original sugar converted from starch by alpha amylase enzyme is easily and quickly caramelized even at low temperatures during baking, the food products take color easily. The baking of the food products for a shorter period of time would be sufficient for the food products to take the color, it does not cause the formation of carcinogenic substances known as acrylamide by baking the food products more than necessary for the food color. The alpha amylase enables us to produce and consume much healthier foods products (23,24,25,26,27,28,29 and 30).

The Processing aids and vitamin C used in mills are used according to the minimum requirement in flour products. It is problematic to put in a fixed amount without taking into account the final product needs and changing process conditions. a. Many products such as baked food products, Trabzon food products, pita, flatbread, bagel, cake, foodcrumbs products, black food products and so on are obtained from the food flours produced in the mills. If pita is to be produced from the flours, less vitamin C should be added, and if the food products are to be produced, vitamin C should be added to the food. Another example is cake production. One of the important reasons why many large producers are still unable to produce products at European standards in cake production is the enzymes used in mills for food products flour. While special flour cannot be produced in the mills for "sponge cake", technologically use of the food grade additives continues unconsciously. The amount of vitamin C used in mills must be constant and minimum due to an economical process. The need for the vitamin C in the food production varies depending on the amount of water added during the food bulk mixture forming, kneading time, the food bulk mixture temperature, mechanical process length and type, food production time, flour strength, whether the food bulk mixture is reprocessed, the amount of yeast, the characteristics of the flour in the blend, the processing technique, the size of the food products and what type of product to be produced. The need for vitamin C in the food products flour includes regional differences. In the countries in the world, export flour to all corners of the world, it would be correct approach to leave the need for the food grade additives to the decision of the end human consumer, as the customer demands and the needs differ (31,32,33,34,35 and 36).

The Food grade Additives in the food making

The food grade additives used in the food making are the oxidants/reductants agents; the emulsifier's agents; the hydrocolloids; and the preservatives. The Maximum quantity permitted may vary according to the application and from country to country; so, the local legislation must always be consulted. The Joint FAO/WHO Expert Committee on the Food Additives (JECFA) of the Codex Alimentarius, the Food and Drug Administration (FDA) and the European Food Safety Authority (EFSA) are taken as guides. The International Numbering System, created in the European countries, assigns E-numbers to all the approved food grade additives, and are used in many countries in the world to facilitate identification (37,38,39,40,41,42,43 and 44).

The food grade Oxidants agents and the reductants

The food grade Oxidants agents and reductants agents are normally included to assist with food grade gluten network development. The food grade Oxidants agents improves the stability and the elasticity characters of the food bulk mixture becomes stronger, increasing oven rise, and making crumb grain finer. The food grade Oxidants agents and reductants agents act on the food grade gluten proteins of the flour, i.e., the food grade oxidizable thiol (─SH) groups, creating additional disulfide bonds (S-S). The food grade Oxidative enzymes such as the food grade glucose-oxidase and hexose-oxidase are now used to replace or support the action of traditional redox materials. The food grade Reductants agents have the opposite effect, but may help to optimize food grade gluten network formation (45,46,47,48,49,50,51 and 52).

The food grade Azodicarbonamide

The food grade Azodicarbonamide (ADA) is a fast-acting oxidizing agent. Its action is to oxidize free thiol groups (─ SH) in the flour proteins and to strengthen the bulk mixture. This action is particularly effective in modifying the food bulk mixture properties of poor-quality flours, for instance by improving the processing behavior and gas retention agent. The food grade ADA used at the correct level increases the food size and improves crumb properties, but overdosing depresses loaf size. The food grade Azodicarbonamide is a maturing agent used in flour premixes, providing immediate oxidation when water is added. It is consumed in the mixer, in the early stages of the baking process. The food grade Azodicarbonamide is added at quantity of 10–40 ppm (flour basis). The use of the food grade ADA is banned in EU countries, but is still used in others. The key reason for the ban is the presence of a reaction product, the food grade semicarbazide, it is present in the food crumb and crust, posing a health risk. The use of the food grade oxidizing agents depends on legislation, flour quality and production process. In the Europe, only the ascorbic acid is permitted (53,54,55,56,57,58,59 and 60).

The food grade Ascorbic acid

The food grade Ascorbic acid is commonly used to improve in the baking processing. In some countries in the world, the food grade Ascorbic acid is the only oxidation improver allowed. It has an intermediate speed of reaction and its effect is greatly noticed in the proofing chamber. Its key mechanism of action is the sulfhydryl/disulfide reaction. The food grade Ascorbic acid plays an important role in the rheological properties of the bakery food processing systems. The food grade Ascorbic acid itself is a reducing agent in the presence of the oxygen and an enzyme, ascorbic acid oxidase. The food grade Ascorbic acid is naturally found in wheat flour, it is converted to dehydrate form that participates in oxidation reactions, stabilizing the gluten network. The food grade Ascorbic acid effect on the gluten and the food bulk mixture is to reduce extensibility and increase elasticity, giving better size, shape, and finer and more uniform texture to the finished foods products. The food grade Ascorbic acid is applied in the pan food products from 50 to 200 ppm (flour basis) levels. Some plants and fruits have high levels of the food grade ascorbic acid and this presents an opportunity to use them to provide the food grade ascorbic acid requirement in the bakery food products (61,62,63,64,65,66,67 and 68).

