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(54) Title: NOVEL GLUCOSE OXIDASE COMPOSITIONS

(57) Abstract: The invention provides taste masking compositions and palatable taste masking compositions based on sensory bud modulation technology. In this technology, taste buds are first desensitized and a palatable taste masked composition is provided comprising taste modifier. Further, invention provides taste masked and palatable taste masked compositions of substances and products having undesirable taste. The taste masked palatable compositions can be in the form of powder, tablet, granules, pellets, pills, oral suspension, oral solution, syrup, liquid preparation, oral gel, oral film, chewable tablet, mouth dissolve tablets and the likes. Invention further provides digestive compositions optionally having nutritive health markers.



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NOVEL GLUCOSE OXIDASE COMPOSITIONS

FIELD OF THE INVENTION

The present invention relates to taste masking compositions, palatable taste masking compositions, taste masked and palatable taste masked compositions, digestive compositions and processes for preparing such compositions.

OBJECT OF THE INVENTION

The first object of the present invention is to provide taste masking compositions comprising fructo-oligosaccharide and glucose oxidase for masking undesirable taste of certain substances and products consumed or administered orally, buccally, sublingually or by any route where taste comes into picture, particularly active ingredients used in nutraceuticals, pharmaceuticals, foods and herbal preparations. These actives may have bitter/ astringent / metallic taste / pungent taste / spicy taste / alcoholic taste / chalky taste/ salty taste or any other undesirable taste such as obnoxious taste.

Second object of the invention is to provide palatable taste masking compositions incorporating taste masking compositions described above. These compositions have combined taste masking compositions with various palatable compositions. Taste masking compositions may not be very palatable whereas palatable compositions may not mask taste each time, however, palatable taste masking compositions are able to achieve taste masking as well as palatability. These compositions have at least one additional ingredient additional to taste masking compositions. The additional ingredient is a taste modifier selected from one or more of saccharide, polyol, sugar alcohol, medium chain triglycerides from coconut oil such as medium chain triglycerides from coconut oil with at least 40 % lauric acid, moringa in the form of extract, oil or powder, dietary fibers, flavors, and one or more digestive enzymes, sour compounds, spicy compounds, salty compounds, fatty compounds, bitter compounds and umami compounds. Taste modifier is selected from substances which balances the other taste which is required to mask. For example, sweet taste balances sour, bitter, and spicy taste. Sour taste also balances sweet and spicy taste. Bitter taste balances salty taste etc.

Further additional ingredient is at least one or more of lubricants, glidants, anti-caking agents, anti-adherents, gum, cellulose.

Third object of the invention is to provide palatable taste masked compositions having at least one substance or product having undesirable taste which is masked successfully in the palatable taste masked compositions. This is achieved by combining that substance or product having undesirable taste with the palatable taste masking compositions. At least one substance with undesirable taste includes any substance having such undesirable taste and intended to be consumed or administered orally, buccally, sublingually or by any route where taste comes into picture.

Fourth object of the invention is to provide digestive compositions comprising at least one ingredient having a digestive problem such as malabsorption or laxative effect etc. and glucose oxidase and optionally one or more of digestive enzymes. Further the digestive compositions preferably contain fructo-oligosaccharide.

Fifth object of the invention is to provide a simple and economical process to prepare taste masking compositions, palatable taste masking compositions, taste masked and palatable taste masked compositions, digestive compositions and compositions incorporating taste masking compositions or palatable taste masking compositions and at least one additional ingredient.

BACKGROND OF THE INVENTION

Taste is one of the most important parameters governing consumer compliance. Undesirable taste is one of the several important formulation problems that are encountered with certain actives such as actives from nutraceuticals, pharmaceuticals, foods and herbal preparations. Oral administration of bitter drugs with an acceptable degree of palatability is a key issue for health care providers, especially for pediatric patients. Certain herbal and Ayurvedic preparations are extremely unpalatable as the undesirable bitter/ astringent / metallic taste / pungent taste / spicy taste / alcoholic taste / chalky taste/ salty taste or any other undesirable taste such as obnoxious taste is not masked effectively. Stevia or steviol-glycosides are often considered desirable and safe over other chemical sweetening agents as they have high sweetness index of 100 - 300 and even more and are from plant origin; however, steviol-glycosides provide extremely bitter aftertaste. Several oral pharmaceuticals, numerous food and beverage products, and bulking agents have unpleasant, bitter-tasting components. The desire of improved palatability in these products has prompted the development of numerous formulations with improved performance and acceptability. Apart from stevia, several high intensity sweeteners like aspartame,

acesulfame-K, alitame, cyclamates, saccharin, sucralose, neohesperidin dihydrochalone, alitame, stevia sweeteners, glycyrrhizin, thaumatin also have undesirable taste / aftertastes.

Neem, senna, Ajwain, nirgundi (nigod), thyme, Gymnema sylvestre, guduchi, karela fenugreek, jamun (seeds extracts), Licorice are few of the long list of substances having undesirable taste. These have lot of medicinal advantages but due to their unpalatable taste and sensory attributes mainly due to extremely bitter and metallic taste, the foods and pharmaceutical organisations are facing a lot of challenges in formulation development that can be readily accepted by consumers. Despite having promising medicinal benefits, taste masked palatable oral preparations of one or more of these ingredients still poses a challenge.

Certain pharmaceutical preparations such as antibiotic preparations particularly which are reconstituted for pediatric use, also provide the palatability hurdles. Similarly, preparing palatable compositions for Antacid preparations, cough syrups, B-complex preparations, liquid protein (hydrolysate), protein powders, hematinic preparations, products for constipation similarly are extremely challenging.

The present invention provides solution to all taste and palatability related issues discussed above by providing taste masking and palatable taste masking formulations. And providing palatable taste masked compositions of certain substances with undesirable taste / aftertaste.

The present invention also covers digestive compositions incorporating certain substances having digestive problems wherein such digestive problems associated with those substances are resolved. Digestive compositions can be combined in any food or nutraceutical product and even in pharmaceutical product. All ingredients used to prepare digestive compositions are commonly known ingredients. There is restriction on the use of some of the ingredients because of several digestive problems associated with them. Present invention has resolved these problems by simple modifications.

Patent no. US20080107788 discloses soft, fluffy powder sweeteners having an intimate combination of inulin and at least one high intensity sweetener having a sweet taste. High intensity sweetener includes sucralose, acesulfame potassium and stevia. However, powder sweetener compositions described in examples covers only combination of inulin and Sucralose. Further, the patent is silent about masking bitter taste of Stevia.

Patent no. US20160235098 discloses composition for fibrous saccharide blends as well as naturally sweet fibrous blends. The fibrous saccharide blend comprises a polysaccharide and an oligosaccharide in weight ratio of 50:50 to 90:10. The naturally sweet fibrous blend includes a fibrous saccharide blend and a sweetening additive comprising tagatose, a natural sweetener extract, or both the tagatose and the natural sweetener extract. Natural sweetener extract is stevia extract.

Patent no. IN201617031608 discloses low-calorie sugar substitute composition comprises a sugar alcohol, a fiber, an oligosaccharide and a high intensity sweetener. Stevia is one of the high intensity sweetener. The low-calorie sugar substitute composition that provides similar properties characteristics and taste of sugar at equivalent volumes and/or weights but without the calorie content of sugar or effects on glycemic index.

Patent no. US20070116828 discloses tabletop sweetener compositions comprising non-caloric or low-caloric natural high-potency sweeteners and methods for making and using them. The tabletop sweetener composition comprises natural high-potency sweetener, sweet taste improving composition, bulking agent and anti-caking agent. Stevia is one of the natural high-potency sweeteners. The tabletop compositions and methods provide a more sugar-like temporal profile, including sweetness onset and sweetness linger, and/or a more sugar-like flavor profile.

None of the prior arts provides different components for taste masking and for imparting palatability. Thus, there is need to develop a composition that completely eliminates the undesirable taste of certain substances and products having undesirable taste, particularly but not limited to undesirable taste of certain actives such as actives from nutraceuticals, pharmaceuticals, foods and herbal preparations and provide palatable compositions with balanced taste.

Surprisingly, inventors of the present invention have invented a taste masking compositions and palatable taste masking compositions incorporating the taste-masking compositions both of which when combined with substances and products having undesirable taste have masked such undesirable taste. Invention also provides digestive compositions which resolve digestive problems associated with several substances.

SUMMARY OF THE INVENTION:

The invention provides taste masking compositions and palatable taste masking compositions which have a pH of near neutral around 6 – 7, preferably around 6.2 to 6.8. The taste masking compositions and most of the palatable compositions are essentially soluble compositions that can be formulated into any suitable oral form. The compositions are extremely stable.

The invention provides a new technology SBMT viz. sensory bud modulation technology or SSBMT specific sensory bud modulation technology. In this technology, first, taste buds are desensitized and further provided with a palatable composition. Hence taste masking and palatability are provided together. Taste masking compositions are also separately provided. In this way consumer compliant compositions are provided. Combination of fructo-oligosaccharide and glucose oxidase in certain proportion act as desensitizing composition for almost all types of undesirable taste.

The additional ingredient is providing palatability and is a taste modifier selected from one or more of saccharide, polyol, medium chain triglycerides from coconut oil such as medium chain triglycerides from coconut oil with at least 40 % lauric acid, Moringa in the form of extract, oil or powder, dietary fibers, flavors, and one or more digestive enzymes, sour compounds, salty compounds, bitter compounds, fatty compounds and umami compounds. Taste modifier is selected from substances which balances the other taste which is required to mask. For example, sweet taste balances sour, bitter, and spicy taste. Sour taste also balances sweet and spicy taste. Bitter taste balances salty taste etc.

Sometimes an edible product is already palatable but certain undesirable taste note such as bitter taste is not masked completely. In such cases only taste masking compositions are provided.

The invention does not restrict to any specific list of substances or products which have undesirable tastes. It provides various solutions of taste masking and particularly palatable taste masking of any substance or product having such undesirable taste.

In a first aspect, the invention provides taste masking compositions comprising taste masking agent which is fructo-oligosaccharide and glucose oxidase for masking undesirable taste of certain substances and products consumed or administered orally, buccally, sublingually or by any route where taste comes into picture, particularly active

ingredients used in nutraceuticals, pharmaceuticals, foods and herbal preparations. These actives may have bitter/ astringent / metallic taste / pungent taste / spicy taste / alcoholic taste / chalky taste/ salty taste or any other undesirable taste such as obnoxious taste.

5 The taste masking composition essentially comprises fructo-oligosaccharide and glucose oxidase preferably in a ratio of from 19:1 to 1:5. Such compositions are provided in table 1. In an embodiment, they are prepared by simple blending of the two ingredients. These compositions desensitize taste buds when taste masked compositions having substance of undesirable taste are consumed.

10 Second aspect of the invention is to provide palatable taste masked compositions incorporating taste masking compositions described above. These compositions have combined taste masking compositions with various palatable compositions and hence it is thought that properties of the two compositions have also combined. However, properties of the two compositions are enhanced than mere combination. Taste masking compositions may not be very palatable whereas palatable compositions may not mask taste each time,
15 however, palatable taste masked compositions are able to achieve taste masking as well as palatability and additionally, they provide pleasant sensation on the taste buds. These compositions have at least one additional ingredient than taste masking compositions. The additional ingredient is taste modifier selected from one or more of saccharide, polyol, medium chain triglycerides from coconut oil with at least 40 % lauric acid, Moringa in the
20 form of extract, oil or powder, dietary fibers, flavors, and one or more digestive enzymes, sour compounds, salty compounds, fatty compounds and umami compounds. Further additional ingredient is at least one or more of lubricants, glidants, anti-caking agents, anti-adherents, gum, cellulose.

25 Most of These palatable taste masking compositions are preferably soluble compositions or most part of the palatable taste masking compositions are soluble compositions and hence, any formulation such as solid oral, liquid orals, suspensions, coated preparations can be easily prepared out of these compositions.

30 Under the third aspect, the invention provides palatable taste masked compositions having at least one substance or product having undesirable taste which is masked successfully in the palatable taste masked compositions. This is achieved by combining that substance or product having undesirable taste with the palatable taste masking compositions. At least one substance with undesirable taste includes any substance having such undesirable taste

and intended to be consumed or administered orally, buccally, sublingually or by any route where taste comes into picture. The substance or product having undesirable taste include but not limited to neem, stevia, senna, ajwain, nirgundi (nigod), thyme, Gymnema sylvestre, guduchi, karela, fenugreek, jamun (seeds extracts), licorice, antibiotic medicines or preparations, antacid preparations, cough syrups, B-complex preparations, liquid protein (hydrolysate), protein powders, hematinic preparations, products for constipation.

