

ORAL CARE COMPOSITIONS

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims priority to U.S. Provisional Patent Application No. 61/289,444 filed on 23 December 2009, which is incorporated herein by reference.

BACKGROUND

[0002] Many individuals desire a “bright” smile and white teeth, and consider dull and stained teeth cosmetically unattractive. Unfortunately, without preventive or remedial measures, stained teeth are almost inevitable due to the absorbent nature of dental material. Everyday activities such as smoking or other oral use of tobacco products, and eating, chewing or drinking certain foods and beverages (in particular coffee, tea and red wine), cause undesirable staining of surfaces of teeth. Staining can also result from microbial activity, including that associated with dental plaque. The chromogens or color causing substances in these materials become part of the pellicle layer and can permeate the enamel layer. Even with regular brushing and flossing, years of chromogen accumulation can impart noticeable tooth discoloration.

[0003] There are a variety of compositions described in the art for preventing or treating the discoloration of teeth. In particular, to combat staining and brighten or restore the natural enamel color, a variety of products containing bleaching materials are commercially available for professional and consumer use. The materials most commonly used in teeth whitening today are peroxides. Peroxides are generally deemed safe from a physiological standpoint, and can be effective to whiten teeth. Such peroxides include hydrogen peroxide, carbamide peroxide, sodium perborate, and sodium percarbonate. When these peroxides are in appropriate contact with teeth they will usually oxidize stains, rendering teeth whiter.

[0004] Professional dental treatments frequently include a tooth surface preparation such as acid etching followed by the application of highly concentrated bleaching solutions (*e.g.*, up to 37% hydrogen peroxide) and/or the application of heat or light. These procedures provide rapid results, but are expensive, and often require several trips to the dentist. Alternatively, at-home bleaching systems can be used. These systems have gained significant popularity in the past decade because of reduced cost, and increased convenience. Instead of time consuming and

frequent trips to the dentist, the tooth whitener is purchased at a consumer retail store and may be easily integrated into the daily hygiene program.

[0005] Current home treatment methods include abrasive toothpastes, toothpastes that produce oxides, whitening gels for use with a dental tray and whitening strips. The effectiveness of such techniques depends on a variety of factors including the type and intensity of the stain, bleaching agent contact time on the teeth, the amount of available bleaching active in the composition, and consumer compliance. Effectiveness is also dependent on the amount of bleaching active in the composition, the ability of the active to be released during use, and the stability of the active in the product. However, the effectiveness of many of these treatments is adversely affected because of deficiencies in one or more factors relating to the composition and consumer compliance.

[0006] The use of surfactants in dentifrice compositions is well known in the art. For example, U.S. Patent No. 5,256,402 reports dentifrice compositions, wherein a nonionic surfactant is present in the amount of 1.2% w/w; and U.S. Patent Application No. 2007/0071695 discloses sodium lauryl sulfate in an amount of 1.2% by weight.

[0007] It also is known to incorporate sodium lauryl sulfate in whitening dentifrices having moderate to high levels of water. Most aqueous non-peroxide commercial whitening dentifrices include at most 1.2% sodium lauryl sulfate by weight. However, to maintain peroxide stability in peroxide-containing whitening dentifrices, a low water system is required which can impart negative taste attributes due to lower flavor release and peroxide taste. For example, low water formulations of superior whitening formulations containing 1-2% hydrogen peroxide having 1.2% sodium lauryl sulfate showed poor flavor release in spite of containing a flavor content of 2.25% by weight, which exceeds the normal flavor level from 1% to 1.5%. In dentifrices containing low levels of water or which are substantially nonaqueous, such conventional low levels of sodium lauryl sulfate result in poor flavor release on brushing and consequently an unpleasant taste in the mouth.

[0008] Thus, there is an ongoing need for whitening oral care compositions that have an improved flavor release thereby providing an enhanced organoleptic testing experience.

SUMMARY

[0009] Some embodiments of the present invention provide oral care compositions having improved flavor and flavor release characteristics. Some embodiments comprise a whitening agent, an anionic surfactant in an amount from 1.75 to 2% w/w, and an orally acceptable carrier having a low water content.