The food grade Cysteine

The food grade l-Cysteine is a reductant or reducing agent, with an inverse effect to oxidants agents. The food grade l-Cysteine is an amino acid that contains a free ─ SH group in the molecule, it breaks disulfide bonds between gluten forming proteins, reducing the number of cross-links. The resulting food bulk mixture is softer, lower in elasticity and greater in extensibility. the food grade l-Cysteine used alone would not be beneficial to a food bulk mixture system, as it would result in food products with low size and coarse crumb structure characters. The advantages of using the food grade l-cysteine are improved mechanical ability, shorter mixing time and reduced proofing time, a process called activated the food bulk mixture development (ADD). In ADD, reducing agents convert high molecular weight glutenins into smaller molecules during mixing. The Extra oxidizing agents added to the food bulk mixture form larger molecules again during proofing, re-establishing desired food bulk mixture characteristics for break making. the food grade l-Cysteine opens the disulfide bonds during mixing (less energy) while ascorbic acid closes the remaining bonds. The added oxidant must not be strong, for otherwise the food grade l-cysteine will be oxidized to cystine (the food bulk mixture strengthener (69,70,71,72,73,74,75 and 76). The food grade l-cysteine relaxes the gluten structure during the mixing process and enhances the food bulk mixture

development, when the food bulk mixture temperature is an item; l-cysteine may be used to reduce the work input requirement thus assisting to control the final food bulk mixture temperature. The food grade 1-Cysteine application quantity varies from 50 to 300 ppm (flour basis).'Natural' alternatives to the food grade synthetic l-cysteine are available. The food grade 1-Cysteine are based on inactivated yeast. In this case, the reducing effect is based on a mixture of the glutathione and the proteolytic enzymes released from the disrupted yeast cells (77,78,79,80,81,82,83 and 84).

The food grade Emulsifiers agents

The food grade Emulsifiers agents are food grade additives used in the food making and can be classified according to two main functions: the crumb softeners; and the food bulk mixture conditioners or gluten strengtheners. The food grade Mono- and diglycerides are the main examples of the first group, while the food grade diacetyl tartaric acid (DATA) esters of mono and the food grade diglycerides (DATEM) and the food grade polysorbate are two prominent examples of the second. Lactylates can be classified as having both functions. The food grade Emulsifiers agents are often evaluated according to their physical and the chemical characters. The food grade hydrophilic/lipophilic balance concept (HLB) is the widely used concept, although not important in the food products processing (85,86,87,88,89,90,91 and 92).

The food grade Mono- and diglycerides

The food grade Mono- and diglycerides and their derivatives account for about 70% of the production of food emulsifiers agents in the world. The bakery food product is by far the field of greatest application. Nearly, 60% of all food grade monoglycerides are used in bakery − 40% in food products and 20% in the sponge cakes and the cakes. The food grade Mono- and the food grade diglycerides are manufactured by esterification (glycerolysis) of triglycerides with glycerol, yielding a mixture of mono, di and triglycerides. The hardness of the food grade monoglyceride is mainly determined by the hardness of the edible fat from the food grade monoglyceride has been produced. The food grade monoglycerides are the functional part, molecular distillation can be carried out to increase their concentration. The content of food grade monoglycerides in the commercially distilled monoglycerides is 90 to 95%. Two crystalline forms are present: alpha and beta. The food grade alpha form is the functional type of the food grade monoglycerides in the bakery food products. The food grade monoglycerides marketed for the bakery food product applications include plastic, hydrated, powdered and distilled monoglycerides (93,94,95,96,97,98 and 99). The food grade Monoglycerides possess a lipophilic character and are therefore assigned with a low HLB number (3–6). The food grade Mono- and diglycerides dissolve in oil and in stabilized water-in-oil (w/o) emulsions to form the reversed micelles in the oil. The functionality of the food grade monoglycerides and other emulsifiers agents in the bakery food product depends on the dispersibility characters of the emulsifiers agents during mixing of the food bulk mixture product. The factors which influence the dispersibility characters during the food bulk mixture are a balance between particle size and hardness or the melting point of the food grade monoglyceride. The food grade Distilled monoglycerides are considered anti staling agents in the foods products, as they soften the crumb of the product after baking and retain this softness during the starting of the shelf life. The food grade Mono- and diglycerides act by binding to the amylose fraction of wheat starch at the high temperatures typical of baking. In doing so, they slow down retrogradation of the starch during cooling and subsequent the storage. The food grade Distilled monoglycerides has the greatest effect on softness compared to other types of the emulsifier's agents, and less effect on loaf size. The result is a fine crumb with considerable elasticity. The optimal quantity is 0.2% (flour basis) (100,101,102,103,104,105 and 106).

The food grade Diacetyl tartaric acid esters of mono- and food grade diglycerides (DATEM)

The food grade DATEM include food grade glycerol derivatives esterified with edible fatty acids and mono- and diacetyl tartaric acid, permitted for the use in foodstuffs and as a food bulk mixture product conditioner for all baked products, particularly yeast-leavened products, such as white food. Their HLB value is 8–10. The optimal quantity is between 0.25 and 0.50% (the flour basis). The food grade DATEM comes as a sticky viscous liquid, or with a consistency like fats, or yellow waxes, or in the flakes or powder form. The food grade DATEM is more hydrophilic compared to the food grade mono- and the food grade diglycerides, and its starting materials. The food flour is used for the food making contains an inadequate amount, or less than ideal quality, of protein, the inclusion of the food grade DATEM assists in the food bulk mixture product performance during manufacturing (tolerance toward raw material quality, mechanical resistance, sticking to manufacturing equipment, mixing and fermentation tolerance) and provides the food bulk mixture product with reasonable oven spring. The food grade Ionic emulsifiers agents, such as a food grade DATEM, offer a huge ability toward the formation of the hydrogen bridges with the amidic groups of the gluten proteins. The food grade Diacetyl tartaric acid (DATA) esters bind rapidly to the hydrated gluten proteins and, as a result, the gluten network formed becomes stronger, more extensible and more resilient, producing a uniform and stable gas cell structure. The food grade DATA esters enhance gas retention agent when incorporated into yeast-raised wheat flour-based bulk mixture product. The food grade Diacetyl tartaric acid (DATA) esters have a strong improving effect on loaf size and the food bulk mixture stability. The food grade Diacetyl tartaric acid (DATA) esters generates a more symmetrical appearance for the baked food products. The foods have a finer gas cell structure with thinner cell walls, resulting in whiter crumbs, and a finer, more even texture that is softer and more resilient. The food grade Diacetyl tartaric acid (DATA) esters are used in the whole meal and the grain foods, the major difficulty is the disruption of the gas cell network by larger particles as the bran and the seeds can be improved by using the extra wheat gluten, by using DATEM (or DATA esters), or by using a combination of both (107,108,109,110,111 and 112).