Fourth aspect of the invention is to provide digestive compositions comprising at least one ingredient having a digestive problem such as malabsorption or laxative effect etc. and glucose oxidase and optionally one or more of digestive enzymes. Further the digestive compositions preferably contain fructo-oligosaccharide. The digestive compositions comprise of glucose oxidase and at least one of the digestive enzymes. The digestive enzymes can be one or more from papain, bromelain, lipase, amylase, glucoamylase, beta glucanase, fructosyl transferase, xylose isomerase, protease, nattokinase, and such similar digestive enzymes known to person skilled in the art.

In an embodiment, digestive enzyme is betaglukanase. In yet another embodiment the digestive enzyme is amylase. In one more embodiment, the digestive enzyme is bromelain.

The digestive composition further comprises one or more nutritive health-markers. A nutritive health marker is any nutritive compound such as vitamin, minerals, essential or branched chain amino acids, carotenoid, antioxidants, proanthocyanidins, digestive fibres, sulforaphane type of compounds and other nutritive compounds known in the art.

Fifth aspect of the invention is to provide a simple and economical process to prepare taste masking compositions, palatable taste masking compositions, palatable taste masked compositions, digestive compositions and compositions incorporating taste masking compositions and at least one additional ingredient as described above. Since the taste masking compositions and most of the palatable taste masking compositions are essentially soluble compositions / almost soluble compositions, and stable and also almost neutral / near neutral compositions, they can be used in preparing solid or liquid oral delivery forms, suspensions, compacts and compressed forms, mouth dissolve tablets, oral gels and films and many other forms and accordingly wide variety of processes such as blending, compacting, compressing, granulation, coating, spray drying, extrusion and /or spheronization and several other processes can be adopted.

A substance having a bitter and/or astringent and/or metallic taste can be a high intensity sweetener such as Stevia, aspartame, acesulfame-K, alitame, cyclamates, saccharin, sucralose, neohesperidin dihydrochalone, alitame, stevia sweeteners, glycyrrhizin, thaumatin and any mixture / combination thereof. A substance having a bitter and/or astringent and/or metallic taste can be one which is present in neem, fenugreek, bitter gourd, guduchi, licorice etc. The invention also provides glucose oxidase compositions useful to treat Alzheimer's or its symptoms such as cognitive impairment symptoms.

BRIEF DESCRIPTION OF THE DRAWINGS

Figure 1 under design A provides, a hollow stirrer of diameter 2 - 4 mm. Palatable Taste masked Composition of stevia of around 40 mg to 100 mg, preferably of 48 mg to 80 mg can be filled in this.

Figure 1 under design B provides, a solid stirrer which is coated with a composition which is a taste masked Composition of stevia of around 40 mg to 150 mg, preferably 64 mg – 150 mg is coated on this stirrer.

Figure 2 under design C provides, a solid stirrer having rectangular cross section with pockets or engravings and a slot at the bottom. The stirrer is coated with a composition which is a taste masked Composition of stevia of around 40 mg to 150 mg, preferably 64 mg – 150 mg.

Figure 2 under design D provides, a solid stirrer having rectangular cross section with pockets or engravings which is coated with a composition which is a taste masked Composition of stevia of around 40 mg to 150 mg, preferably 64 mg – 150 mg is coated on this stirrer.

Figure 2 under design E provides, a solid stirrer having rectangular cross section with pockets or engravings and a slot at the bottom. It is coated with a composition which is a taste masked composition of stevia of around 40 mg to 150 mg, Preferably from 64 mg – 150 mg is coated on this stirrer.

Figure 2 under design F provides, a solid stirrer having rectangular cross section with pockets or engravings. It is coated with a composition which is a taste masked Composition of stevia of around 40 mg to 150 mg. Preferably 64 mg – 150 mg is coated on this stirrer.

DETAILED DESCRIPTION OF THE INVENTION

Scientific names of herbs mentioned in the specification.

Guduchi - *Tinospora cordifolia*

5 Neem – *Azadirachta indica*

Fenugreek - *Trigonella foenum-graecum*

Stevia - *Stevia rebaudiana*

Ajwain - *Trachyspermum ammi*

Amla - *Phyllanthus emblica*

10 Bitter gourd - *Momordica charantia*

Licorice - *Glycyrrhiza glabra*

Nirgundi - *Vitex negundo*

Thyme - *Thymus vulgaris*

Jamun - *Syzygium cumini*.

15 Mango powder – fruity spice from *Mangifera indica*

Moringa - *Moringa oleifera*.

Garlic – Cloves of *Allium sativum*.

The invention provides a new technology SBMT viz. sensory bud modulation technology or SSBMT specific sensory bud modulation technology. In this technology, first, taste buds
20 are desensitized and further provided with a palatable composition. Hence taste masking and palatability are provided together. Taste masking compositions are also separately provided.

Under various aspects of this invention, inventors describe various compositions comprising glucose oxidase, particularly compositions comprising glucose oxidase and
25 fructo-oligosaccharides. The compositions further cover soluble dietary fibre sugar alcohols or polyol, saccharides and various other ingredients. These compositions are taste masking / palatable taste masking compositions for compounds with undesirable taste such as bitter/ astringent / metallic taste / pungent taste / spicy taste / alcoholic taste / chalky taste/ salty taste or any other undesirable taste such as obnoxious taste.

30 The invention further provides digestive compositions. Some of these compositions have high amounts of sugars/saccharides and / or sugar alcohols and yet they are devoid of any GI tract problems often associated with these compounds.

Further, the invention provides certain glucose oxidase compositions which can be used to treat serious diseases such as Alzheimer's or its symptoms such as cognitive impairment symptoms.

The taste masking and/or digestive composition and / or compositions for treating Alzheimer's can be formulated into various solid and liquid dosage forms based on the selection of certain substances or products along with which they are used. For example, they can be given in hard or soft capsule or tableted into tablets, prepared in the form of pellets or cubes or provided in the form of sachets and kits thereof. Some of the forms include Powder composition, granule compositions, crystalline compositions, pellet, pill, tablet, hard and soft capsule compositions, pellet compositions, powder for oral suspensions, liquid solutions and suspensions and sterile preparation and kits.

The term "polyol", as used herein, refers to a molecule that contains more than one hydroxyl group. A polyol may be a diol, triol, or a tetraol which contain 2, 3, and 4 hydroxyl groups, respectively. A polyol also may contain more than four hydroxyl groups, such as a pentaol, hexaol, heptaol, or the like, which contain 5, 6, or 7 hydroxyl groups, respectively.

According to an embodiment, the polyols are selected from at least one of mannitol, xylitol, maltitol, isomalt, inositol, erythritol, lactitol, glycerol (glycerine), sorbitol, arabitol, ribitol, polyglycetol, hydrogenated starch hydrolysates (HSH), threitol, fruitol, iditol, volemitol, lactitol, galactitol, palatinose, palatinit, propylene glycol, reduced isomalto-oligosaccharides, fructo-oligosaccharide, maltooligosaccharide, reduced xylo-oligosaccharides, reduced gentio-oligosaccharides, reduced maltose syrup, reduced glucose syrup, reduced starch sugar and sugar alcohols or any other carbohydrates capable of being reduced which does not adversely affect the taste of the sweetener composition.

According to an embodiment, the polyols are preferably selected from at least one of mannitol, xylitol, maltitol, erythritol, inositol, isomalt and glycerol. These polyols such as NEOSORB® Sorbitol, LYCASIN® and POLYSORB® maltitol syrup, PEARLITOL® mannitol, SWEETPEARL® maltitol, XYLISORB® xylitol used in accordance with the present invention are commercially available from manufacturers such as Roquette.

According to an embodiment, the saccharide is selected from at least one of fructose, glucose, galactose, sucrose, lactose, trehalose, caramel, golden syrup, refiners syrup, blackstrap molasses, maple syrup, honey, sorghum syrup, cane juice, barley malt syrup, coconut palm sugar, brown rice syrup, agave syrup and derivatives thereof. Non limiting

examples of saccharides include tagatose, rhamnose, dextrin including cyclodextrin such as α -cyclodextrin, β -cyclodextrin, and γ -cyclodextrin), maltodextrin (including resistant maltodextrins such as Dietary fibersol-2™), dextran, ribulose, threose, arabinose, xylose, lyxose, allose, altrose, mannose, idose, levulose, hexulose, maltose, invert sugar, isotrehalose, neotrehalose, palatinose or isomaltulose, erythrose, deoxyribose, gulose, talose, erythrulose, xylulose, psicose, turanose, cellulose, cellobiose, starch, pectins such as amylopectin, glucosamine, mannosamine, fucose, glucuronic acid, gluconic acid, glucono-lactone, glycogen, abequose, galactosamine, beet oligosaccharides, isomalto-oligosaccharides (isomaltose, isomaltotriose, panose and the like), xylo-oligosaccharides (xylotriose, xylobiose and the like), gentio-oligosaccharides (gentiobiose, gentiotriose, gentiotetraose and the like), sorbose, nigero-oligosaccharides, palatinose oligosaccharides, fucose, fructo-oligosaccharides (kestose, nystose and the like), maltotetraol, maltotriol, malto-oligosaccharides (maltotriose, maltotetraose, maltopentaose, maltohexaose, maltoheptaose and the like), lactulose, melibiose, raffinose, rhamnose, ribose, isomerized liquid sugars such as high fructose corn/starch syrup (e.g., HFCS55, HFCS42, or HFCS90), coupling sugars, soybean oligosaccharides, and glucose syrup.

The invention provides taste masking compositions and palatable compositions which have a pH of near neutral around 6 – 7, preferably around 6.2 to 6.8. Taste masking compositions and most of the palatable taste masking compositions are essentially soluble compositions which can be formulated into any suitable oral form. The compositions are extremely stable and can be exposed to heat and other processing parameters.

In a first aspect, the invention provides taste masking compositions comprising fructo-oligosaccharide and glucose oxidase for masking undesirable taste of certain substances and products, particularly active ingredients used in nutraceuticals, pharmaceuticals, foods and herbal preparations. These actives may have bitter/ astringent / metallic taste / pungent taste / spicy taste / alcoholic taste / chalky taste/ salty taste or any other undesirable taste such as obnoxious taste. These compositions contain fructo-oligosaccharide and glucose oxidase in a ratio from 19:1 to 1:5, preferably 19:1 to 3:1 and most preferably, from 15:1 to 5:1.

In an embodiment, taste masking composition comprises mixture comprising 70 parts of fructo-oligosaccharide and 30 parts of glucose oxidase. In another embodiment, taste masking composition comprises 50 parts of fructo-oligosaccharide and 50 parts of glucose oxidase. In one more embodiment, the taste masking composition comprises two parts of

fructo-oligosaccharide and one part of glucose oxidase. In a preferred embodiment, the taste masking composition is in a mixture form. However, when it is diluted to make a palatable taste masking composition as described under second aspect, each ingredient of the palatable taste masking composition can be added separately and mixed including ingredients of taste masking composition. Such palatable compositions are described in second aspect.

Table 1 provides various taste masking compositions of fructo-oligosaccharide and glucose oxidase and as an exemplary active, guduchi is taken to find out suitable ratio of fructo-oligosaccharide. Guduchi is extremely bitter and often used in high concentration. It is taken in low concentration only to arrive at suitable ratios of fructo-oligosaccharide and glucose oxidase.

It is observed that ratio of fructo-oligosaccharide to glucose oxidase at 24:1 produces average taste masking whereas ratio of 19:1 produces good taste masking. Thus, it is surprisingly found that amount of glucose oxidase in a taste masking composition should be substantial such as 5 %. On the higher side, ratio of fructo-oligosaccharide to glucose oxidase at 15:1 and on the lower side, ratio of 5:1 produced excellent taste masking. The range of ratios of fructo-oligosaccharide to glucose oxidase from 19:1 to 1:2 is quite satisfactory.