[0010] In some embodiments, the whitening oral care composition is a single phase composition having improved flavor, comprising a peroxide whitening agent, an anionic surfactant, and a substantially anhydrous orally acceptable carrier. In some embodiments, the anionic surfactant comprises sodium lauryl sulfate. In some embodiments, the anionic surfactant is present in an amount from 1.75% to 2% w/w. In further embodiments, the anionic surfactant is present in an amount from 1.8% to 2.0% w/w. In other embodiments, the anionic surfactant is present in an amount from 1.8% to 2.0% w/w. In other embodiments, the anionic surfactant is present in an amount from 1.9% to 2.0% w/w. Still further embodiments provide oral care compositions in which the anionic surfactant is present in the amount of 2.0% w/w.

[0011] In some embodiments, the whitening agent is selected from the group consisting of: hydrogen peroxide; a bound peroxide; and a solid. In some embodiments, the bound peroxide comprises hydrogen peroxide and a polymer. In some embodiments, the bound peroxide comprises any peroxide compound and a porous cross-linked polymer, such as polymers of polyvinylpyrrolidone, polyacrylates, a polymethacrylates, and a polyitaconates. In some embodiments, the solid peroxide is sodium perborate or urea peroxide.

[0012] Other aspects of the invention provide methods of whitening teeth by contacting one or more tooth surface(s) with the whitening dentifrice compositions described herein.

[0013] Compositions and methods described herein afford benefits over compositions and methods known in the art. Such benefits include, *inter alia*, enhanced flavor release characteristics resulting in improved flavor availability and improved taste. Further benefits and embodiments will be readily apparent to persons having ordinary skill in the art from a review of the detailed description set forth herein.

DETAILED DESCRIPTION

[0014] As used herein, the term “low water content” means the total concentration of water, including any free water and all water contained in any ingredients, is less than 4%.

[0015] As used herein, the term "whitening agent" refers to a material that is effective in whitening a tooth surface to which it is applied.

[0016] As used herein, the term "peroxide compound" refers to an oxidizing compound comprising a bivalent oxygen-oxygen group.

[0017] In some embodiments, the present invention provides oral care compositions and methods for administration, or application to, a human or other animal subject. As referred to herein, an "oral care composition" is any composition that is suitable for administration or application to the oral cavity of a human or animal subject for enhancing the health, hygiene or appearance of the subject. In some embodiments, an oral care composition is retained in the oral cavity for a time sufficient to affect the intended utility.

[0018] In some embodiments, the present invention provides single phase whitening oral care compositions, comprising a whitening agent, sodium lauryl sulfate in an amount from 1.75% to 2% w/w, and an orally acceptable carrier having a low water content. In some embodiments, the oral care compositions of this invention provide highly efficacious whitening and cleaning while at the same time having an enhanced flavor release profile as determined by organoleptic evaluations.

[0019] In some embodiments, it is important that the water content of the carrier be kept relatively low, and preferably substantially anhydrous. In some embodiments, the water content is less than 4% w/w. In other embodiments, the water content is less than 2% w/w, while in other embodiments, the water content is 0% w/w. The selection of the whitening agent in conjunction with a carrier possessing a low water content allows stabilized delivery of the whitening agent and provides improved flavor release and taste. Significantly, the demonstrated improvement in flavor release and taste has not adversely affected the whitening activity of the compositions described herein.

[0020] In some embodiments, the compositions comprise a whitening agent. In some embodiments, the whitening agent comprises a peroxide compound. In further embodiments, the whitening agent comprises a solid whitening agent or a bound whitening agent which is a substantially anhydrous oxygen generating compound. By way of example and not exclusion, solid whitening agents include peroxide compounds, metal chlorites, and persulfate.

[0021] Exemplary peroxide compounds include hydroperoxides, hydrogen peroxide, peroxides of alkali and alkaline earth metals, organic peroxy compounds, peroxy acids, pharmaceutically-