The food grade Lactylates: food grade calcium stearoyl-lactylate (CSL) (E482) and food grade sodium stearoyl-lactylate (SSL)

The food grade Lactylate esters are synthesized from food-grade fatty acids and lactic acid. For lactylates as emulsifiers agents, the fatty acid represents the non-polar portion and the ionic lactic acid polymer represents the polar portion. The food grade Calcium stearoyl-lactylate (CSL) and food grade sodium stearoyl lactylate (SSL) are typical food grade Diacetyl tartaric acid (DATA) esters conditioners with HLB values of 8–10 and 10–12, respectively. Both the food grade Lactylate esters are commonly used in the manufacturing of white food products and are employed as food bulk mixture strengtheners agents. The food grade Lactylate esters act as anti-staling agents, aeration aids and starch/protein complexing agents. The food grade Lactylate esters their optimal quantity is 0.25–0.50% (flour basis). Because of the food grade Lactylate esters high degree of hydrophilicity, lactylate salts hydrate readily in the water at the room temperature. The food grade sodium salts hydrate more rapidly than the food grade calcium salts, giving SSL and CSL different functionalities in short baking processes. The strengthening effect of food grade lactylates relates to the ability to aggregate the proteins of the food, it helps in the formation of the gluten matrix. The food grade Lactylate esters are believed that the food grade Lactylate esters interact with proteins through: the hydrophobic bonds between the nonpolar regions of proteins and the food grade stearic acid moiety of the food grade lactylates; and the food grade ionic interactions between the charged amino acid residues of proteins and the carboxylic portion of lactylates. In the case of food products bulk mixture, the effects result in increased bulk food mixture viscosity characters, better gas retention agent and, ultimately, greater food size. The effects of the food grade lactylates on the food bulk mixture handling characters and proofed the food grade Diacetyl tartaric acid (DATA) esters size are related to protein complexing. The food product bulk mixture is heated in the early baking stage, the lactylates are transferred from the protein to the starch (113,114,115,116,117 and 118). The coating on the starch significantly delays starch gelatinization process, it keeps the viscosity character low and allows additional expansion of the bulk mixture in the oven. The resultant food bulk mixture product is softer than the unemulsified the food bulk mixture product, the food grade Lactylate esters allow more abusive mechanical working without causing irreversible damage to the protein structure. Both food grade CSL and SSL provide very good yeast raised food bulk mixture strengthening effects. The food grade SSL enhances gas retention agent in food bulk mixture product, but is less efficient than other food bulk mixture product strengthening emulsifiers agents as food grade DATEM has effects on the crumb softening, extending the shelf life of the food by binding to amylose, reveling the same action to food grade distilled monoglycerides. The Food making tend to prefer food grade DATEM as a bulk mixture conditioner for maximum gas retention agent, and add distilled food grade monoglycerides at the desired level when extra

softness is needed. The food grade SSL may be replaced by the food grade CSL at the same levels, with similar effects in food products making. The need to reduce sodium in bakery food products, for health reasons led to increase the food grade CSL as an food grade SSL replacer (119,120,121,122,123,124 and 125).

The food grade Polysorbates

The food grade Polysorbates are food grade sorbitol derivatives and form part of a group of emulsifiers agents known as food grade sorbitan esters; it can be further modified to the polysorbates. The food grade polysorbate family of products is among the hydrophilic or water-soluble emulsifiers agents allowed in the foods products, due to the long polyoxyethylene chain, so the addition of small amounts of the food grade polysorbate emulsifiers agents to water results initially in a dramatic decrease in interfacial tension agent. The unique qualities of each food grade polysorbate are attributed to the different fatty acids used in each product. The food grade ethylene oxide chain length is controlled at an average of 20 moles and it does not change between products. The short chain fatty acid polysorbate 20 has the highest HLB at 16.7, followed by the others with the longer chains, such as polysorbates 40, 60, 65, 80 and 85. The food grade Sorbitan esters and food grade polysorbates are emulsifiers agents regulated by governing bodies, in North America, the market is popular, the specific applications for the compounds in foods products are defined and the use level is controlled. The food grade polysorbates are used in bakery food product goods. In the bakery food product applications, the food grade polysorbates are used below 0.3% (flour basis). The food grade Polysorbates are added as a food bulk mixture strengthener to improve baking performance. The food grade Polysorbates stabilize the food bulk mixture during the late proofing and early stages of baking, when there are great stresses on the inflating cells. The food grade Polysorbates, their use results in loaves with greater size and a fine and uniform crumb structure. Regardless of its good effects in the food making, and the fact that the polymerized forms of ethylene oxide used in polysorbates have been shown to be safe. So, even if the potential risk of impurities in the food grade polysorbates is low, a responsible food manufacturer should be aware of the concerns. The Food producers would be prudent to source the food grade polysorbates from a reputable supplier (126,127,128,129, 130,131 and 132).

The food grade Hydrocolloids

The food grade Hydrocolloids are widely used in the food products processing, because they modify the rheology and texture of aqueous systems. The food grade additives play a very important role in the foods products, as they act as stabilizers, thickeners and gelling agents, affecting the stabilization of emulsions, suspensions, and foams, and modifying starch gelatinization. In the baking process, starch gelatinization and protein coagulation take place and the aerated structure obtained during leavening is fixed, forming the food crumb. The granule swelling can be reduced by the presence of hydrocolloids (particularly at high concentrations). The food grade Hydrocolloids can interact with the molecules leached out from starch granules, leading to a stiffening effect. The food grade Hydrocolloids due to the interactions, crumb structure and texture are positively influenced by the presence of gums. In the baking processing, food grade hydrocolloids are very important as food making improvers, because they enhance the food bulk mixture handling characters, improve the quality of fresh food products, and extend the shelf life of the stored food products. The food grade Hydrocolloids must be used in small quantities (<1% flour basis) and are expected to increase water retention agent and the loaf size, decreasing firmness and the starch retro gradation. The food grade Polysaccharides such as the food grade carboxymethyl cellulose, the food grade guar gum and the food grade xanthan gum are employed as stabilizers in the bakery food products (133,134,135,136,137 and 138).