In a second aspect, the invention provides palatable taste masking compositions or taste masking palatable compositions incorporating taste masking compositions of aspect 1. The palatable taste masking compositions are combinations of otherwise palatable composition which are palatable but may not be able to mask taste and taste masking compositions which may not be palatable. From the palatable taste masking compositions, the taste masking compositions act by desensitize the taste buds for undesirable taste and palatable compositions provide desirable taste completely masking undesirable taste and aftertaste of several substances and products. The palatable compositions comprise of taste modifier. Taste modifier is a carbohydrate selected from a dietary fibre or a saccharide or combinations thereof. Fructose is one preferred saccharide. Other preferred saccharides include glucose, maltose, lactose, sucrose, tagatose, polydextrose. Other preferred taste modifiers include polyol or sugar alcohol. One preferred sugar alcohol is xylitol. Erythritol is another preferred sugar alcohol. Other preferred sugar alcohols include maltitol, lactitol, sorbitol, etc. The taste modifier is selected from one or more of saccharide, polyol, sugar

alcohol, medium chain triglycerides from coconut oil such as medium chain triglycerides from coconut oil with at least 40 % lauric acid, Moringa in the form of extract, oil or powder, dietary fibers, flavors, essential oils, oleoresins, fruit extracts and fruit juice concentrates, fruit oils, one or more digestive enzymes, sour compounds, spicy compounds, salty compounds, fatty compounds and umami compounds and sometimes even bitter compounds. Preferably, a taste modifier includes high amount of one or more of carbohydrates such as saccharides and fibres, polyols or sugar alcohols or their combination. Sweet tasting taste modifier is preferred when undesirable taste is bitter, sour or spicy.

Taste modifier is selected from substances which balances the other taste which is required to mask. For example, sweet taste balances sour, bitter, and spicy taste. Sour taste also balances sweet and spicy taste. Bitter taste balances salty taste etc.

If undesired taste is a bitter taste, and if the final product is desired to be sweet, the bitter taste is masked and then further made palatable by use of saccharide, sugar alcohol, polyols or likes. If final product is desired to be salty, amino acids such as lysine, methionine and phenyl alanine can be used. If the final product is desired to be sour, use of sour tasting compounds is done such as dry mango powder, amla powder, Garcinia cambogia powder or its composition etc.

Moringa powder provides taste and aroma of chlorophyll. Moringa powder is used as a palatable ingredient for capsaicin. Capsaicin is a substance of undesirable taste. Capsaicin is also used as a palatable ingredient. Capsaicin from chili peppers, piperine from black pepper, gingerol from ginger root and allyl isothiocyanate from horseradish are used to make spicy preparations.

Medium chain triglyceride of coconut oil is rather tasteless with great flavour and aroma. It makes the preparations palatable without imparting any strong taste. The composition can be granulated with MCT. The preferred process is blending of all solids and causing adsorption of MCT oils onto the solids. The mixture is then vacuum dried to obtain powder / granules which can be compressed to obtain tablets. The Medium chain triglyceride of coconut oil is used as a palatable taste modifier for Fenugreek powder. Fenugreek can also be used as a palatable ingredient to induce slight bitter taste. Further neem powder also can be used.

For patients with mild chronic hyponatremia, sodium chloride and salt preparations are provided. Recently, sodium chloride tablets are also recommended every 2 hrs. Taste masking of such tablets is very crucial. Around 6 g of sodium chloride can be administered over a day by administering small doses of sodium chloride. MCT of coconut oil is used as a palatable ingredient for such tablets and the composition is provided in table 11. Two tablets provide a dose of 660 mg. Total 9 administrations over a day can provide a dose of around 5.9 g of sodium chloride. The dose can be adjusted as per the actual requirement.

Thus, taste modifier can be sweet tasting, spicy, sour tasting, salty or even slight bitter. The invention does not want to restrict to a specific list of the taste modifiers to make the compositions palatable.

In one embodiment, 86 parts of palatable composition is mixed with 12 parts of taste masking composition and 2 parts of other ingredients to provide 100 parts of palatable taste masking composition or taste masking palatable composition. The 86 parts of the palatable composition comprise of fructose. The 12 parts of the taste masking composition comprises 10 parts of fructo-oligosaccharide and 2 parts of glucose oxidase.

In yet another embodiment, 84 parts of the palatable composition comprises 64 parts of fructose and 20 parts of xylitol and is combined with the 16 parts of the taste masking composition comprising 15 parts of fructo-oligosaccharide and 1 part of glucose oxidase.

Preferably, palatable composition is in larger proportion than the taste masking composition. Preferably, palatable composition is at least 30 – 50 %, more preferably at least 70 % and most preferably at least 80 % of the palatable taste masking composition. In an embodiment, palatable composition is 80 parts and taste masking composition is 20 parts. In another embodiment, palatable composition is 90 parts and taste masking composition is 10 parts.

However, amount of taste modifier incorporated in any palatable taste masking composition depends on the strength of the taste modifier. For example, for spicy preparations, it is not needed to add taste modifier imparting spicy taste in an amount of at least 30 %. The same is the case when slight bitter taste is induced by neem or fenugreek powders as taste modifiers.

The palatable taste masked composition comprises fructo-oligosaccharide and glucose oxidase enzyme in a ratio from around 19:1 to 1:5. This combination can be used for taste masking of several ingredients which are bitter/ astringent / metallic taste / pungent taste /

spicy taste / alcoholic taste / chalky taste/ salty taste or any other undesirable taste such as obnoxious taste. Typically, such placebo occupies at least 80 %, at least 90 % and at least 95 % of the composition. Thus, the amounts of actives are 20 % or less, preferably 10 % or less and most preferably 5 % or less.

5 However, invention also provides certain systems wherein actives such as stevia or other high intensity sweeteners having undesirable taste / aftertaste can be used in concentrations higher than 20 %, such as 33 % and even 50 %. Some of these systems include stirrer cum dispensers for sweetening drink etc.

10 Taste masking compositions and most of the palatable taste masking compositions are essentially soluble compositions and hence, any formulation such as solid oral, liquid orals, suspensions, coated preparations can be easily prepared out of these compositions. They can be compacted or compressed by adding one or more of diluent, disintegrants, binders, lubricants, anti-adherents, glidants, anti-caking agents and if required, solubilizing agents are also added. Oral gels or films by incorporating suitable polymers and gelling agents can
15 be prepared. The formulation type prepared depends on the nature and desired administration form of the substance and products having undesirable taste with which they are intended to combine.

Table 2 provides various palatable compositions and table 3 provides various palatable taste masking compositions.

20 In a third aspect, the invention relates to palatable taste masked composition or taste masked palatable compositions comprising taste masking compositions and palatable compositions and at least one substance or product with undesirable taste.

25 Either the palatable taste masking compositions are produced first and then combined with substances or products having undesirable taste or each ingredient of palatable taste masking composition is added separately and combined with substances or products having undesirable taste. When palatable taste masking compositions are first produced, they are produced by combining taste masking compositions with palatable compositions.

In an embodiment, palatable taste masked composition of stevia comprises of stevia, fructo-oligosaccharide, glucose oxidase, fructose and xylitol.

30 In another embodiment, palatable taste masked composition of Capsaicin is prepared. Capsaicin, cinnamon, black pepper are medicinally beneficial actives but have strong spicy tastes. Taste of such substances can be masked with palatable taste masking composition

comprising fructo-oligosaccharide, glucose oxidase and MCT of coconut oil with at least 40 % lauric acid.

When MCT of coconut oil with at least 40 % lauric acid is used as a taste modifier, the formulation can be preparation of granules of active, fructo-oligosaccharide and glucose oxidase with MCT. The oil is adsorbed on the solids and vacuum drying of the mixture is used to produce powder / granules. Any low temperature drying / process is feasible. Freeze drying is also another alternative.

For certain pungent tasting food, combination of such food with fructo-oligosaccharide and glucose oxidase as taste masking composition and Moringa as a taste modifier provide palatable taste masked compositions.

In this aspect, the invention relates to palatable taste masked compositions of substances and products which had undesirable taste before preparing such compositions. The palatable taste masked composition comprises at least following i) a substance or product such as an active having undesirable taste such as a bitter/ astringent / metallic taste / pungent taste / spicy taste / alcoholic taste / chalky taste/ salty taste or any other undesirable taste such as obnoxious taste, ii) taste masking composition having a taste masking agent and iii) palatable composition having a taste modifier.

In a first embodiment, a substance having undesirable taste is stevia or steviol-glycosides, mainly 98 % pure Stevia or stevioside or rebaudiosides or rebaudioside A, collectively referred hereinafter as Stevia. Stevia's taste has a slower onset and longer duration than that of sugar, and some of its extracts may have a bitter taste and /or Licorice like aftertaste. Despite being a natural sweetener, market of stevia is largely uncaptured and unexploited due to several taste problems associated with it. The successful taste modifying agents amongst all include sugar alcohols and saccharides and they can mask up to 60 % of bitter taste / aftertaste of stevia. However, the consumer compliance is poor and consumers often keep on changing different formulations and different brands.

In an embodiment, the substance of undesirable taste is an active compound having bitter/ astringent / metallic taste / pungent taste / spicy taste / alcoholic taste / chalky taste/ salty taste or any other undesirable taste such as obnoxious taste wherein the substance is neem, fenugreek, guduchi, licorice or any constituent or component from neem, fenugreek, guduchi, licorice etc.

In yet another embodiment, the active can be any high intensity sweetener selected from the group consisting of aspartame, acesulfame-K, neotame, cyclamates, saccharin, sucralose, neohesperidin dihydrochalone, alitame, stevia sweeteners, glycyrrhizin, thaumatin and any mixture / combination thereof.

5 In yet another embodiment, the substance of undesirable taste is a medicinal active or nutraceutical active such as antibiotic, antacid, active ingredients of cough syrups, B-complex preparations, liquid protein (hydrolysate), protein powders, hematinic preparations, actives and products for constipation etc.

Medicinal actives with undesirable tastes include, but are not limited to diclofenac, paracetamol, donepezil, metronidazole, tramadol, paroxetine, quinine, loperamide, sildenafil, topiramate, citalopram, mirtazapine, desloratadine, enalapril, lorazepam, zopiclone, selegline, lorazepam, risperidone, ondansetron, olanzapine, almotriptan, frovatriptan, naratriptan, sumatriptan, zolmitriptan, rizatriptan, cimetidine, ranitidine, famotidine, nizatidine, etnidine, lupitidine, nifentidine, niperotidine, roxatidine, sulfotidine, tuvatidine, zaltidine, penicillin, ampicillin, erythromycin, acetaminophen, caffeine, dextromethorphan, diphenhydramine, theophylline, spironolactone, chlorpheniramine, nabumetone, ibuprofen, naprosyn, ketoprofen, astemizole, azatadine, brompheniramine, cetirizine, chlorpheniramine, clemastine, cyproheptadine, dexchlorpheniramine, dimenhydrinate, diphenhydramine, doxylamine, hydroxyzine, loratadine, phenindamine, terfenadine, tripeleminamine, effective salts thereof and derivatives thereof. Based on the properties of the actives, a suitable process is selected.

Table 4 provides various palatable taste masked compositions of substances having undesirable bitter taste before taste masking.

Most of the present palatable taste masking compositions are essentially soluble compositions with very low or no insoluble matter and hence they can be added even to manufactured products with undesirable taste such as antibiotic preparations, B-complex preparations, liquid protein (hydrolysate), protein powders, hematinic preparations, products for constipation etc.

Table 5 and table 6 provide various palatable taste masked compositions of Stevia. The taste masked compositions comprising stevia or one or more steviol glycosides are formulated into solids as well as liquid compositions. The stevia or steviol glycosides can be used in up to 50 % of total composition. Saccharides or polyols are most preferred taste

modifying agents and are added in amounts at least 10 %, preferably at least 20 % and most preferably at least 25 % of the total composition.

In an embodiment, the saccharide is Crystalline Fructose is used in amounts of 45 – 55 %.

In another embodiment, sugar alcohol is erythritol and used in amounts of 13 % and 25 %.

5 In yet another embodiment, sugar alcohol is xylitol and used in amounts of 25 and 37 %.

In a preferred embodiment, combinations of sugar alcohol and saccharides are used as provided in table 5.

10 It is noted by the inventors that even when high percentage of saccharide or sugar alcohol or combination of saccharide and sugar alcohol are used, bitter taste and aftertaste of stevia persists. Inventors of the present invention formulated a composition comprising i) 10 % stevia / steviol glycoside, ii) 50 % fructose and iii) 40 % xylitol. However, even with such high percentages of saccharides and sugar alcohol they could not mask the bitter taste of stevia. Hence, along with sweet and pleasant taste of fructose and soothing effect of sugar alcohol, taste masking agent was essential.

15 Taste masking agent is any agent which when added in a formulation completely relieves consumer tasting such formulation from the bitter taste / aftertaste of any constituent present in such formulation.