acceptable salts thereof, and mixtures thereof. Peroxides of alkali and alkaline earth metals include lithium peroxide, potassium peroxide, sodium peroxide, sodium percarbonate, magnesium peroxide, calcium peroxide, barium peroxide, and mixtures thereof. Organic peroxy compounds include urea peroxide, glyceryl hydrogen peroxide, alkyl hydrogen peroxides, dialkyl peroxides, alkyl peroxy acids, peroxy esters, diacyl peroxides, benzoyl peroxide, and monoperoxyphthalate, and mixtures thereof. Peroxy acids and their salts include organic peroxy acids such as alkyl peroxy acids, and monoperoxyphthalate and mixtures thereof, as well as inorganic peroxy acid salts such as and perborate salts of alkali and alkaline earth metals such as lithium, potassium, sodium, magnesium, calcium and barium, and mixtures thereof. Preferred solid peroxides are sodium perborate, sodium percarbonate, urea peroxide, and mixtures thereof. Suitable metal chlorites include calcium chlorite, barium chlorite, magnesium chlorite, lithium chlorite, sodium chlorite, and potassium chlorite. The whitening agent may be bound. For example, peroxide may be bound to a polymer such as PVP (poly-N-vinylpyrrolidone). Suitable PVP complexes are disclosed, for example, in U.S. Pat. No. 5,122,370, the contents of which are incorporated herein by reference in their entirety. Linear PVP peroxide and cross-linked PVP peroxide sold as Peroxydone[™] from ISP Corp. are also peroxide compounds useful as whitening agents in the present invention. PVP peroxide can be effectively produced by mixing linear PVP or cross-linked PVP with concentrated liquid hydrogen peroxide in the dentifrice.

[0022] In some embodiments, it may be desirable to use any known whitening agent except sodium percarbonate and/or any of the percarbonate salts. In some embodiments, the peroxide compound comprises hydrogen peroxide. In some embodiments, the peroxide compound comprises from 0.1% to 50% w/w, preferably from 0.1% to 40% w/w, and more preferably from 0.1% to 30% w/w, of the oral care composition. In further embodiments, the peroxide compound consists essentially of hydrogen peroxide. In yet other embodiments, the hydrogen peroxide delivered by the compositions of the present invention is in an amount from 0.1% to 3% w/w, and is preferably delivered in an amount from 1% to 2% w/w.

[0023] In some embodiments, the compositions of the present comprise an orally acceptable carrier. In some embodiments, the carrier does not substantially reduce the efficacy of the active material. Selection of specific carrier components is dependant on the desired product form, including dentifrices, rinses, gels, and paints.

[0024] In some embodiments, the oral care composition is a dentifrice. By way of example and not limitation, the term “dentifrice” as used throughout this description, denotes a paste, gel, toothpowder, dental tablet or liquid formulation. In some embodiments, the dentifrice deep striped, surface striped, or multilayered, having a gel surrounding the paste. In some embodiments, the composition is used with a tape, tray, mouthpiece or similar appliance.

[0025] In some embodiments, the carrier is a low water content orally acceptable carrier and may include any known ingredients or additives. In some embodiments, the water content of a single phase oral care composition is less than 4%, 2%, 1% or 0.1% w/w.

[0026] In a some embodiments, the orally acceptable carrier is substantially anhydrous. In some embodiments, the substantially anhydrous carrier further comprises various ingredients to adjust the rheology and feel of the composition such as humectants, surface active agents, thickening or gelling agents, etc. Suitable low water content carriers include but are not limited to Pluraflo[®] L4370 and Pluracare[®] L1220, polythethylene glycol such PEG400, PEG600, PEG/PPG copolymers such as PEG/PPG 38/8 copolymer, PEG/PPG-116/66 copolymer sold as Pluracare L4370 and Pluracare L1220 from BASF, respectively. Propylene glycol or glycerin may be present in an amount from 0% to 15% w/w.

[0027] In other embodiments, the compositions further comprise adhesion agents; viscosity modifiers; diluents; nonionic, cationic or amphoteric surfactants; foam modulators; peroxide activators; peroxide stabilizing agents; abrasives; pH modifying agents; humectants; mouth feel agents; sweeteners; flavoring agents; and colorants, or combinations of two or more thereof. It is understood that while general attributes of each of the above categories of materials may differ, there may be some common attributes and any given material may serve multiple purposes within two or more of such categories of materials. One skilled in the art will recognize that such additional materials are selected based upon compatibility with the peroxide complex and with other components of the composition.

[0028] In some embodiments, the surfactant may enhance stability of the formulation, help clean the oral cavity surfaces through detergency, and provide foam upon agitation, *e.g.*, during brushing with a dentifrice composition of the invention. Suitable anionic surfactants include water-soluble salts of C₈₋₂₀ alkyl sulfates, sulfonated monoglycerides of C₈₋₂₀ fatty acids, sarcosinates, taurates and mixtures thereof. Illustrative examples of these and other surfactants, in addition to the sodium lauryl sulfate are, sodium coconut monoglyceride sulfonate, sodium