The food grade Xanthan gum

The food grade Xanthan gum is an anionic polysaccharide employed to modify rheological characters of the food products. It is produced industrially from carbon sources through fermentation by the Gram-negative bacterium *Xanthomonas campestris*. Structure-wise, it is a polymer with a d glucose backbone. The Trisaccharide side chains formed by the glucuronic acid sandwiched between two mannose units are linked to every second glucose of the main polymer chain. The carboxyl groups in xanthan gum may ionize creating negative charges, increasing the viscosity character of the solution in water. The food grade Xanthan gum easily disperses in the cold and the hot water, quickly producing viscous solutions. The solutions are stable to acid, salt, and high temperature processing conditions, and show good efficiency at low concentrations, around 0.1% (flour basis). The products that contain this food grade gum have fluidity character, good mouthfeel, and adhesion. The advantages make food grade xanthan gum a suitable thickener, the stabilizer, and the suspending agent in many foods products. In the bakery food products, the food grade Xanthan gum improves the wheat food bulk mixture stability during proofing state. The food grade Xanthan gum has the ability to increase the food bulk mixture stability during the freeze thaw cycles in the frozen food bulk mixture products (139,140,141,142,143 and 144).

The food grade Guar gum

The food grade Guar gum is made of the powdered endosperm of the seeds of *Cyamopsis tetragonolobus*, a leguminous crop. The endosperm contains a complex polysaccharide, a galactomannan, it is a polymer of d galactose and d mannose. The hydroxyl group rich polymer forms hydrogen bonds with water, imparting significant viscosity character and thickening to the solution. Due to its thickening, emulsifying, binding and gelling characters, quick solubility in cold water, wide pH stability, film forming ability and bio-degradability, the food grade Guar gum finds applications in a large number of industries, including the bakery food product processing. The food grade Guar gum at the level of 0.5% (flour basis) in food products improves both softness and loaf size. The food grade Guar gum is used for improving the food bulk mixture production in the baked goods products of the food (144,145,146,147 and 148).

The food grade Carboxymethylcellulose

The food grade Carboxymethylcellulose (CMC) is a cellulose derivative, and it is called cellulose gum. The food grade Carboxymethylcellulose (CMC) finds applications in the food processing as a food stabilizer and thickener. The food grade Carboxymethylcellulose (CMC) contains carboxymethyl groups (─CH_2COOH) attached to ─OH groups within the glucopyranose monomers forming a carboxymethyl gum backbone. The anionic polysaccharide is often used as a food grade additive in its sodium salt form (sodium carboxymethylcellulose). In food grade sodium carboxymethylcellulose, some of the carboxyl groups have been replaced by sodium carboxylate groups. The degree of substitution by sodium ions, chain length of the cellulose backbone and clustering of the carboxymethyl substituents determine CMC functionality. The food grade Carboxymethylcellulose (CMC) has a combined effect with enzymes and emulsifiers agents on textural characters of both the food bulk mixture and the fresh food products. The food grade Carboxymethylcellulose (CMC) contributes to producing high size and retarding staling. Both The food grade Carboxymethylcellulose (CMC) and the food grade guar gum have proven to be beneficial in the formulation of the gluten free foods (130,131,132,133,134 and 135).

The food grade Preservatives

The food grade Preservatives are intended to inhibit the growth of molds and thermophilic bacteria. The food grade preservatives permitted for use in food products are commonly limited by legislation. The food grade Propionic, The food grade sorbic and The food grade benzoic acids are among the commonly used food products preservation. The food grade Propionic acid inhibits molds and *Bacillus* spores' bacteria, but not yeasts to the same extent, and has, therefore, been the traditional choice for food products preservation. The food grade Preservatives are often added in their salt form, it is more soluble in aqueous solutions. The food grade preservatives effectiveness depends on the pH of the system, they are added, as the dissociated acid alters the antimicrobial effect. The p*K*a values (pH at it dissociation occurs) of the food grade propionic acid and the food grade sorbic acid are 4.88 and 4.76, respectively. The Maximum pH for their activity is around 6.0–6.5 and 5.0–5.5 for the food grade sorbate and the food grade propionate, respectively. At pH six, only 7% of the food grade propionic acid will be undissociated, compared to 71% at pH 4.5 (111,112,113,114,115 and 116).

The food grade Propionates

The sodium, potassium and calcium salts of propionic acid are used as food preservatives in many countries in the world. The sodium, potassium and

calcium salts of propionic acid preservatives have two functions, to retard the rate of mold development, and to prevent the bacterial spoilage of the food products known as "rope" caused by certain *Bacillus* species bacteria, notably *B. subtilis* bacteria and *B. licheniformis* bacteria. The Calcium propionate is more widely used than propionic acid, because it is easier to handle the solid salt than the corrosive liquid acid. Its regular quantity is around 0.3% (flour basis). It is effective at retarding molds and preventing "rope" spoilage, there are some practical disadvantages associated with the use of calcium propionate, among it is the effect on loaf size. A decrease in loaf size is caused by the combination of reduced yeast activity and altered the food bulk mixture rheology characters. Regarding propionic acid, high levels of dietary intake have been associated with propionic acidemia in children. Complications of this disease can include learning disabilities, seizures, arrhythmia, gastrointestinal symptoms, recurrent infections and many others (100,101,102,103,104 and 105).

The food grade Sorbates

The food grade Sorbates are more effective at inhibiting mold growth than propionates by weight. The food grade sorbic acid and its salts are of less value in food and yeast raised goods, because of their detrimental effects on the food bulk mixture and food characteristics. They can produce the sticky food bulk mixtures and they are difficult to handle; and the baked products may have reduced food size and an irregular cell structure. The use of encapsulated sorbic acid is an alternative to overcome the negative effects. The food grade sorbic acid or its salts may be sprayed on the surface of the foods products. Within the food bulk mixture, the food grade Sorbates its quantity is about 0.1% (flour basis) (55,56,57,58,59 and 60).