20 Such formulation can be directly tasted to ensure complete absence of bitter taste / aftertaste. Alternatively, if the composition is a soluble composition, a 10 % solution of such composition is prepared and tasted.

After several trials with various taste masking agents, the formulations comprising fructo-oligosaccharides are found most suitable amongst all others. However, these formulations did not show complete absence of bitter taste / aftertaste of stevia.

25 Surprisingly, it is noted by the inventors of the present invention that when glucose oxidase enzyme is added to the fructo-oligosaccharide containing formulations of stevia, complete taste masking occurs.

30 Further when such combination of fructo-oligosaccharide and glucose oxidase is used, taste masking of several other substances and products having undesirable taste is observed when glucose oxidase is added in at least 5 % amount of the total composition of fructo-oligosaccharide and glucose oxidase.

Inventors have surprisingly observed that when Glucose oxidase enzyme, which is chosen by the inventors to alleviate or to get rid of side effects associated with saccharides and sugar alcohols particularly when such saccharides and sugar alcohols are used in preparations which are consumed over longer duration, along with fructo-oligosaccharide provides excellent taste masking of actives.

Mixture or combination of fructo-oligosaccharide and glucose oxidase enzyme in amounts of at least 5 % are found to completely eliminate bitter taste / aftertaste of stevia containing formulations. Accordingly taste masking compositions of the present invention are designed. Taste masking compositions are directly used for products wherein adding taste modifier such as saccharide or sugar alcohol is not required. Such products either do not need taste modifier or they already contain taste modifier or they contain any other alternative to taste modifier.

However, when saccharide or sugar alcohol are desired, palatable taste masking composition should be used which not only masks the taste but makes the substance or product more palatable.

In an embodiment, the total amount of fructo-oligosaccharide and glucose oxidase enzyme is 5.5 % having 0.5 % of glucose oxidase and rest, a fructo-oligosaccharide.

In another embodiment, a compressed cube of 100 mg has 16 mg of stevia, 1 mg of glucose oxidase, 5 mg of fructo-oligosaccharide, 47 mg of fructose, 2 mg of anti-caking agent and rest xylitol. Preferred anticaking agent is silicon dioxide, calcium silicate or their combinations. However, any anti-caking agent can be added in amounts from 0.1 to 3 %.

In yet another embodiment as provided in table 10, a pellet / tablet composition having 8 mg of stevia is provided. In one more embodiment, a pellet / tablet around 100 mg of weight similarly contains 16 mg of stevia.

The advantage of such formulations is that a high concentration of stevia can be used. Thus, in a composition of 100 mg, up to 20 % of stevia can be incorporated.

Further, it is possible to incorporate up to 33 % and 50 % of stevia of the total composition in such taste masked palatable compositions of stevia. In an embodiment, such taste masked palatable compositions of stevia in the form of powder or granules or pellets are added inside a stirrer having a capillary for capillary action. The stirrer with stevia sweetener composition when used to stir a drink, the taste masked palatable compositions of stevia being soluble compositions, are dissolved instantaneously in the liquid drink which rises in

the capillary and the sweetened drink is then mixed with the rest of the drink. The stirrer acts as a stirrer cum dispenser of sweetener. The time required for composition to get dissolved in the drink is less than 2 minutes, preferably less than a minute and most preferably less than 45 seconds.

5 Such stirrers are preferably 100 - 200 mm long with 2 - 4 mm diameter. In an embodiment, stirrer has circular cross section. In another embodiment, it has square or rectangular cross section. In a stirrer with rectangular cross section, the smaller side of the cross section can be of 1-2 mm and larger side can be from 5 – 8 mm.

10 The figure 1 provides a design A with a hollow stirrer of diameter 2 – 4 mm. The palatable taste masked stevia composition in the form of pellets or tablets can be added in the hollow stirrer such that due to their diameter, the pellets or tablets stay inside the stirrer. Some other technique or means also can be used to allow pellets to stay inside the stirrer. By adding new means even powder and granules can be filled inside such stirrer. Design B is a design of a solid stirrer which has a square cross section of 2 - 4 mm. The stirrer tip is
15 coated with suitable coating solution having taste masked or palatable taste masked stevia compositions.

In such stirrers, without any limitation stevia from 4 mg to 64 mg can be used. Stevia is one of the high intensity sweeteners. Other sweeteners can also be used with or without stevia. Such other sweeteners include aspartame, acesulfame-K, neotame, cyclamates,
20 saccharin, sucralose, neohesperidin dihydrochalone, alitame, glycyrrhizin, thaumatin and the likes and any mixture / combination thereof.

When other sweeteners are used for example sucralose, a combination of 8 mg of Stevia and 8 mg of sucralose can be formulated into pellets or tablets by using taste masking or palatable taste masking composition and such pellets or tablets are filled in the hollow
25 stirrer. By adding suitable means to the stirrer, sucralose and stevia palatable tasked masked compositions in the form of powder or granules can also be incorporated.

In an embodiment, the amount of stevia is around 16 mg and taste masking or palatable taste masking composition amounts to 32 mg (around 33 % of stevia). In yet another embodiment, the amount of stevia is around 16 mg and rest of the components amount to
30 48 mg (25 % of stevia). In yet another embodiment, the amount of stevia in such composition is around 32 mg and rest of the components amount to 32 mg (50 % of stevia).

When stevia compositions are placed inside a hollow stirrer to dissolve by a capillary action, a suitable material of construction for the stirrer should be sought considering safety of using such two in one stirrer (stirrer and dispenser) along with hot drinks.

Palatable taste masked stevia compositions are also coated on various solid stirrers or stirrers having pockets or engravings. When the stirrer is used to stir and sweeten the drink, the coating on the stirrer comprising soluble palatable taste masked stevia compositions get instantly dissolved in the drink, sweetening the same. The time required for composition to get dissolved in the drink is less than 2 minutes, preferably less than a minute and most preferably less than 45 seconds.

Usually, when stevia composition is coated on to a stirrer, stirrer is a solid stirrer such as preferably a wooden stirrer, bamboo stirrer, edible food grade stirrer such as soup sticks bread sticks etc. optionally with pockets or engravings. Any other solid material having safe use with hot drinks is also preferred.

The total coated matter on the solid stirrer with or without pockets or engravings will vary based on the size of stirrer selected. In an embodiment, the total amount of palatable taste masked stevia composition is around 32 mg having 8 – 16 mg of stevia. In another embodiment, after coating of total of 96 mg of palatable taste masked stevia composition comprising 16 – 32 mg of stevia, another coating of 40 – 50 mg is applied thus the total coating material may go up to 150 mg per stirrer. In an embodiment, the said another coating is preferably that of a sugar.

It is understood that neither the design nor the material of construction or the amount of composition in any way restrict the scope of the invention. They are merely provided for understanding. Invention provides palatable taste masked composition of stevia with or without any other sweetener filled inside or coated onto or both filled inside and coated onto a stirrer which acts as a two in one i.e. stirrer and dispenser of such palatable taste masked composition of stevia.

In figure 1, design B represents a solid stirrer without pockets or engravings onto which palatable taste masked composition of stevia is coated.

In figure 2, design C, D, E and F represent a solid stirrer with pocket or engravings onto which palatable taste masked composition of stevia is coated.

It is estimated that stevia is 300 times sweeter than sugar. Hence for one teaspoon of sugar which has around 4.77 g of sugar (or 4.8 g of sugar), around 16 mg of stevia is sufficient.

If such small quantity of sweetener can be delivered in similarly small unit quantity of composition, it is most desirable.

Further, liquid compositions are prepared as provided in table 9. In liquid compositions, 16 g of stevia and other ingredients are added to water and stirred. The mixture or solution is boiled preferably to sterilize, and the boiled and cooled solution is filled in sterile bottles of around 10 ml capacity in sterile atmosphere.

Liquid compositions are similar to solid compositions except that they may not contain anti-caking agent but may contain food preservatives. Any food preservative can be added in amounts from 0.001 to 0.1 % concentration, preferably in 0.01 to 0.05 % concentration. The preferred food preservatives are sodium benzoate and potassium sorbates and their mixtures. Natural preservatives such as moringa and rosemary extract can also be used.

Around 100 ml of liquid composition has 16 g of stevia which is 16,000 mg of stevia. Therefore, 0.1 ml (or 100 microliter = 2 drops) of liquid composition has around 16 mg of stevia. Since one teaspoon sugar corresponds to 16 mg of stevia, 2 drops of the liquid composition can be added to get sweetness of 1 teaspoon of sugar and four drops can be added to get sweetness of 2 teaspoon of sugar and one drop can be added to get sweetness of 1/2 teaspoon of sugar.

Hence, under the third aspect, a small unit size of composition is achieved by choosing a bitter active, taste masking compositions comprising taste masking agent which is a combination of fructo-oligosaccharide and glucose oxidase and palatable composition comprising a taste modifying agent such as carbohydrate, polyol or sugar alcohol.

Table 7 of Examples 7 provide various compositions according to this aspect. Formulation C of example 6 and formulations I, J, K and N of example 7 are not part of the inventions and are provided for comparison only. These comparative examples provide that unless a mixture or combination of fructo-oligosaccharide and glucose oxidase enzyme is used, mere use of high concentrations of saccharides and sugar alcohol cannot eliminate bitter taste / after taste of stevia.

In one embodiment, fructo-oligosaccharide and glucose oxidase enzyme are used in a ratio from around 19:1. In a second embodiment, fructo-oligosaccharide and glucose oxidase enzyme are used in a ratio from around 10:1. In another embodiment, a ratio of 5:1 is used and in yet another embodiment ratio of 3:2 is used.

In table 10 are provided powdered stevia compositions for sachet filling having fructo-oligosaccharide and glucose oxidase enzyme in a ratio from around 6.66:1. In another embodiment of table 10, fructo-oligosaccharide and glucose oxidase enzyme in a ratio from around 7.5:1 is provided. These compositions A and B of table 10 contain 16 mg or 32 mg of stevia.

Table 10 provides taste masked palatable stevia compositions in which stevia concentrations are less than 5 % preferably around 3.2 % and 1.6 %. In such compositions where large amounts of placebo are required, and active concentrations are low, this type of placebo is useful.

In a fourth aspect, the present invention covers digestive compositions incorporating certain substances having digestive problems wherein such digestive problems associated with those substances are resolved. Digestive compositions of the present invention can be combined in any food or nutraceutical product and even in pharmaceutical product. All ingredients used to prepare digestive compositions are commonly known ingredients.

There is restriction on the use of some of the ingredients because of several digestive problems associated with them. Present invention has resolved these problems by simple modifications. Fructose is commonly used saccharide. Some people do not absorb all of the fructose they eat. This condition is known as fructose malabsorption, which is characterized by excessive gas and digestive discomfort. By adding glucose oxidase to Fructose, inventors of the present invention have resolved this issue. Another commonly used ingredient in industry is Polyol or sugar alcohols. Polyols for e.g. xylitol and erythritol, are known for laxative effect Hence, there is a limit on consumption of polyols in diet. Adding glucose oxidase to polyols and sugar alcohol resolves this issue. Further the digestive compositions preferably contain fructo-oligosaccharide. The invention provides a composition having high percentage of sugar alcohol or saccharide or both and a glucose oxidase enzyme wherein the composition is devoid of any digestive problems such as poor absorption, poor digestibility, bloating, diarrhea and similar GI tract problems which usually occur when compositions having high percentages of sugar alcohol and / or saccharides are consumed.

It is further advantageous if such compositions have dietary fibers such as fructo-oligosaccharides, beta glucans or fenugreek galactomannan. Such compositions have at least 30 %, preferably at least 40 % and more preferably at least 50 % of saccharides such as fructose or sugar alcohols such as xylitol, erythritol or mannitol.

Despite having high amounts of fructose or sugar alcohols, no side effects such as poor absorption, poor digestibility, bloating, diarrhea or any similar GI tract problems were observed.

In such compositions, glucose oxidase is present from 0.01 to 20 %, preferably from 0.05 % to 20 % and most preferably from 0.5 % to 20% of the final composition.

In an embodiment, glucose oxidase is from 1-6 % of the total composition. In another embodiment, glucose oxidase is from 6 – 10 % of the total composition.

In one embodiment, the digestive composition or placebo comprises i) glucose oxidase 10 %, ii) xylitol 55 % and fructose 20 %. Another embodiment contains 2% of Glucose oxidase enzyme, 64% of Fructose and 20% of xylitol. Both the embodiments have fructo-oligosaccharide.