lauryl sarcosinate, sodium lauryl isoethionate, sodium laureth carboxylate, sodium dodecyl benzenesulfonate, and mixtures thereof. Suitable nonionic surfactants include poloxamers, polyoxyethylene sorbitan esters, fatty alcohol ethoxylates, alkylphenol ethoxylates, tertiary amine oxides, tertiary phosphine oxides, dialkyl sulfoxides and mixtures thereof. Suitable amphoteric surfactants include derivatives of C₈₋₂₀ aliphatic secondary and tertiary amines having an anionic group such as carboxylate, sulfate, sulfonate, phosphate or phosphonate. A suitable example is cocoamidopropyl betaine. In some embodiments, one or more surfactants may be present in a total amount of from 1.75% to 2% w/w. In some embodiments, one or more surfactants may be present in a total amount of from 1.8% to 2% w/w. In some embodiments, one or more surfactants may be present in a total amount of from 1.9% to 2% w/w. In some embodiments, one or more surfactants may be present in the total amount of 2% w/w.

[0029] In some embodiments, the orally acceptable carrier further comprises dispersants such as polymers and/or copolymers of polyethylene glycol, of ethylene oxide, propylene oxide, and of silicone. If such copolymers/polymers are used, they may be selected from the commercially available materials Pluraflo[®] L4370 and Pluracare[®] L1220 (available from BASF, Wyandotte, Mich., United States of America). In some embodiments, the viscosity of the dentrifice is between 10,000 CPS and 700,000 CPS. In some embodiments, the viscosity of the dentrifice is between 30,000 CPS and 300,000 CPS. In some embodiments, one or more dispersants are present in a total amount of from 2% to 55% w/w and preferably from 2% to 35% w/w.

[0030] Some embodiments of the present invention comprise a dental abrasive or combination of dental abrasive agents. As used herein, the term “abrasive” or “abrasive agent” also includes materials commonly referred to as “polishing agents”. Suitable abrasives may include those previously considered to be incompatible in a peroxide containing formulation (“a peroxide-incompatible abrasive”). Such abrasive is one which, in an aqueous solution with hydrogen peroxide, substantially reacts with the hydrogen peroxide so as to reduce whitening efficacy of the solution.

[0031] Any orally acceptable abrasive can be used, but preferably, type, fineness (particle size) and amount of abrasive should be selected so that tooth enamel is not excessively abraded in normal use of the composition. Suitable abrasives include without limitation silica (in the form of silica gel, hydrated silica or precipitated silica), alumina, insoluble phosphates, calcium carbonate, resinous abrasives such as urea-formaldehyde condensation products and the like.

Among insoluble phosphates useful as abrasives are orthophosphates, polymetaphosphates and pyrophosphates. Illustrative examples are dicalcium orthophosphate dihydrate, calcium pyrophosphate, β -calcium pyrophosphate, tricalcium phosphate, calcium polymetaphosphate and insoluble sodium polymetaphosphate. Average particle size of an abrasive, if present, is generally 0.1 to 30 μm , for example 1 to 20 μm or 5 to 15 μm . In some embodiments, one or more abrasives is present in an amount of 0.1% to 40% w/w. In some embodiments, the abrasive is calcium pyrophosphate. In some embodiments, the calcium pyrophosphate is present in an amount from 5% to 50% w/w.

[0032] In various embodiments of the present invention, the oral composition comprises an anticalculus agent. Generally, tartar control agents are categorized as being incompatible with some whitening agents, but some embodiments of the present invention incorporate tartar control agents and whitening agents in a single phase whitening composition. Suitable anticalculus agents include without limitation phosphates and polyphosphates (for example pyrophosphates), polyaminopropanesulfonic acid (AMPS), hexametaphosphate salts, zinc citrate trihydrate, polypeptides, polyolefin sulfonates, polyolefin phosphates, diphosphonates. In some embodiments, the anticalculus agent is present in an amount of 0.1% to 30% w/w. In some embodiments, the oral care composition comprises a mixture of anticalculus agents. In some embodiments, tetrasodium pyrophosphate (TSPP) and sodium tripolyphosphate (STPP) are used as the anticalculus agents. In some embodiments, the anticalculus agent comprises 1% to 2% w/w TSPP, and 0% to 7% w/w STPP.

[0033] In some embodiments, the oral care composition optionally comprises a source of fluoride ions. In some embodiments, the source of fluoride ions is selected from: fluoride; monofluorophosphate; and fluorosilicate salts. In some embodiments, one or more fluoride ion-releasing compounds are optionally present in an amount providing a total of 100 to 20,000 ppm, 200 to 5,000 ppm, or 500 to 2,500 ppm, fluoride ions.