The food grade Acetates

The food grade Acetic acid in the form of vinegar has been used by foodmaking for many years to prevent the bacterial spoilage of food products known as "rope" and to increase the mold free shelf life. The food grade Acetic acid gives products a more "natural" appeal and is effective against "rope" at concentrations equivalent to 0.1–0.2% of acetic acid (flour basis). At such concentrations, its effect against molds is limited. Higher concentrations of the food grade Acetic acid led to an unacceptable odor of vinegar in the food products (88,89,90,91,92,93 and 94).

The food grade Fermentates

An increasing number of natural preservatives are being marketed as clean label or label friendly shelf-life extension solutions for the bakery food product processing. Among them there are fermentates, they are food ingredients produced by the fermentation of a variety of raw materials by the microorganisms. The microorganisms include lactic acid bacteria or propionic acid bacteria that produce weak organic acids with a preservative effect. The weak organic acid preservatives have actually been reported to have no effect on the shelf life of the bakery food products with pH values close to seven. The Preservatives inhibit microbial spoilage, but do not destroy microorganisms. It is important to process baked goods following good manufacturing practices (GMPs), including the use of good quality raw materials and appropriate hygiene systems that are correctly monitored (17,18,19,20,21,22 and 23).

The food grade Enzymes in the foodmaking

The food grade enzymes, called food grade biocatalysts, are proteins with special characters. The food grade enzymes are able to accelerate the reactions at low energy requirements without being consumed by the reactions; and the resultant effects modify the structure and/or the physical and the chemical characters of the environment. Each type of the food grade enzymes has its own specific substrate on it acts; it provides excellent process control for the use in the food making. The food grade enzymes are used are not active in the final food products, once they are damaged in the oven. The food grade enzymes are known as "processing aids", and do not need to be included in the list of ingredients in product labels (33,34,35,36,37,38 and 39).

The food grade Substrate: the food grade polysaccharides

The main food grade polysaccharide present in wheat flour is starch, it is present in the form of granules composed of two fractions. One fraction is amylose (25–28%), the linear fraction, composed by glucose molecules linked by α-1,4 bonds; and the other fraction is amylopectin (72–75%) it is a branched fraction. The food grade Amylopectin is a glucose polymer formed by α-1,4 bonds and branches are linked to the linear backbone by α-1,6 bonds. In the milling process, some starch granules become damaged and it is necessary to have between 7 and 11% of this damaged starch in wheat flour, once it is the substrate for α-amylase action (28,29,30,31,32,33 and 34).

The Food grade Fungal α-amylase

This type of food grade endoamylase randomly hydrolyzes α-1,4 bonds of damaged starch granules from wheat flour, generating low molecular weight dextrins and oligosaccharides (maltose, maltotriose, etc.). Each generated food grade dextrin has its own non reducing end. Subsequently, the endogenous wheat flour β-amylase hydrolyzes generated dextrins to maltoses, it will be hydrolyzed to glucose by maltase enzyme produced by the yeast. The maximum activity pH range of fungal α-amylase varies from 5 to 6, and fits with the pH of food bulk mixture products. The food grade Fungal α-amylases are denatured by heat before starch gelatinization temperature range is reached. This fact explains why it is necessary to have damaged starch to be hydrolyzed by this enzyme: it is a more easily degradable substrate than native starch granules. There is a smaller risk of over action of food grade fungal α-amylase due to its lower thermo-stability. The combined use of food grade fungal α-amylase with food grade endogenous β-amylase produces higher levels of maltose, stimulating yeast fermentation. The higher gas production enhancing food products size occurs. The food grade Endogenous α-amylase is present in ungerminated wheat, but its activity varies and can be indirectly measured by the Falling Number (FN). Its activity is low in ungerminated wheat, providing high FN results. On the contrary, in germinated wheat, its activity is high, causing low FN results, and this situation can be a disaster for baking. So, it is necessary to standardize flour with fungal α-amylase to guarantee the same good results in baking in terms of food products size, crust, color and general loaf quality. The food grade α-Amylase contributes to a better crumb texture. Once it degrades damaged starch, the food bulk mixture consistency decreases and the ability is enhanced. An important contribution of the food grade fungal α-amylase for the baking is that reducing the sugars generated during mixing and fermentation will participate in the Maillard reaction (combination of the low molecular weight reducing sugars with proteins under high temperature). The Maillard reaction is responsible for the non-enzymatic browning of food crust and generation of food characteristics including aroma and flavor. The food grade Amylases permit oven spring to occur for a prolonged period. The food products size is increased once they avoid quick viscosity character rising during starch gelatinization (45,46,47,48,49,50 and 51).

The food grade β-Amylase

This endogenous enzyme is present in mature ungerminated wheat, and hydrolyzes only damaged starch granules. In food making, this food grade exo-amylase acts sequentially from the non-reducing ends of starch fractions (amylose and amylopectin) or dextrins, hydrolyzes α-1,4 bonds and releases maltoses and β-limit dextrins. The generated maltoses will be substrate for yeast fermentation after maltase action, enhancing the gassing power of the food bulk mixture product. The food grade β-Amylase action ceases one glucose molecule before an α-1,6 bond of amylopectin. The α-1,6 bond is the branching point of amylopectin. This effect contributes to reduce food firmness. The maltoses generated that are not consumed by the yeast contribute to crust color (82,83,84,85,86,87 and 88).

The food grade Bacterial amylase

This food grade enzyme hydrolyzes starch more aggressively than fungal α-amylase. This food grade enzyme effect is due to its efficiency to act on amorphous regions of starch granules, generating excessive dextrinization, with excessive decrease in the food bulk mixture viscosity characters, producing an open texture crumb. The food grade Bacterial amylase provides a softer crumb, despite greater recrystallized starch content in comparison with a control. The stickiness and gumminess were verified in crumb treated with this enzyme. Such effect occurs by greater thermo-stability of the food grade bacterial amylase, it keeps its capacity to hydrolyze gelatinized starch inside the oven, when fungal α-amylase is already denatured, and its action may continue during storage. It was proven that bacterial amylase was efficient to extend the food products shelf life. A small overdosing provokes great and undesirable texture modification (77,78,79,80,81,82,83 and 84).