Table 15 of example 15 provides three such compositions A, B and C which are in nature of nutraceutical compositions and are completely devoid of any GI tract related problem. The ingredient responsible to eliminate any GI tract problem is glucose oxidase enzyme.

Out of the three compositions, composition having minimum glucose oxidase i.e. a composition with 2 % glucose oxidase is subjected to Hydrogen Breathe Test along with composition D which is devoid of glucose oxidase. This test demonstrates that administration / consumption of composition having high percentages of fructose result in increase in hydrogen gas in the breath of the subject due to fructose malabsorption. This provides discomfort and patients avoid taking any composition having fructose. In this test, two sets of subjects are prepared as provided under chart of example 16. These subjects were kept on a specific diet having low amounts of any fermentable carbohydrate. For both the sets, fasting breath sample is collected, and hydrogen gas in such initial samples is estimated. Then, one set of subjects are given composition B having 84 % of combination of fructose (a saccharide) and xylitol (a sugar alcohol) whereas another set of subjects are given composition D which does not contain glucose oxidase but almost similar amount (86 %) of combination of fructose (a saccharide) and xylitol (a sugar alcohol). The test is performed as shown in chart 1 under example 16. The breath samples are collected again. The breath samples of subjects to whom composition D was given showed prominent rise in Hydrogen gas. The breath samples of subjects to whom composition B was given showed negligible rise in Hydrogen gas. This test provides that the digestive compositions of the present invention completely relieves the consumer consuming such composition from the

dietary problems otherwise associated with such ingredients such as fructose or saccharide and sugar alcohol.

In the fourth aspect, the invention relates to a digestive composition comprising glucose oxidase and at least one of the digestive enzymes.

5 The digestive enzymes can be one or more from papain, bromelain, lipase, amylase, glucoamylase, beta glucanase, Fructosyl Transferase, xylose isomerase, protease, nattokinase, glucoamylase, beta glucanase, Fructosyl Transferase, xylose isomerase, and protease and such similar digestive enzymes known to person skilled in the art.

10 In an embodiment, digestive enzyme is betaglucanase. In yet another embodiment the digestive enzyme is amylases. In one more embodiment, the digestive enzyme is bromelain., xylose isomerase, lipase, fructosyl transferase, bromelain and protease.

The digestive composition further comprises one or more nutritive health-markers. A nutritive health marker is any nutritive compound such as vitamin, minerals, essential or branched chain amino acids, carotenoid, antioxidants, Proanthocyanidins, digestive fibres,
15 Sulforaphane type of compounds, prebiotics and probiotics and other nutritive compounds known in the art.

In an embodiment, the digestive composition can further include at least one of the nutritive health-markers selected from

20 i) Oats / Barley Beta Glucans, Glucomannan, Fenugreek saponins and Galactomannans, and fructo-oligosaccharide if not included in original composition.

ii) Antioxidant berries: Bilberry, Blueberry, Strawberry, Gooseberry, Raspberry;

iii) Oligomeric Proanthocyanidins from Pine bark, Grapes etc,

iv) Resveratrol from Grape skin,

v) Astaxanthin from Microalgae,

25 vi) Lutein, Zeaxanthin and Lycopene from various fruits and vegetables like carrots, oranges, Tomatoes etc,

vii) Sulphoraphane, DIM from Broccoli,

viii) Minerals: selenium, Chromium, Magnesium, Potassium, Iodine, Iron, Manganese, Phosphorus etc,

ix) Vitamins B12, D3, B group vitamins, C, E, A and Carotenoids etc,

x) Essential Amino acids and Branched chain amino acids;

xi) MCT of coconut oil which is a super power nutrient for immunity boost and helpful in treating various Neurodegenerative Disorders like Alzheimer's, Parkinson's, Stroke, Multiple sclerosis, Insomnia and depression;

xii) Micro organisms which are involved in food flavourings and taste enhancers;

xiii) Moringa oleifera. It has 92 Nutrients, 48 Antioxidants and 71 antimicrobials which help mask various undesirable tastes and aromas

xiv) Pancreatic enzymes, lipase and bromelain from pineapple plays significant role in SBMT. The enzymes help metabolism of not only carbohydrates but also helps in optimum digestibility of proteins and fats.

In an embodiment, the digestive composition further comprises prebiotics such as Fructo - oligosaccharides, and / or probiotics of lactobacillus, Bifidobacterium, species for optimising immunity.

These digestive compositions are further processed into various food and nutraceutical compositions.

Fifth aspect of the invention is to provide a simple and economical process to prepare taste masking compositions, palatable taste masking compositions, palatable taste masked compositions, digestive compositions and compositions incorporating taste masking compositions and at least one additional ingredient as described above. Since the taste masking compositions and most of the palatable taste masking compositions are essentially soluble compositions / almost soluble compositions, and also stable and almost neutral / near neutral compositions, they can be used in preparing solid or liquid oral delivery forms, suspensions, compacts and compressed forms, mouth dissolve tablets, oral gels and films and many other forms and accordingly wide variety of processes such as blending, compacting, compressing, granulation, coating, spray drying, extrusion and /or spheronization and several other processes can be adopted.

When taste modifier is one or more of saccharides and sugar alcohols, simple blending, granulation and low temperature drying etc. are preferred. With MCT of coconut oil, adsorption of MCT oil on solids and vacuum drying of the mixture is preferred.

Further, the invention also provides study on certain glucose oxidase compositions useful to treat Alzheimer's or its symptoms such as cognitive impairment symptoms. Such compositions are invented and provided in PCT applications as follows: PCT/IN2017/000084 and PCT/IN2017/050332. Under this aspect, further a study "Mini-Mental State Examination" hereinafter MMSE is conducted using compositions of tables 15. The MMSE study as provided under example 12 involves analysis of various cognitive functions of the patients including studying the effects of medicines on at least few following functions: Orientation, Registration, Attention and Calculation, Recall, Language, Copying.

A test of 30 marks is designed based on materials already known and available. If a patient scores 24 and above, no cognitive impairment is reflected. If patient scores from 18 – 23, a mild cognitive impairment is reflected and if patient scores from 0 – 17, a severe cognitive impairment is reflected.

From various known patients, five patients with severe cognitive impairment are selected.

One patient did not enroll in the study and the study began with four patients. Two patients were given composition Y of table 12 having 20 % of glucose oxidase enzyme and the other two patients were given another composition X of table 12 having 10 % of glucose oxidase enzyme. These two compositions are provided in table 12. Each patient was given 25 g of composition per day. The first composition thus delivered 5 g of glucose oxidase per day (20 % of 25 g) whereas the second composition delivered 2.5 g of glucose oxidase per day (10 % of 25 g).

The first two patients did not complete the treatment beyond one month. The two remaining patients, both above 60 years of age have successfully completed six months and three months treatment respectively and the studies are presented in tables 13 and 14 below.

In a first study presented, a female patient of age 61 was treated with composition from table 12. The treatment continued for 7 months from June 2017 to January 2018. The patient had initial score of 13 which changed to 22 after 4 months and 24 after 7 months.

In a second study presented, a male patient of age 84 was treated with composition from table 12. The treatment continued for 4 months from September 2017 to January 2018. The patient had initial score of 9 which changed to 16 after 3 months and 23 after 4 months.

These compositions are being tested on larger set of patients and very promising results are underway.

Thus, present invention provides various useful compositions. Glucose oxidase enzyme in the composition eliminates fructose malabsorption problem resulting in no Hydrogen production in the above test. This is encouraging for those who experience serious digestibility problems especially diets rich in fructose.

In an embodiment, fibre and micronutrients enriched fruits and vegetables like Pumpkin, Bottle guard, Pomegranate, Pineapples, Apples (Pectin, Quercetin), Amla etc can be used with this taste masking and/or digestive composition to make wide variety of Natural and Tasty food products such as Jams / Fruit spread, Vegetables relish Mayonnaise, Vegetables and fruit based yoghurts, Jellies, Pickles, Sauces, Juices, Beverages, Snack foods, Ice creams, with great number of health benefits

The compositions of the present invention can be combined with oats, millets, teff, quinoa, lentils etc to make healthy and tastier diet options for optimum digestibility and absorption of dietary fibers like beta glucan in oats, Vitamins, Minerals etc which can be targeted as Gluten free and low glycemic load options for weight conscious.

The palatable taste masked and/or digestive compositions of the present invention can be formulated into various solid and liquid dosage forms based on the substances and products with which they are combined. For example, they can be given in hard or soft capsule or tabletted into tablets, in the form of pellets or cubes or provided in the form of sachets and kits thereof. They can be also provided in oral gel and film forms by combining with one or more suitable gelling or film forming agent or polymer. Some of the forms include Powder composition, granule compositions, crystalline compositions, pellet, pill, tablet, hard and soft capsule compositions, pellet compositions, powder for oral suspensions, liquid solutions and suspensions and sterile preparation and kits.

Without limitations, following embodiments describe various aspects of the present invention.

EXAMPLES:

EXAMPLE 1

Table 1 -Taste masking composition

Ingredients / Composition	CE	A	B	C	D	E	F	G	H

Fructo-oligosaccharide	96	95	83.3	50	66.6	33.4	93.75	75	90.9
Glucose oxidase	4	5	16.7	50	33.4	66.6	6.25	25	9.1
Ratio	24:1	19:1	5:1	1:1	2:1	1:2	15:1	3:1	10:1
Active	1 part of Guduchi powder is mixed with 99 parts of above mixture of Fructo-oligosaccharide and Glucose oxidase.								
Taste masking	++	+++	+++++	+++	+++	+++	+++++	++++	+++++
Palatability	++	++	++	-	+	-	++	++	++
CE: Comparative example; - No palatability; + Below Avg palatability; ++ Avg. palatability, +++ Good palatability, ++++ Very Good palatability; +++++ Excellent palatability									

Process

- 1) Weigh desired quantities of Fructo-oligosaccharide and Glucose oxidase and blend in a double cone blender of suitable size for 10 minutes.
- 2) Weigh 1 part of Guduchi powder (100 mg) and mix with 99 parts (9.9 g) of mixture of Fructo-oligosaccharide and Glucose oxidase prepared in step 1 to prepare second mixture.
- 3) Check taste masking and palatability of the second mixture.

Observation

- 1) Acceptable level of taste masking is noted for a mixture of Fructo-oligosaccharide and Glucose oxidase in a ratio from 19: to 1:2;
- 2) Good to Very Good level of taste masking is noted for a mixture of Fructo-oligosaccharide and Glucose oxidase in a ratio from 19: 1 to 3:1;
- 3) Excellent level of taste masking is noted for a mixture of Fructo-oligosaccharide and Glucose oxidase in a ratio from 15:1 to 5:1.

EXAMPLE 2

Table 2 -Palatable composition

Ingredients / Composition	A	B	C	D	E	F
Fructose	100	88	82		50	
Xylitol	-	12	18		50	
MCT of coconut oil preferably with at least 40 % lauric acid				100		
Moringa (powder / extract / oil)						100

Process

i) Weigh desired quantity of Fructose or quantities Fructose and xylitol and blend in a double cone blender of suitable size for 10 minutes; OR

5 i) Weigh desired quantity of MCT of coconut oil OR

i) Weigh desired quantity of moringa powder; AND

ii) Optionally process further to prepare palatable compositions.

EXAMPLE 3

10 **Table 3 -Palatable taste masking composition**

Ingredients / Composition	A	B	C	D	E
Fructose	86	64	-		-
Xylitol	-	20	-		-
MCT of coconut oil with at least 40 % lauric acid			88 - 89	74 - 75	
Moringa powder					75 - 77

Fructo-oligosaccharide	10	15	10	20	20
Glucose oxidase	2	1	1	4	3
Other ingredients	2	-	0 - 1	0 - 1	0 - 2

Process:

Weigh desired quantities of all ingredients and

- 5 i)blend Fructose or Fructose and xylitol with Fructo-oligosaccharide and glucose oxidase to obtain blend of palatable taste masking composition; OR
- i)Blend Fructo-oligosaccharide and glucose oxidase and add MCT of coconut oil to cause its adsorption on the solids , and vacuum dry the mixture to obtain powder; OR
- i)blend moringa powder with Fructo-oligosaccharide and glucose oxidase to obtain blend of palatable taste masking composition; AND
- 10 ii) optionally further process the mixture /powder to prepare palatable taste masking compositions.