[0034] In some embodiments, the composition optionally comprises a thickening agent. Any orally acceptable thickening agent can be used, including without limitation carbomers, also known as carboxyvinyl polymers, carrageenans, also known as Irish moss and more particularly -carrageenan (iota-carrageenan), high molecular weight polyethylene glycols (such as CARBOWAX[®], available from The Dow Chemical Company), cellulosic polymers such as hydroxyethylcellulose, carboxymethylcellulose (CMC) and salts thereof, *e.g.*, CMC sodium,

natural gums such as karaya, xanthan, gum arabic and tragacanth, colloidal magnesium aluminum silicate, and colloidal and/or fumed silica and mixtures of the same. In some embodiments, the one or more optional thickening agents are present in a total amount of 0.1% to 90% w/w. In some embodiments, the one or more optional thickening agents are present in a total amount of 1% to 50% w/w. In some embodiments, the one or more optional thickening agents are present in a total amount of 5% to 35% w/w.

[0035] Useful flavoring agents include any material or mixture of materials operable to enhance the taste of the composition. Any orally acceptable natural or synthetic flavoring agent can be used, such as flavoring oils, flavoring aldehydes, esters, alcohols, similar materials, and combinations thereof. Flavoring agents include vanillin, sage, marjoram, parsley oil, spearmint oil, cinnamon oil, oil of wintergreen (methylsalicylate), peppermint oil, clove oil, bay oil, anise oil, eucalyptus oil, citrus oils, fruit oils and essences including those derived from lemon, orange, lime, grapefruit, apricot, banana, grape, apple, strawberry, cherry, pineapple, etc., bean- and nut-derived flavors such as coffee, cocoa, cola, peanut, almond, etc., adsorbed and encapsulated flavorants, and mixtures thereof. Also encompassed within flavoring agents herein are ingredients that provide fragrance and/or other sensory effect in the mouth, including cooling or warming effects. Such ingredients include menthol, menthyl acetate, menthyl lactate, camphor, eucalyptus oil, eucalyptol, anethole, eugenol, cassia, oxanone, χ -irisone, propenyl guaithol, thymol, linalool, benzaldehyde, cinnamaldehyde, N-ethyl-p-menthan-3-carboxamine, N,2,3-trimethyl-2-isopropylbutanamide, 3-1-menthoxypropane-1,2-diol, cinnamaldehyde glycerol acetal (CGA), methone glycerol acetal (MGA) and mixtures thereof. In some embodiments, one or more flavoring agents are optionally present in a total amount of 0.01% to 5% w/w. In some embodiments, one or more flavoring agents are optionally present in a total amount of 0.05% to 2% w/w. In some embodiments, one or more flavoring agents are optionally present in a total amount of 0.1% to 2.5% w/w. In some embodiments, one or more flavoring agents are optionally present in a total amount from 0.1% to 0.5% w/w. In some embodiments, one or more flavoring agents are optionally present in the total amount of 2.25% w/w.

[0036] Some embodiments optionally comprise a breath freshening agent. Any orally acceptable breath freshening agent can be used, including without limitation zinc salts such as zinc gluconate, zinc citrate and zinc chlorite, - ionone and mixtures thereof. One or more breath freshening agents are optionally present in a breath freshening effective total amount.

[0037] Sweeteners among those useful herein include orally acceptable natural or artificial, nutritive or non-nutritive sweeteners. Such sweeteners include dextrose, polydextrose, sucrose, maltose, dextrin, dried invert sugar, mannose, xylose, ribose, fructose, levulose, galactose, corn syrup (including high fructose corn syrup and corn syrup solids), partially hydrolyzed starch, hydrogenated starch hydrolysate, sorbitol, mannitol, xylitol, maltitol, isomalt, aspartame, neotame, saccharin and salts thereof, sucralose, dipeptide-based intense sweeteners, cyclamates, dihydrochalcones and mixtures thereof. Some embodiments optionally comprise one or more sweeteners. In some embodiments, the one or more optional sweeteners are present in a total amount from 0.005% to 5% w/w. In some embodiments, the one or more optional sweeteners are present in a total amount from 0.01 to 1% w/w.