The food grade Bacterial maltogenic α-amylase

The food grade Bacterial maltogenic α-amylase is obtained from genetically modified *Bacillus stearothermophilus* bacteria. This enzyme hydrolyzes α-1,4 linkages of easily accessible outer gelatinized starch molecules, in both amylose and amylopectin fractions, producing α-maltose and other malto oligosaccharides, decreasing food staling speed. The hydrolyzed amylopectin branches project themselves to the intergranular spaces hampering their reorganization, avoiding crystallization and/or amylose amylopectin interactions, providing a weaker and less firm starch structure, yielding softer food. This exo enzyme is unable to hydrolyze α-1,6 linkages, so it stops its action one glucose molecule before starch branching. Some evidences of endo activity, by amylose and β-limit dextrin hydrolysis. The lower molecular weight branched oligosaccharides resulting from the food grade maltogenic α-amylase action on amylopectin, maltotriose and/or maltotetralose, act as anti-firming agents in baked goods products. The use of the food grade maltogenic α-amylase did not affect rheological characters of food products bulk mixture because it's low activity at the mixing temperatures (lower than 35°C). The food grade Bacterial maltogenic α-amylase higher activity is observed at the starch gelatinization temperatures during the baking stage, it is enough for the hydrolysis of glycosidic bonds in gelatinized starch by this enzyme. The inactivation of the food grade Bacterial maltogenic α-amylase by high temperatures occurs during baking time, and starch hydrolysis produces a limited amount of soluble dextrins. The produced maltodextrins inhibit starch starch and starch protein interactions causing a delay in amylopectin reassociation and retrogradation, resulting in a slower crumb firming process. This effect is known as anti staling (38,39,40,41,42,43 and 44).

The food grade Amyloglucosidase or glucoamylase

This exo amylase directly releases α-glucose molecules from native or damaged starch granules, increasing the production rate of fermentable sugars in the bulk mixture, enhancing yeast fermentation rate. The level of added sugars can be reduced by using food grade amyloglucosidase, and crust color can be improved, as enzyme activity remains after yeast inactivation. As glucose continues to be generated and is no longer consumed by the yeast, glucose remaining in the food bulk mixture during baking contributes to crust browning and to an increase in food products sweetness. The food grade Amyloglucosidase or glucoamylase enzyme has limited action on α-1,6 linkages, overriding side chains. The food grade amyloglucosidase completely converts starch molecules to glucose (11,12,13,14,15,16 and 17).

The food grade Substrate: the proteins

The Proteins are composed of sequences of amino acids linked by peptide bonds. The main proteins of wheat flour are gliadin (a prolamine) and glutenin (a glutelin), it forms, in the presence of water and mechanical energy, a cohesive protein network called gluten. This structure is very important for foodmaking. It has special viscoelastic characters (extensibility and elasticity) that allow the food bulk mixture to flow. It is able to retain CO_2 generated by the yeast during the fermentation step (61,62,63,64,65 and 66).

The food grade Glucose oxidase

The food grade Glucose oxidase converts glucose (from the hydrolysis of starch) and oxygen (present inside the bulk mixture) into gluconolactone and hydrogen peroxide (H_2O_2). The food grade gluconolactone is natural and spontaneously converted to gluconic acid. H_2O_2 readily oxidizes the free thiol (─SH) groups of the wheat flour bulk mixture proteins, promoting the formation of disulfide bonds (S─S) between gliadin and /or glutenin, that strengthen the gluten network. Thus, this enzyme is very important for foodmaking. The cross-linking effect of proteins is responsible for the gluten network strengthening, that contributes for better crumb structure and food size improvement. The high quantity of glucose oxidase produce excessive stiffness of the food bulk mixture reducing ability, and must be avoided (71,72,73,74,75,76,77 and 78).

The food grade Hexose oxidase

The type of oxidoreductase has similar effects to those of glucose oxidase is substrates are mono and oligosaccharides, other than glucose. The corresponding lactones are obtained, and the generated H_2O_2 acts exactly the same way as in the case of glucose oxidase (25,26,27,28,29,30,31 and 32).

The food grade Transglutaminase

The type of acyl transferase promotes the reaction between amines, such as those presented by the γ-carboxamide from l-glutamine with the ε-amino group from l-lysine. This food grade enzyme catalyzes the formation of covalent cross linkages between proteins having the amino acid residues. The food grade Transglutaminase gives an additional strengthening effect to the gluten network comprising disulfide bonds. The result is the formation of larger and food grade insoluble gluten polymers that affect not only the biochemical characteristics of the bulk mixture, but the food grade Transglutaminase rheological characters. Such an effect permits to replace the use of the oxidant's agents and even food grade emulsifiers agents in bakery food product formulations. The food grade transglutaminase agents are sometimes recommended in high fiber and rye food production. Gluten free baked goods are a promising field of action, as the utilization of transglutaminase enhances the protein network formation in the food making. This enzyme increases water absorption of wheat flour bulk mixtures, provokes bulk mixture strengthening character, enhances the food bulk mixture stability, reduces the food bulk mixture extensibility ability, improving the food crumb texture and food products size. The food grade Transglutaminase agent is recommended for reinforcing weak protein networks, and for enhancing freeze thaw stability of the frozen food bulk mixtures, as the frozen croissants and puff pastry, as the food grade Transglutaminase decreases their deterioration during the frozen storage (144,145,146,147 and 148).