EXAMPLE 4**Table 4 -Palatable taste masked composition**

Ingredients / Composition	A	B	C	D
	%			
Substance with undesirable taste	Up to 20	50	Up to 10	Up to 10
Fructose	65 - 70	25 - 30		
Xylitol	-	-		
Fructo-oligosaccharide	10	15 - 20	10 - 15	10 - 20
Glucose oxidase	1	2 - 4	1 - 2	1 - 4
MCT of coconut oil with at least 40 % lauric acid.	-	-	70 - 80	-
Moringa powder	-	-	-	60 - 70
Dietary soluble fibers (Pectin, Gums, Carrageenan, Alginates,	Up to 2	-	-	Up to 2

Sea weed polysaccharides, Quercetin)				
Other ingredients Lubricants / glidants / anti-caking agents/ anti-adherents	Up to 2	Up to 2	Up to 2	Up to 2

Process:

Weigh desired quantities of all ingredients and

i) blend substance with undesirable taste, Fructose or Fructose and xylitol with Fructo-oligosaccharide and glucose oxidase to obtain blend of palatable taste masked composition;
OR

i) Blend substance with undesirable taste, Fructo-oligosaccharide and glucose oxidase and add MCT of coconut oil to cause its adsorption on the solids , and vacuum dry the mixture to obtain palatable taste masked powder; OR

i) blend substance with undesirable taste, moringa powder, Fructo-oligosaccharide and glucose oxidase to obtain blend of palatable taste masked composition; AND

ii) optionally further process the palatable taste masked compositions to prepare final palatable taste masked compositions.

EXAMPLE 5

Table 5 -Palatable taste masked stevia composition

Ingredients	Weight %
Stevia	Up to 20 %
Glucose oxidase	Upto 10 %
Saccharide (Mono and Disaccharides) Fructose	Up to 60%
Polyols-Xylitol, Erythritol, Maltitol	Up to 50%
Fructo Oligosaccharides, Inulin	Up to 20%
Dietary soluble fibers (Pectin, Gums, Carrageenan, Alginates, Sea weed polysaccharides, Quercetin)	Up to 10%
Lubricants / glidants / anti-caking agents/ anti-adherents	Q.S.

The above composition eliminates the bitterness and bitter aftertaste of stevia.

Process

- i) Weigh and mix all ingredients to prepare a blend.
- ii) Fill the blend in sachet or compress into cubes / pellets / tablets.

5 **EXAMPLE 6****Table 6 - Palatable taste masked stevia composition**

The different compositions A to E as presented in the below table are prepared.

Ingredients	Ingredients in %				
	A	B	C	D	E
STEVIA 98% Steviol glycosides	10	15	10	15	12
Crystalline Fructose	47	55	50	38	40
Fructo Oligosaccharide (FOS)	5	3	0	10	5
Xylitol	37	25	40	0	25
Glucose Oxidase Enzyme	1	2	0	2	5
Erythritol	0	0	0	35	13
Total	100	100	100	100	100
Taste	No bitterness	No bitterness	Bitter	No bitterness	No bitterness

Process: same as under example 5

The following are the observations:

- 10 i) Stevia has Bitter, Metallic and Astringent aftertaste.
- ii) The composition C does not include Glucose Oxidase Enzyme and FOS but includes xylitol. However, the use of only xylitol does not mask the bitter taste of stevia.
- 15 iii) Glucose Oxidase Enzyme and FOS has clear synergistic role in bitter masking and removing other objectionable aftertastes such as astringent and metallic. Composition C do not mask the bitter taste.

iv) Glucose Oxidase helps mask aftertaste of steviol glycoside and FOS helps mask Rebaudioside aftertaste

v) Fructose helps in masking bitter aftertaste whereas cooling effect of Xylitol/Erythritol is helpful for masking astringent and other objectionable aftertastes, in presence of Glucose Oxidase enzyme and FOS.

vi) Compositions A, B, D, E did not exhibit any bloating, diarrhoea or laxative effect whereas Composition C revealed strong laxative effect in 15 healthy volunteers. Dosage given: 100g / day for 3 weeks

vii) Composition C does not contain any Glucose Oxidase Enzyme and Fructo oligosaccharide.

viii) This study provides that Glucose Oxidase enzyme and Fructo-oligosaccharide has beneficial effect in overcoming laxative action of polyols.

Bitter herbal extracts like neem, fenugreek, saponins were also tried in above compositions in place of stevia. The compositions A, B, D, E effectively mask the bitter taste of these herbals as well.

EXAMPLE 7

Table 7 - Taste Masking Compositions of Stevia

The different stevia compositions: F, G, H, I, J, K, L, M and N are prepared to show the synergistic effect of using glucose oxidase enzyme and Fructo Oligosaccharide.

COMPOSITIONS	POWDER FORMULATIONS								
INGREDIENTS	%	%	%	%	%	%	%	%	%
	F	G	H	I	J	K	L	M	N
Stevia 98% extract	15	15	15	15	20	20	20	20	20
GOD	5	5	5	0	0	5	5	5	0
FOS	5	5	5	5	0	0	5	5	5
Xylitol	40	45	50	35	30	35	40	45	50
Erythritol	15	10	5	0	5	10	15	20	5

Fructose	20	20	20	45	45	30	15	5	20
Total	100	100	100	100	100	100	100	100	100
Taste	Sweet			Bitter			Sweet		Bitter

Conclusion

Compositions I and N do not include Glucose Oxidase Enzyme. Further, Composition K do not include FOS. The compositions I, N and K do not mask the bitter taste of stevia. The compositions F, G, H, L and M comprising both glucose oxidase and FOS eliminate the bitter taste of stevia completely. In absence of GOD and/or FOS, the bitterness of stevia is not masked completely. Further, the sensory evaluation of these composition is conducted.

Example 8: SENSORY EVALUATION

Summary Sheet

Product: Stevia Compositions

20% solution in water of various compositions carrying codes as F,G,H,I,J,K,L

Number of Evaluators: 15

Sex: 10 Males + 5 Females

Table 8 – Sensory evaluation study and results

SAMPLE CODE: F/G/H/I/J/K/L							
PARAMETERS							
RATING (0 to 5 Scale)							
SAMPLE CODES	F	G	H	I	J	K	L
VISUAL PHASE							
TRANSPARANCY	4	5	5	4	4	4	5
BRIGHTNESS	5	4	5	5	4	5	4
COLOUR	N A -	N A -	N A -	N A -	N A -	N A -	N A -
AROMA							
FRUITY	5	5	5	4	2	3	5

FLORAL	4	4	4	4	3	2	4
HERBAL	1	1	1	3	4	4	1
OBNOXIOUS	0	0	0	0	0	0	0
TASTE							
SWEET	5	5	5	2	3	3	5
BITTER	0	0	0	3	3	3	0
ASTRINGENT	0	0	0	1	3	2	0
METALLIC	0	0	0	3	2	2	0
BITTER METALLIC	0	0	0	3	3	3	0
ALCOHOLIC	N A -	N A -	N A -	N A -	N A -	N A -	N A -
SWEET and PLEASANT	5	5	5	2	2	3	5
AFTERTASTE							
LINGERING SWEET	0	0	0	2	2	3	0
BITTER METALLIC	0	0	0	3	3	2	0
HERBAL	0	0	0	2	2	4	0
OBNOXIOUS	0	0	0	0	2	2	0
OVERALL							
BAD							
GOOD							
VERY GOOD							
EXCELLENT							
Sensory panellist should be non-smoker, non-drinker, not had spicy foods before evaluation like onion, garlic, spices etc.							
RANKING							
VISUAL PHASE:							
From 0 to 5 Scale: Higher the better							

2. AROMA:	
FRUITY	Higher the Better
FLORAL	Higher the Better
HERBAL	Lower the Better
OBNOXIOUS	Lower the Better
3. TASTE	
SWEET	Higher the Better
BITTER	Lower the Better
ASTRINGENT	Lower the Better
METALLIC	Lower the Better
BITTER METALLIC	Lower the Better
ALCOHOLIC	Lower the Better
SWEET and PLEASANT	Higher the Better
4. AFTERTASTE	
LINGERING SWEET	Lower the Better
BITTER METALLIC	Lower the Better
HERBAL	Lower the Better
REMARKS, IF ANY:	
I, J and K Samples Exhibited bitter, metallic aftertaste which was figured out clearly by our Sensory panellists. I – 0%GOD J – 0% GOD and 0% FOS K – 0%FOS So, it may be concluded that GOD and FOS both act as synergistic additives in bitter masking of stevia and other natural herbal extracts.	

EXAMPLE 9

The compositions of the present invention are also prepared in the form of liquid concentrate drops.

Table 9 – Composition of liquid concentrate drops

COMPOSITIONS	LIQUID CONCENTRATE DROPS		
INGREDIENTS	%	%	%
	X	Y	Z
Stevia 98% extract	15	16	14
GOD	2	2	3
FOS	3	4	8
Xylitol	30	25	35
Erythritol	5	0	5
Fructose	15	20	10
Water	30	33	25
Sodium Benzoate	100 ppm	100 ppm	100 ppm
Potassium Sorbate	100 ppm	100 ppm	100 ppm
Total	100	100	100
Taste	Sweet	Sweet	Sweet

Process:

The liquid concentrate drops are prepared by following process:

- 5 i) Add all the components to water and stir well,
- ii) Boil to sterilize,
- iii) Fill in 10 ml sterile bottles in sterile atmosphere.

The 10ml solution provides approximately 200 drops of solution. One drop is equivalent to 1 teaspoon of sugar in sweetness.

EXAMPLE 10

The compositions of the present invention are also prepared in the form of sachet and pellet.

Table 10 – Sachet and Pellet / tablet composition

INGREDIENTS	Sachet (mg)	Sachet (mg)	100 mg pellet / tablet
	A	B	C

Stevia	16	32	8
GOD	20	15	2
FOS	150	100	10
Xylitol	400	253	20
Erythritol	50	100	0
Fructose	364	500	50
Lubricants / glidants / anti-adherents	Q.S.	Q.S.	Q.S.
PRESERVATIVES			
Sodium Benzoate	100 ppm	100 ppm	100 ppm
Potassium Sorbate	100 ppm	100 ppm	100 ppm
Lactose	0	0	10
Total (approx.)	1000	1000	100
	1 sachet = 1 teaspoon of sugar	1 sachet = 2 teaspoons of sugar	2 pellets = 1 teaspoons of sugar

Process

- i) Weigh and mix all ingredients to prepare a blend.
- ii) Fill the blend in sachet or compress into pellets / tablets.

5

EXAMPLE 11

Table 11: Taste masked compositions of Guduchi, Capsaicin, Fenugreek, Salts, garlic powder

Ingredients	%	%	Mg per tablet / sachet		
Sodium chloride and other salts	-	30			330
Guduchi powder	-	-	-	350	-
Capsaicin powder	-	-	50		-

Fenugreek powder or garlic powder	10	-			
MCT of coconut oil with at least 40 % lauric acid	25 - 35	35	-		
Moringa powder	-	-	350		
Glucose Oxidase Enzyme	5	5	12	11	50
Fructo-oligosaccharide /Inulin	50 – 60	25	74	89	300
Fructose	-	-	-	540	400
Flavours	Q.S.			Q.S.	Q.S.
Other ingredients	Up to 3 %	5	14	10	20
Preferred dosage form.	Tablet	Tablet	Sachet / Tablet	Sachet / Tablet	Sachet / Tablet

Process:

For MCT compositions – Solids are mixed together and MCT oil is adsorbed onto the solids. Then the mixture is vacuum dried to obtain powder. The powder can be sifted / subjected to oscillating granulator to reduce lumps if any. The granules are compressed into tablets.

For Sachet compositions – Ingredients are blended and filled in sachets.

For tablets composition - Ingredients are blended and compressed into tablets.

Example 12 – Glucose oxidase Composition For The Mini-Mental State Examination To Arrive At Potential Treatment For Alzheimer's And Neurodegenerative Disorders

TABLE 12 - Glucose oxidase compositions

Ingredients	(wt %)	
	Composition X	Composition Y
Glucose Oxidase Enzyme	10	20
Fructo-oligosaccharide /Inulin	45	25
Beta Glucan	5	25
Galactomannan from Fenugreek	30	
Wheat bran fibre	10	
Mannitol		15
Erythritol		15

The Mini-Mental State Examination (MMSE)

The Mini-Mental State Examination (MMSE) is a measure of cognitive function which was originally designed as a screening tool. It is perhaps the most widely used measure of cognitive function in the world and it is also used by researchers. It consists of 11 items designed to evaluate orientation, memory, attention, language and motor skills. Possible scores range from 30 (severe impairment) to 0 (no impairment).