[0038] Colorants among those useful herein include pigments, dyes, lakes and agents imparting a particular luster or reflectivity such as pearling agents. In some embodiments, colorants are operable to provide a white or light-colored coating on a dental surface, to act as an indicator of locations on a dental surface that have been effectively contacted by the composition, and/or to modify appearance, in particular color and/or opacity, of the composition to enhance attractiveness to the consumer. Any orally acceptable colorant can be used, including talc, mica, magnesium carbonate, calcium carbonate, magnesium silicate, magnesium aluminum silicate, silica, titanium dioxide, zinc oxide, red, yellow, brown and black iron oxides, ferric ammonium ferrocyanide, manganese violet, ultramarine, titaniated mica, bismuth oxychloride, FD&C dyes, and mixtures thereof. Some embodiments optionally comprise one or more colorants in a total amount from 0.001% to 20% w/w. In some embodiments, the one or more optional colorants are present in a total amount from 0.01% to 10% w/w. In some embodiments, the one or more optional colorants are present in a total amount from 0.1% to 5% w/w.

[0039] Humectants useful herein include polyhydric alcohols such as glycerin, sorbitol, xylitol or low molecular weight PEGs. In some embodiments, humectants are operable to prevent hardening of paste or gel compositions upon exposure to air. In some embodiments humectants also function as sweeteners. Some embodiments comprise one or more humectants in a total amount from 1% to 50% w/w. In some embodiments, the one or more humectants are present in a total amount from 2% to 25% w/w. In some embodiments, the one or more humectants are present in a total amount from 5% to 15% w/w.

[0040] pH modifying agents among those useful herein include acidifying agents to lower pH, basifying agents to raise pH, and buffering agents to control pH within a desired range. For example, one or more compounds selected from acidifying, basifying and buffering agents can be included to provide a pH of 2 to 10, or in various embodiments from 2 to 8, from 3 to 9, from 4 to 8, from 5 to 7, from 6 to 10, and from 7 to 9. Any orally acceptable pH modifying agent can be used, including without limitation carboxylic, phosphoric and sulfonic acids, acid salts (e.g., monosodium citrate, disodium citrate, monosodium malate, etc.), alkali metal hydroxides such as sodium hydroxide, carbonates such as sodium carbonate, bicarbonates, sesquicarbonates, borates, silicates, phosphates (e.g., monosodium phosphate, trisodium phosphate, pyrophosphate salts, etc.), imidazole and mixtures thereof. One or more pH modifying agents are optionally present in a total amount effective to maintain the composition in an orally acceptable pH range.

[0041] In some embodiments, the compositions optionally comprise one or more further active material(s), operable for the prevention or treatment of a condition or disorder of hard or soft tissue of the oral cavity; the prevention or treatment of a physiological disorder or condition; or to provide a cosmetic benefit.

[0042] In some embodiments, the compositions comprise stannous ion or a stannous ion source. Suitable stannous ion sources include without limitation stannous fluoride, other stannous halides such as stannous chloride dihydrate, stannous pyrophosphate, organic stannous carboxylate salts such as stannous formate, acetate, gluconate, lactate, tartrate, oxalate, malonate and citrate, stannous ethylene glyoxide and the like. In some embodiments, one or more stannous ion sources are optionally present in the total amount of 0.01% to 10% w/w. In some embodiments, one or more stannous ion sources are optionally present in the total amount of 0.1% to 7% w/w. In other embodiments, one or more stannous ion sources are optionally present in the total amount of 1% to 5% w/w.

[0043] In some embodiments, the compositions of the present invention further comprise an antimicrobial (e.g., antibacterial) agent. By way of example and not limitation, a list of useful antibacterial agents is reported in U.S. Pat. No. 5,776,435 to Gaffar *et al.*, the contents of which are incorporated herein by reference in their entirety. In some embodiments, one or more antimicrobial agents are optionally present. In some embodiments, one or more antimicrobial agents are optionally present in the amount of 0.05% to 10% w/w. In some embodiments, one or more antimicrobial agents are optionally present in the amount of 0.1% to 3% w/w.

[0044] Some embodiments of the present invention optionally comprise an antioxidant. Any orally acceptable antioxidant can be used, including butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), vitamin A, carotenoids, vitamin E, flavonoids, polyphenols, ascorbic acid, herbal antioxidants, chlorophyll, melatonin, and mixtures thereof.

[0045] Some embodiments of the present invention optionally comprise a sialagogue or saliva-stimulating agent, an antiplaque agent, an anti-inflammatory agent, a desensitizing. Any orally acceptable saliva stimulating agent can be used, including without limitation food acids such as citric, lactic, malic, succinic, ascorbic, adipic, fumaric, and tartaric acids, and mixtures thereof.