The food grade Protease

The Proteins present in the baking food bulk mixtures are substrates for proteases, it hydrolyzes peptide bonds irreversibly, in order to reduce mixing time of food products bulk mixtures products, or to reduce the strength of biscuit bulk mixture's products, improving the ability. The disulfide cross linkages of gluten are not affected by proteases and thus remain intact. The extension of protease effects depends on the amount of enzyme added and on the period of time that it is allowed to work before its inactivation by the oven temperatures or pH changes. The main results of the food grade protease action are increase in protein water solubility; decrease in bulk mixture viscosity character; decrease in the average molecular weight of protein fractions; and, consequently, decrease in gluten complex elasticity. The Neutral or sulfhydryl proteases have been used effectively due to their active pH range (from 5 to 8), that fits the pH of the majority of food s and biscuit food bulk mixture's products. Almost all the fungal proteases from *Aspergillus oryzae* are neutral type, while vegetable proteases, like papain and bromelain, are sulfhydryl type. In long fermentation times, like in saltine cracker production, the food bulk mixture can reach pH 4 or lower, and in this case, acidic protease is better used. In the soda cracker production, the food bulk mixture rises up to the alkaline region after the soda addition, making serine protease (the trypsin) effective for the gluten breakdown. The type of protease is extracted mainly from bacterial sources like *Bacillus subtilis* bacteria. The excess amounts of protease cause such gluten network weakening that produces the coarse texture desired for English muffins, or favors cookie the food bulk mixture flow in the oven. Be Care to avoid excessive proteolysis in food products bulk mixtures, because weak gluten networks generate undesirable coarse texture and low food products size. In the food sponge process, it is usual to add small amounts of protease at the starting of mixing, allowing its action on the gluten network during the sponge fermentation. When the fresh flour is incorporated to the sponge, the newly added flour is poorly hydrolyzed during the food bulk mixture. This blend of hydrolyzed and almost the non-hydrolyzed gluten generates good smooth the food bulk mixture that permits a decrease in mixing time. Add small amounts of food grade protease in the strait the food bulk mixture process for pan food products, to avoid tight the food bulk mixture give incomplete pan filling, or to avoid undesirable breaking along the loaf side. In the production of hamburger and hot dog foods products, the food bulk mixture must flow to fill in the molds during the short fermentation period. By using small amounts of food grade protease in the mixer improves the bulk mixture flow and enhances food products shape and symmetry. In the pizza food bulk mixture production, the makeup work to spread and round the food bulk mixture into a thin layer becomes easier as a result of adding small amounts of protease during mixing. In this case, the enzyme is able to

work during proofing time, adequately reducing the strength of the gluten network, avoiding the food bulk mixture contraction during sheeting and preserving the desired oven spring. The amino acids released by the proteolytic action react with the reducing sugars at high temperatures in the Maillard reaction, enhancing color and flavor of the foods products and biscuits (141,142,143,144,145 and 146).

The food grade Substrate: the lipids

The Wheat flour lipids are composed of high levels of linoleic acid (C18:2), and lower levels of palmitic (C16:0) and oleic (C18:1) acids. The fatty acids may occur in the free form, or bound to starch and proteins. Starch lipids, mainly lysophospholipids, form complexes with amylose during gelatinization and have little importance for food products making. The Non starch lipids (NSLs) (75% of total wheat flour lipids) are divided 1:1 into polar and non-polar lipids. The bound NSLs are composed by triacylglycerols (non polar). Free NSLs are mainly composed of glycolipids and phospholipids; both are polar molecules that positively contribute to the food bulk mixture handling characters. They have a great effect on loaf size, due to their effect on the stability of the gas cells, as they can form thin lipid monolayers inside gas cells that enhance CO_2 retention agent by the bulk mixture (10,11,12,13,14,15 and 16).

The food grade Phospholipase

The food grade Phospholipases are a particular type of lipase with higher specificity toward phospholipids (polar fraction), that converts them *in situ* into lipids with even higher polarity and surface activity. The food grade Phospholipases act as bulk mixture strengthening emulsifiers agents, with bulk mixture stabilizing characters. With the use of food grade phospholipases, traditional food grade emulsifiers agents like food grade DATEM, food grade CSL and food grade SSL can be completely or partially substituted in food products making with similar results. The food grade Phospholipases improve the food bulk mixture ability, as the stickiness is reduced, and the food size ultimately increases (71,72,73,74,75,76 and 77).

The food grade Glycolipase

The food grade Glycolipases are a particular type of the lipase with higher specificity toward glycolipids (polar fraction), that, similarly to phospholipase, converts them *in situ* into emulsifiers agents. The food grade Glycolipases have similar effects in the food making as those from phospholipases, the enzymes increase the food bulk mixture stability characters. The food grade Glycolipases effect is possible once the generated surface-active lipids maintain stable gas cell structures, due to the interaction of polar lipids with proteins at the liquid lamellae that surround gas cells (101,102,103,104,105 and 106).

The food grade Lipase

This type of food grade enzyme is classified as a glycerol ester hydrolase due to its capacity to hydrolyze acylglycerol ester linkages, releasing preferably fatty acids at positions −1 and −3 from the glycerol structure. The products formed include mono and diacylglycerol residues, they act as crumb softening emulsifiers agents in the food products making. This effect is due to the acylglycerols capacity to penetrate amylose helicoidal structure forming amylose lipid complexes, retarding amylose retrogradation, increasing food products size and providing better crumb structure and texture (135,136,137,138,139 and 140).

The food grade Lipoxygenase

The substrates of food grade lipoxygenase are polyunsaturated fatty acids, such as linoleic (C18:2) and linolenic (C18:3) acids, and β-carotene and chlorophylls from wheat flour. This enzyme, present in enzyme active soy flour, oxidizes endogenous wheat flour pigments, providing a bleaching effect, resulting in a whiter crumb. The food bulk mixture strengthening occurs during food products making. The accessible thiol (─SH) groups from wheat flour proteins are oxidized by the hydroxyperoxides produced by lipoxygenase action on fatty acids. This oxidation provokes intermolecular disulfide bond formation among the gluten proteins, increasing mixing tolerance, improving the food bulk mixture ability characters, enhancing rheological characters for food products making, increasing food products size and improving internal texture of the food product. The high quantity of food grade lipoxygenase produces undesirable flavors in food products, due to the decomposition of the hydroxyperoxides of fatty acids generated by food grade lipoxygenase action, and must be avoided (120,121,122,123,124 and 125).