There is an improvement by factor 5 observed with Alzheimer's patients receiving above composition in a span of 3 months. Average scores up to 25 have been documented.

Simple memory related questions like name, address, relatives name, telephone numbers etc were asked to test the memory, recall and concentration and found good improvement in patients.

Another important observation is enhancement of mood and behavioural pattern of these patients observed.

So, definitely nutrients from above composition are contributing positive factors towards the improvement of cognition in Alzheimer's patients.

With the enhancement of Mood and memory, all above activities noted remarkable improvement while administering the novel GOD Composition to these patients.

It is observed that the composition helps to lower Depression and Anxiety of the patients substantially.

Example 13: MINI MENTAL STATE EXAMINATION (MMSE)

5 Table 13 -MMSE report of Patient of 1

Age: 61 Years

Patient was medically diagnosed as Alzheimer's

One point for each answer DATE:	6/2017	10/2017	1/2018
ORIENTATION Year Season Month Date Time	3/ 5	3/ 5	3/ 5
Country Town District Hospital Ward/Floor	2/ 5	3/ 5	4 / 5
REGISTRATION Examiner names three objects (e.g. apple, table, penny) and asks the patient to repeat (1 point for each correct. THEN the patient learns the 3 names repeating until correct).	2/ 3	3/ 3	3/ 3
ATTENTION AND CALCULATION Subtract 7 from 100, then repeat from result. Continue five times: 100, 93, 86, 79, 65. (Alternative: spell "WORLD" backwards: DLROW).	2/ 5	3/ 5	3/ 5
RECALL Ask for the names of the three objects learned earlier.	2/ 3	3/ 3	3./ 3
LANGUAGE Name two objects (e.g. pen, watch).	1/ 2	2/ 2	2./ 2
Repeat "No ifs, ands, or buts".	0/ 1	1/ 1	1/ 1

Give a three-stage command. Score 1 for each stage. (e.g. "Place index finger of right hand on your nose and then on your left ear").	1/ 3	2/ 3	2/ 3
Ask the patient to read and obey a written command on a piece of paper. The written instruction is: "Close your eyes".	0/ 1	0/ 1	1/ 1
Ask the patient to write a sentence. Score 1 if it is sensible and has a subject and a verb.	0/ 1	1/ 1	1./ 1
COPYING: Ask the patient to copy a pair of intersecting pentagons 	0/1	1/1	1/1
Total	13/ 30	22/ 30	24/ 30

MMSE scoring

24-30: no cognitive impairment

18-23: mild cognitive impairment

0-17: severe cognitive impairment

Example 14**Table 14 -MMSE report of Patient of 2**

Age: 84 years

Patient was medically diagnosed as Alzheimer's

One point for each answer DATE:	9/2017	12/2017	1/2018
ORIENTATION			
Year Season Month Date Time	2/ 5	3/ 5	.4/ 5

Country Ward/Floor	Town	District	Hospital	1/ 5	1/ 5	.2/ 5
REGISTRATION Examiner names three objects (e.g. apple, table, penny) and asks the patient to repeat (1 point for each correct. THEN the patient learns the 3 names repeating until correct).				2/ 3	3/ 3	3/ 3
ATTENTION AND CALCULATION Subtract 7 from 100, then repeat from result. Continue five times: 100, 93, 86, 79, 65. (Alternative: spell “WORLD” backwards: DLROW).				1/ 5	3/ 5	3./ 5
RECALL Ask for the names of the three objects learned earlier.				1/ 3	2/ 3	3./ 3
LANGUAGE Name two objects (e.g. pen, watch).				1/ 2	2/ 2	2./ 2
Repeat “No ifs, ands, or buts”.				0/ 1	0/ 1	1/ 1
Give a three-stage command. Score 1 for each stage. (e.g. “Place index finger of right hand on your nose and then on your left ear”).				1/ 3	1/ 3	2/ 3
Ask the patient to read and obey a written command on a piece of paper. The written instruction is: “Close your eyes”.				0/ 1	0/ 1	1/ 1
Ask the patient to write a sentence. Score 1 if it is sensible and has a subject and a verb.				0/ 1	0/ 1	1./ 1
COPYING: Ask the patient to copy a pair of intersecting pentagons 				0 / 1	1/ 1	..1/ 1
TOTAL				9/ 30	16/ 30	23/ 30

MMSE scoring

24-30: no cognitive impairment

18-23: mild cognitive impairment

0-17: severe cognitive impairment

5

EXAMPLE 15**Table 15 - Digestive composition**

Ingredients	A (wt%)	B (wt%)	C (wt%)	D (wt%)
Xylitol	55	20	30	20
Cranberry extract/ fruit extract	0	0	0	0
Bilberry extract	0	5	0	5
Fructooligosaccharide / Inulin	15	2	0	2
Fenugreek galactomannan	0	0	5	0
Beta glucans	0	7	0	7
Beta d fructose	20	64	50	66
Glucose oxidase enzyme	10	2	15	0
Sugar	0	0	0	0
Total	100	100	100	100

10

The digestive composition of the present invention is used to determine the fructose malabsorption. Hydrogen breath test is used to diagnose the same.

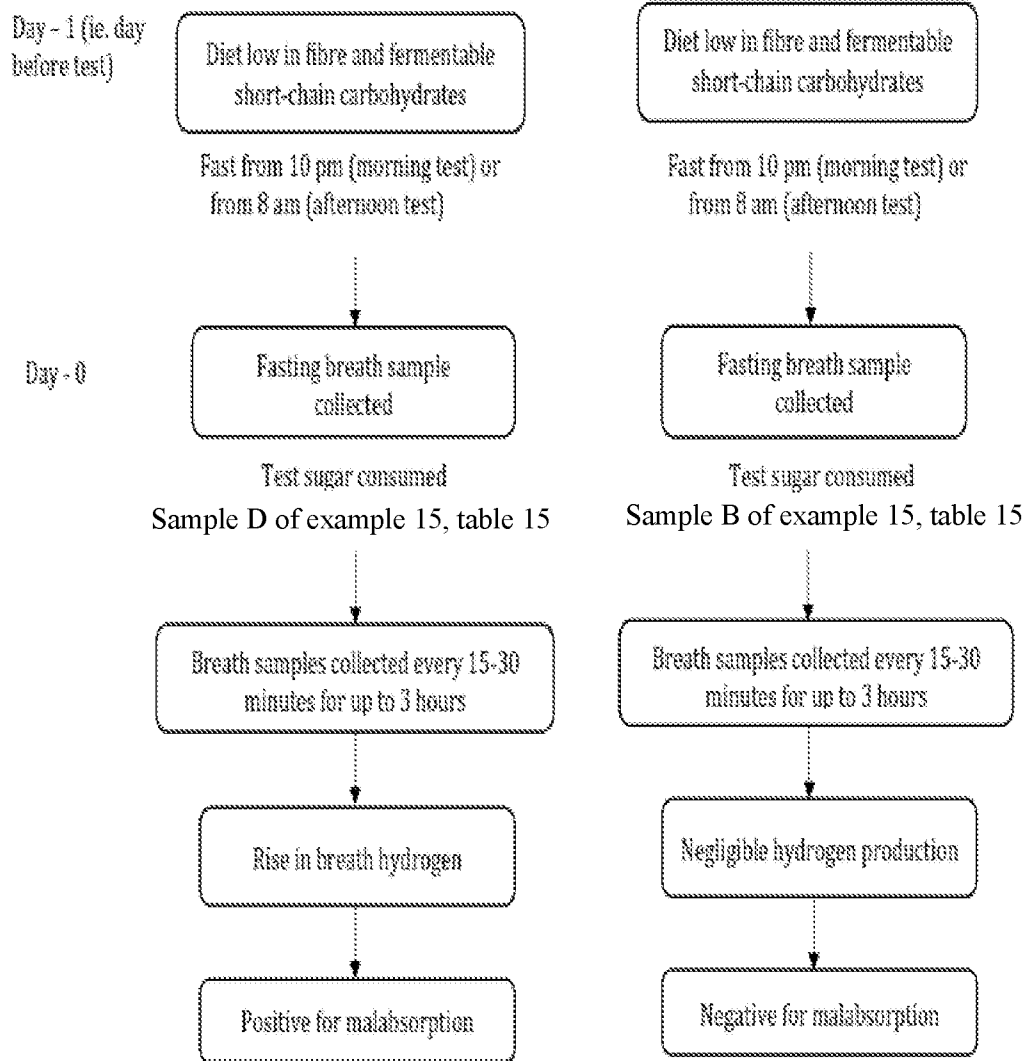
Most of the gas produced by bacteria in the colon moves into the bloodstream and then into the lungs and gas is breathed out. The hydrogen breath test measures the amount of hydrogen in our breath.

Example 16

15

The below chart demonstrates the Hydrogen Breathe Test.

Chart 1



CLAIMS

We claim

1. Taste masking composition comprising fructo-oligosaccharaide and glucose oxidase for
5 masking an undesirable taste of substances or products.
2. The taste masking composition according to the claim 1 wherein ratio of fructo-oligosaccharaide to glucose oxidase is from 19:1 to 1:5, preferably from 19:1 to 1:2.
3. The taste masking composition according to the claim 2 wherein ratio of fructo-oligosaccharaide to glucose oxidase is from 19:1 to 1:1; preferably from 19:1 to 3:1.
- 10 4. The taste masking composition according to the claim 3 wherein ratio of fructo-oligosaccharaide to glucose oxidase is from 15:1 to 3:1, preferably from 15:1 to 5:1.
5. Palatable taste masking composition comprising sensory bud modulation technology providing i) desensitization of taste buds and ii) presenting palatable composition to taste buds.
6. The palatable taste masking composition of claim 5 comprising a taste modifier.
- 15 7. The palatable taste masking composition of claim 5 comprising i) taste masking composition of claim 1 and ii) at least one taste modifier.
8. The palatable taste masking composition of claim 7 wherein the taste modifier is selected from one or more of saccharide, polyol, sugar alcohol, medium chain triglycerides from coconut oil, moringa in the form of an extract, an oil or a powder, dietary fiber, flavour,
20 digestive enzyme, sour compound, salty compound, bitter compound, fatty compound and umami compound.
9. The palatable taste masking composition of claim 8 wherein the digestive enzyme is selected from the group consisting of papain, bromelain, lipase, amylase, glucoamylase, beta glucanase, Fructosyl Transferase, xylose isomerase, and protease Lipase, papain, bromelain, nattokinase,
25 amylase, protease or any combinations thereof.
10. The palatable taste masking composition of claim 7 further comprises one or more of lubricants, glidants, anti-caking agents, anti-adherents, gum, cellulose.
11. The palatable taste masking composition of claim 7 further comprising one or more of filler, binder, disintegrant, solubilizing agents, polymer, gelling and film forming agent.

12. The composition of claim 7 wherein the taste modifier is present in amount of at least 30 %, preferably in amount of at least 50 % and most preferably in amount of at least 70 % of the palatable taste masking composition.

13. Taste masked composition comprising i) at least one substance or product having an undesirable taste and ii) fructo-oligosaccharaide and glucose oxidase for masking an undesirable taste of the substance or product.

14. The Taste masked composition of claim 13 wherein the ratio of fructo-oligosaccharaide and glucose oxidase is from 19:1 to 1:2, preferably from 19:1 to 3:1 and most preferably from 15:1 to 5:1.

15. Palatable taste masked composition comprising

i) at least one substance or product having an undesirable taste; ii) fructo-oligosaccharaide and glucose oxidase for masking an undesirable taste of the substance or product; and iii) a taste modifier for imparting palatability.

16. The palatable taste masked composition of claim 15 wherein an undesirable taste is one or more of a bitter, astringent, metallic, pungent, salty, spicy, alcoholic, chalky, salty and obnoxious taste.