[0046] The compositions of the present invention can be prepared by conventional methods known to those skilled in the art. For example, compositions of the present invention can be prepared by adding and mixing the ingredients of the composition in a suitable vessel such as a stainless steel tank provided with a mixer. In some embodiments, the ingredients are added to the mixing vessel in the following order: diluent, thickening agent(s), peroxide composite (or other active) and any flavoring agent(s), colorant or sweetener. In some embodiments, the flavoring agent is dissolved in Pluraflo[®] L4370 and Pluracare[®] L1220. In some embodiments, the Pluraflo L4370 and Pluracare[®] L1220 are then added and the solution is mixed for five minutes. In some embodiments, the peroxide or other whitening agent is added and the solution is mixed for 20 minutes until the mixture is homogenous. Additional ingredients such as coloring or sweeteners are added at any point during the mixing process but in various embodiments, such ingredients are preferably added last or close to last.

[0047] Some embodiments of the present invention provide methods of whitening an oral surface in a human or animal subject. As used herein “animal subject” includes higher order non-human mammals such as canines, felines, and horses.

[0048] In some embodiments, the present invention provides a method of improving patient compliance with an oral care composition, comprising applying to an oral surface an effective amount of any one of the oral care compositions described herein.

[0049] In some embodiments, the oral care composition is applied and contacted with the oral surface. In some embodiments, the dentifrice is applied regularly to an oral surface, preferably on a daily basis, at least one time daily for multiple days, but alternately every second or third day. In other embodiments, the oral care composition is applied to an oral surface from 1 to 3 times daily, for at least 2 weeks. In further embodiments, the oral care composition is applied to

an oral surface from 1 to 3 times daily, up to 8 weeks. In still other embodiments, the oral care composition is applied to an oral surface from 1 to 3 times daily, for a period of four months to three years. In some embodiments, the oral care composition is applied to the oral surfaces from 1 to 3 times daily, for a period in excess of 3 years.

[0050] The invention will now be further described by the following non-limiting examples. In some embodiments, the oral care composition is applied and contacted with the oral surface. In some embodiments, the dentifrice is applied regularly to an oral surface, preferably on a daily basis, at least one time daily for multiple days, but alternately every second or third day. In other embodiments, the oral care composition is applied to an oral surface from 1 to 3 times daily, for at least 2 weeks. In further embodiments, the oral care composition is applied to an oral surface from 1 to 3 times daily, up to 8 weeks. In still other embodiments, the oral care composition is applied to an oral surface from 1 to 3 times daily, for a period of four months to three years. In some embodiments, the oral care composition is applied to the oral surfaces from 1 to 3 times daily, for a period in excess of 3 years.

[0051] The invention will now be further described by the following non-limiting examples.

EXAMPLES

Example 1

[0052] Table 1 below provides examples of oral dentifrice compositions containing an enhanced amount of sodium lauryl sulfate and a low water content.

Table 1

Ingredient	% Raw Material					
	1	2	3	4	5	6
Water	0.000	0.000	0.000	2.000	0	0
Phosphoric Acid	0.200	0.200	0.200	0.200	0.200	0.200
Pluraflo L4370	20.610	20.610	20.610	29.360		
Pluracare L1220	15.000	15.000	25.000	25.000	10.000	5.000
PEG600	10.000	10.000	10.000		10.000	10.000
Glycerin	5.000				5.000	47.36
Propylene Glycol	5.000	10.000			25.000	15.00
HEC		1.000				
Fumed Silica	1.500	1.500	1.500	1.250	1.500	
PVP Polyplasdone XL-10						9.500
BHT	0.030	0.030	0.030	0.030	0.030	0.030
PVP Peroxide	11.000	11.000	11.000	11.000	5.500	5.500
TSPP	2.000	2.000	2.000	2.000	2.000	2.000
Saccharin	0.800	0.800	0.800	0.800	0.600	0.600
Sucralose	0.150	0.150	0.150	0.150	0.050	0.050
SLS	1.2-2.0	1.2-2.0	1.2-2.0	1.2-2.0	2.000	2.000
Calcium Pyrophosphate	24.5-23.7	23.5-22.7	24.5-23.7	24-23.2	35.110	0
MFP	0.760	0.760	0.760	0.760	0.760	0.760
Flavoring agent	2.250	2.250	2.250	2.250	2.250	2.000

Example 2

[0053] Table 2 (below) reports organoleptic evaluation scores/ratings obtained from an experienced flavorist. In these compositions, the sodium lauryl sulfate (“SLS”) content was varied, while the flavoring agent content remained constant (2.25% w/w). The experienced flavorist rated these compositions on a scale of 0-6, with a rating of 6 being most preferred. As shown in Table 2, the compositions possessing an SLS content equal to or greater than 1.75% w/w, demonstrated dramatic improvement in rating compared to compositions containing 1.2% w/w SLS.