The food grade Substrate: food grade non starch polysaccharides (NSPS)

There are several food grades non starch polysaccharides (NSPS) in wheat flour: food grade pentosans, food grade β-glucans and food grade cellulose, all classified as dietary fiber constituents. food grade Pentosans are the important NSPS due to their great water absorption capacity, despite their low content (2–3%) in wheat flour. Around 50% of food grade pentosans are water soluble, and 50% insoluble. About 75% of food grade pentosans are xylans, and almost 25% are galactans. Due to their strong hydrophilicity, pentosans affect the food bulk mixture viscosity character and the loaf size characters. The food grade Xylans are xylose polymers linked by β-1,4 bonds. They can have arabinose molecules linked to the xylan backbone by β-1,3 bonds; then, they are called arabinoxylans (AXs). The linkages can be β-1,2, mainly in the insoluble or water un-extractable arabinoxylans (WU-AXs). Soluble or water extractable arabinoxylans (WE-AXs) present a 3:1 xylose:arabinose ratio, while WU-AXs have a greater proportion of arabinose. The food grade AXs are the main NSPS that constitute wheat endosperm cell walls, and, in the solution, provide high viscosities, they depend on AXs molecule length. Both food grade WE-AXs and food grade WU-AXs have great water-binding capacity, they, in the food making, increases the food bulk mixture consistency, stiffness and resistance to extension characters, while decreasing mixing time and the food bulk mixture extensibility characters. The food grade WE-AXs are weakly linked to wheat endosperm cell walls and have gelling characters in the presence of oxidants agents. The main components responsible for the increase in viscosity character of flour suspensions are the food grade WE-AXs, and the ability stabilizes protein films during temperature elevation. The food grade WE-AXs are considered beneficial to food products quality, enhancing gas retention agent. The food grade WU-AXs are structural components of wheat cell walls that link the food grade AXs, the proteins, the cellulose and the lignin, through covalent and non- covalent bonds. The better loaf size and the food quality when food grade WU-AX content decreases, and this effect is due to physical barriers to the gluten development expressed as the food grade WU-AX, they impair the gliadin and the glutenin approximation; high water absorption capacity, making water unavailable for the gluten network development; and gas cell perforation by the structures, provoking their coalescence. If the food grade AXs do not receive appropriate enzymatic treatment during the food bulk mixture processing, the water added to the wheat flour becomes constrained in the hydrophilic structures, causing a water scarcity for the gluten network development, enzyme action, yeast activity and starch granule gelatinization, impairing the food products final quality (48,49,50,51,52,53 and 54).

The food grade Fungal xylanase

The food grade enzyme is used to release water from xylans. It has great influence on the food bulk mixture viscosity characters. This food grade enzyme improves the food bulk mixture tolerance to the food making processes, as the food bulk mixture elasticity character is reduced; and contributes to increase the food size up to twenty percentage when compared with a control, mainly in the high fiber bulk mixture foods, such as foods made with whole wheat flour and other whole cereals. The food grade Xylanases enhances gas retention agent of the food bulk mixture, contribute to a softer and finer crumb characters. The type of endo xylanase is extracted from the *Aspergillus* species mold. and this enzyme preferentially hydrolyzes the WE-AX, promoting gluten protein aggregation, due to its water releasing capacity it is beneficial for gluten network formation. Excess amounts must be avoided, because the slack and the sticky wheat flour bulk mixture products are produced. This effect is caused by the excessive hydrolysis of AX, provoking excessive loss in the water binding capacity. The resultant foods products present in appropriate crumb structure, with ragged gas cell distribution and inappropriate crust color (128,129,130,131,132 and 134).

The food grade Bacterial xylanase

The food grade endo xylanase is extracted from the *B. subtilis* bacteria. The food grade endo xylanase is preferentially hydrolyzing WU-AX, improving the food bulk mixture product stability characters so the food bulk mixture is able to keep the maximum size for a longer period during the fermentation

step, and it maintains a great resistance to mechanical stress characters during the food making process. The Oven spring is prolonged and food products size is enhanced due to bulk mixture relaxation and better gas retention agent. The food grade endo xylanase produces finer grains that provide a softer and homogeneous food crumb. For fungal xylanase, the excessive quantity of the bacterial xylanase must be avoided (135,136,137,138,139 and 140).

The food grade Cellulase

The food grade enzyme hydrolyzes cellulose (linear homopolysaccharide composed by a glucose polymer backbone linked by β-1,4 bonds) from wheat cell walls, mainly from the wheat grain outer layers. The Cellulose chains are organized in crystalline and amorphous regions. In cellulose crystalline structure, the molecules are highly ordered and chain arrangement blocks the water and enzyme penetration into the microfibrils. In the non-crystalline (amorphous) regions, the water and enzymes have greater access, and the sites are easily hydrolyzed than the crystalline ones. The amorphous regions are firstly attacked and degraded by the food grade cellulases. This produces lower molecular weight fragments that can bind water. The food grade Cellulase action on the cellulose has numerous benefits in the food making process the water absorption increases; the food bulk mixture viscosity characters increases; the high fiber bulk mixture foods stickiness characters decrease; the ability is enhanced; the release of the glucose increases, and the cut opening for French rolls increases (141,142,143,144,145,146,147 and 148).

Conclusion

There is currently huge pressure on the food products processing to produce healthier products. “Clean” or “friendly” labels, with shorter and simpler ingredient lists are a strong trend include the search for natural and healthier alternatives for the food grade additives they have a negative impact on the end human consumer acceptance. The bakery food product processing is trying to eliminate E-number ingredients from its formulations using, for example the food grade enzymes and the food grade vital wheat gluten (a food grade ingredient) to eliminate emulsifiers agents and food grade oxidants agents; hydrocolloids as a more “friendly” choice than other the food grade additives; and food grade natural preservatives such as food grade fermentates agents, for the mold control. In some cases, the alternatives are expensive and not as effective as food grade additives. The food grade Enzymes do not need to be declared as processing aids on the labels of the food products in many countries in the world, so they are an interesting future plane for clean labels. Some enzymes are under study and will become commercially available for use in the food making. The laccase is a food grade oxidative enzyme that oxidizes agent’s different types of the phenolic compounds, increasing the food bulk mixture stability and the strength characters, promoting quicker the food bulk mixture formation and reducing the bulk mixture stickiness characters. The food grade β-glucanase hydrolyzes the β-glucans present in the barley, the rye and the oat flours, enhancing the food microstructure, the suze, the texture, the shelf life and the taste in the foods made with the food grade additives composite flours products to the food.

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