17. The palatable taste masked composition of claim 15 wherein at least one substance or product having an undesirable taste is one or more of

i) stevia and / or any other high intensity sweeteners,

ii) any component of neem, fenugreek, guduchi, licorice Sena, Ajwain, nirgundi, nigod, thyme, Gymnema sylvestra, karela, jamun (seeds extracts), bitter gourd,

iii) antibiotics and their preparations, antacids and their preparations, cough syrup, liquid protein (hydrolysate), protein powders, hematinic preparations, products for constipation and B-complex preparations.

iv) any one or more of medicinal ingredient from diclofenac, paracetamol, donepezil, metronidazole, tramadol, paroxetine, quinine, loperamide, sildenafil, topiramate, citalopram, mirtazapine, desloratadine, enalapril, lorazepam, zopiclone, selegline, lorazepam, risperidone, ondansetron, olanzapine, almotriptan, frovatriptan, naratriptan, sumatriptan, zolmitriptan, rizatriptan, cimetidine, ranitidine, famotidine, nizatidine, etidine, lupitidine, nifentidine, niperotidine, roxatidine, sulfotidine, tuvatinine, zaltidine, penicillin, ampicillin, erythromycin, acetaminophen, caffeine, dextromethorphan, diphenhydramine, theophylline, spironolactone, chlorpheniramine, nabumetone, ibuprofen, naprosyn, ketoprofen, astemizole, azatadine,

brompheniramine, cetirizine, chlorpheniramine, clemastine, cyproheptadine, dexchlorpheniramine, dimenhydrinate, diphenhydramine, doxylamine, hydroxyzine, loratadine, phenindamine, terfenadine, tripeleminamine and likes and their salts and derivatives.

18. The palatable taste masked composition of claim 15 wherein ratio of fructo-oligosaccharide and glucose oxidase is from 19:1 to 1:2, preferably from 19:1 to 3:1 and most preferably from 15:1 to 5:1.

19. The palatable taste masked composition of claim 15 wherein the taste modifier is selected from one or more of saccharide, polyol, sugar alcohol, medium chain triglycerides from coconut oil, moringa extract, oil or powder, dietary fibers, flavors, digestive enzyme, sour compound, salty compound, bitter compound, fatty compound and umami compound.

20. The palatable taste masked composition of claim 15 in the form of powder, tablet, granules, pellets, pills, oral suspension, oral solution, syrup, liquid preparation, oral gel, oral film, chewable tablet, mouth dissolve tablet.

21. Stirrer for stirring drink comprising taste masked composition or palatable taste masked composition of at least one substance or product having an undesirable taste filled inside the stirrer or coated on to the stirrer or both filled inside the stirrer and coated on to the stirrer.

22. The stirrer for stirring drink according to the claim 21 comprising taste masked composition wherein taste masked composition comprises of taste masking composition of claim 1.

23. The stirrer for stirring drink according to the claim 21 comprising the taste masked or palatable taste masked composition of one or more of stevia, aspartame, acesulfame-K, neotame, cyclamates, saccharin, sucralose, neohesperidin dihydrochalcone, alitame, glycyrrhizin, thaumatin.

24. The stirrer for stirring drink according to the claim 23 wherein palatable taste masked composition comprises of stevia, glucose oxidase, fructo-oligosaccharide and a taste modifier.

25. The stirrer for stirring drink according to the claim 24 wherein palatable taste masked composition comprises of a taste modifier selected from one or more of saccharide, polyol and sugar alcohol.

26. The stirrer for stirring drink according to the claim 25 wherein palatable taste masked composition of stevia further comprises of one or more of lubricants, glidants, anti-caking agents, anti-adherents, gum, cellulose, filler, binder, disintegrating agent, solubilizing agents, polymer, gelling agent, film forming agent, polymer, sugar and coating adjuvants.

27. Digestive composition comprising i) at least one ingredient having a digestive problem, ii) glucose oxidase and iii) optionally one or more of digestive enzymes wherein the digestive problem of the ingredient is resolved.

28. Digestive composition of claim 27 wherein the composition further comprises one or more of nutritive health-markers.

29. Process of preparing a taste masking composition of claim 1 comprising combining fructo-oligosaccharide and glucose oxidase wherein fructo-oligosaccharide and glucose oxidase are combined in ratio of 19:1 to 1:5.

30. Process of preparing taste masked composition of claim 13 comprising combining fructo-oligosaccharide and glucose oxidase with a substance or product of an undesirable taste and optionally processing further to make taste masked composition.

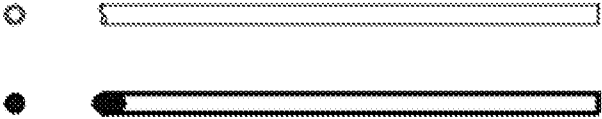
31. Process of preparing a palatable taste masking composition of claim 7 comprising fructo-oligosaccharide and glucose oxidase and taste modifier wherein fructo-oligosaccharide and glucose oxidase are employed in ratio of 19:1 to 1:5 and taste modifier is combined with fructo-oligosaccharide and glucose oxidase in amounts of at least 30 % of the total palatable taste masking composition.

32. Process of preparing a palatable taste masking composition of claim 31 wherein taste modifier is combined with fructo-oligosaccharide and glucose oxidase in amounts of at least 50 %, preferably 70 % of the total palatable taste masking composition.

33. Process of preparing a palatable taste masked composition of claim 15 for masking an undesirable taste of a substance or a product comprising preparing palatable taste masking composition and combining it with the substance or product with an undesirable taste; or taking each ingredient of the palatable taste masking composition and combining with the substance or product with an undesirable taste or its composition.

34. Process of preparing the taste masked composition of claim 30 or the palatable taste masked composition of claim 33 wherein combining includes one or more of mixing, granulating, spraying, spray-drying, vacuum drying, freeze drying, coating, compacting, compressing, encapsulating or pelletizing or stirring or suspending or solubilizing of a substance of an undesirable taste with one or more of glucose oxidase, fructo-oligosaccharide and taste modifier and optionally with one or more of lubricants, glidants, anti-caking agents, anti-adherents, gum, cellulose, saccharide, polyol, dietary fibres, flavours, one or more digestive enzymes, filler, binder, disintegrating agent and solubilizing agents.

A



B

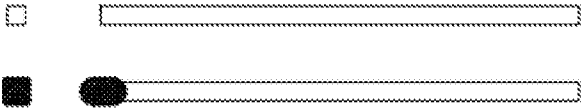


Figure 1

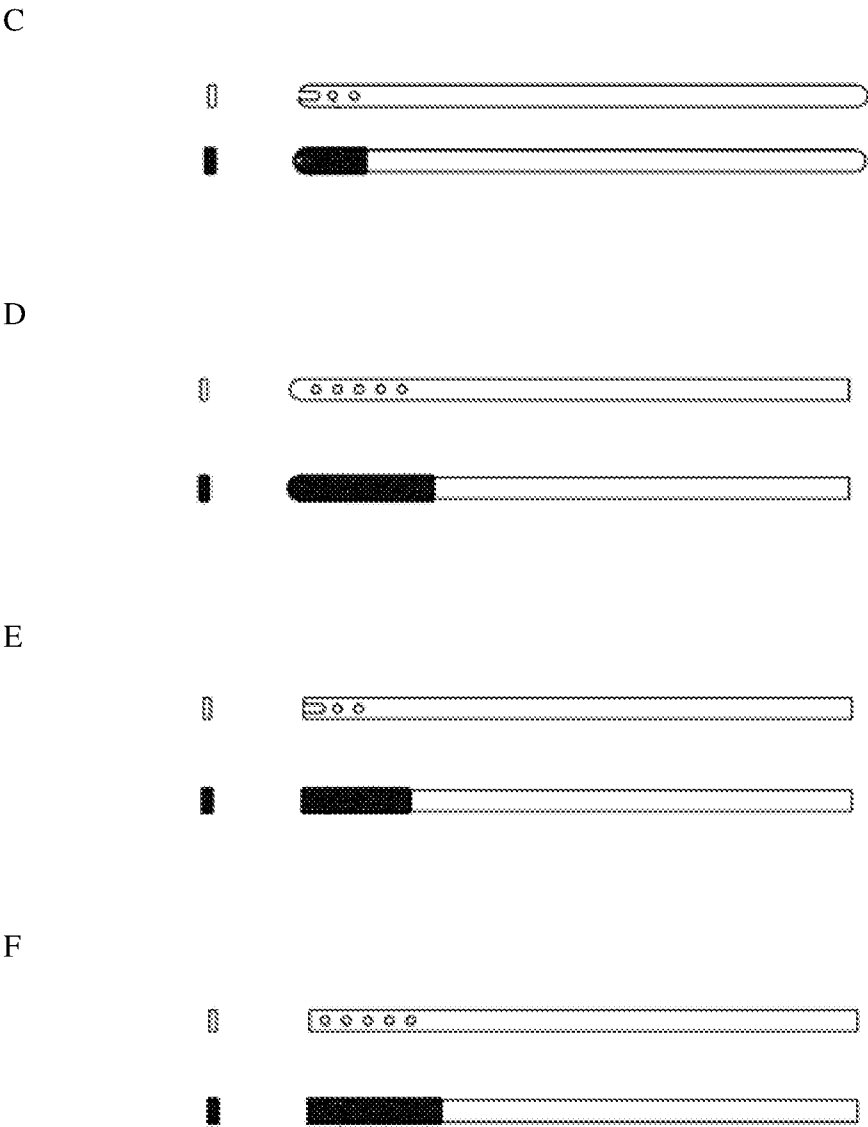


Figure 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2019/050071

A. CLASSIFICATION OF SUBJECT MATTER
A23L29/30, A23L2/60 Version=2019.01

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A23L

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

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

Database: TotalPatent One, IPO Internal Database

Keywords: Fructo-oligosaccharides, Glucose oxidase, Taste masking.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US20160376263A1 (SENOMYX INC); Dec 29, 2016 (29-12-2016) *Whole document especially paragraphs 1, 147, 149, 159, 181 and 207*	27-28
Y	--do--	1-26, 29-34
Y	Ram S. Singh and Rupinder P. Singh; "Production of Fructo oligosaccharides from Inulin by Endoinulinases and Their Prebiotic Potential"; Food Technology and Biotechnology; Vol 48(4), Pages 435-450; 2010 *Whole document especially column 1, page 445*	1-26, 29-34
Y	US4996062A (STABRA AG); Feb 26, 1991 (26-02-1991) *Whole document especially claim 1 and column 2, line 45*	1-26, 29-34
Y	US4986451A (CHRISTOPHER H. LOWE, NICHOLAS J. ALLEN); Jan 22, 1991 (22-01-1991) *Whole document especially claims 1 and 14-15*	21-26
A	R.-L. Heiniö et al; "Differences Between Sensory	



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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

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

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

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

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

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

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

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

"&" document member of the same patent family

Date of the actual completion of the international search

23-04-2019

Date of mailing of the international search report

23-04-2019

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2019/050071

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	Profiles and Development of Rancidity During Long-Term Storage of Native and Processed Oat"; American Association of Cereal Chemists; Vol. 79, No. 3; 2002 *Whole document especially abstract and column 2 of page 367*	1-26, 29-34

INTERNATIONAL SEARCH REPORT

International application No.
PCT/IN2019/050071

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

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

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

2. ☐ Claims Nos.:
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:

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

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

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

The present application does not meet the requirement of unity of invention under PCT Article 3(4) (iii) and Rule 13.1, and has been considered to contain 3 different groups of inventions.

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☒ As all searchable claims could be searched without effort justifying additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:

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

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

Continuation of Observations where unity of invention is lacking (Box III)

Claims 1-34 can be grouped into the following distinct inventions:

GROUP 1: Claims 1-20 and 29-34 (fully)

Relates to palatable taste masked composition comprising i) at least one substance or product having an undesirable taste; ii) fructo-oligosaccharide and glucose oxidase for masking an undesirable taste of the substance or product; and iii) a taste modifier for imparting palatability; iv) a substance having undesirable taste; and process for preparing said palatable taste masked composition.

GROUP 2: Claims 21-26 (fully)

Relates to a stirrer for stirring drink comprising taste masked composition or palatable taste masked composition of at least one substance or product having an undesirable taste filled inside the stirrer or coated on to the stirrer or both filled inside the stirrer and coated on to the stirrer.

GROUP 3: Claims 27-28 (fully)

Relates to a digestive composition comprising i) at least one ingredient having a digestive problem, ii) glucose oxidase and iii) optionally one or more of digestive enzymes wherein the digestive problem of the ingredient is resolved.

These groups of inventions address different problems and as such can be implemented independently of each other.

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/IN2019/050071

Citation	Pub.Date	Family	Pub.Date
US 4996062 A	26-02-1991	WO 1990004336 A1	03-05-1990
		AU 1990004336 B2	03-06-1993
		EP 0396688 A1	14-11-1990
		CA 2001752 A1	28-04-1990
US 4986451 A	22-01-1991	GB 8629966 D0	28-01-1987
		US 4860929 A	29-08-1989
		GB 2199480 B	06-06-1990