Table 2

% SLS	Rating
2.00	5.5
1.75	4.5
1.2	2.5

[0054] One skilled in the art will appreciate that the present invention is not limited in its application to the details of construction and to the arrangements of the components set forth in

the preceding description and examples, or illustrated in the drawings. The invention is capable of embodiments in addition to those described and of being practiced and carried out in various ways. Also, it is to be understood that the phraseology and terminology employed herein, as well as the abstract, are for the purpose of description and should not be regarded as limiting.

[0055] As such, those skilled in the art will appreciate that the conception upon which this disclosure is based may readily be utilized as a basis for the designing of other structures, methods and systems for carrying out the several purposes of the present invention. It is important, therefore, that the claims be regarded as including such equivalent constructions insofar as they do not depart from the spirit and scope of the present invention.

CLAIMS

1. An oral care composition comprising:
 - a whitening agent;
 - an anionic surfactant present in an amount from 1.75% to 2.0% w/w; and
 - an orally acceptable carrier having a low water content.
2. The composition of Claim 1, wherein the anionic surfactant is selected from the group consisting of sodium lauryl sulfate and sodium lauryl sulfoacetate.
3. The composition of any of Claims 1 to 2, wherein the whitening agent is selected from the group consisting of a peroxide compound, a bound peroxide, a solid peroxide and mixtures thereof.
4. The composition of Claim 3, wherein the peroxide compound is selected from the group consisting of hydrogen peroxide, peroxides of alkali and alkaline earth metals, organic peroxy compounds, peroxy acids, pharmaceutically acceptable salts thereof and mixtures thereof.
5. The composition of Claim 4, wherein the hydrogen peroxide is present in an amount from 0.1% to 2% w/w.
6. The composition of Claim 5, wherein the hydrogen peroxide is present in an amount from 1% to 2% w/w.
7. The composition of Claim 3, wherein the bound peroxide includes a peroxide compound and a cross-linked polymer.
8. The composition of Claim 7, wherein the cross-linked polymer is selected from the group consisting of polyvinyl pyrrolidone, polyacrylate, a polymethacrylate and polyitaconates.

9. The composition of Claim 3, wherein the solid peroxide is selected from the group consisting of sodium perborate and urea peroxide.
10. The composition of any of Claims 1 to 9, wherein the whitening agent is present in an amount from 0.1% to 30% w/w.
11. The composition of any of Claims 1 to 10, wherein the anionic surfactant is present in an amount from 1.8% to 2% w/w.
12. The composition of any of Claims 1 to 11, wherein the anionic surfactant is present in the amount of 2% w/w.
13. The composition of any of Claims 1 to 12, wherein the water content of the orally acceptable carrier is from 0% to 4% w/w.
14. The composition of Claim 1, wherein the water content of the orally acceptable carrier is from 0% to 2% w/w.
15. The composition of Claim 1, wherein the water content of the orally acceptable carrier is from 0% to 1% w/w.
16. The composition of Claim 1, wherein the water content of the orally acceptable carrier is less than 0.1% w/w.
17. The composition of Claim 1, wherein the orally acceptable carrier is selected from the group consisting of polymers and copolymers of polyethylene glycol, ethylene oxide and propylene oxide.
18. The composition of any of Claims 1 to 17, wherein the carrier further comprises fumed silica, an abrasive, a poloxamer and a flavoring agent.

19. The composition of any of Claims 1 to 18, further comprising a fluoride salt.
20. The composition of any of Claims 1 to 21, further comprising an active agent selected from the group consisting of an antimicrobial agent, an anti-inflammatory agent, a zinc salt and triclosan.
21. The composition of any of Claims 1 to 20, wherein the composition comprises a single phase.
22. A method of improving patient compliance with an oral care composition, comprising applying to an oral surface an effective amount of the oral care composition of any of Claims 1 to 21.
23. A method of whitening a tooth surface, the method comprising contacting the tooth surface with a composition of any of Claims 1 to 21.