



(51) International Patent Classification:

A61K 8/97 (2017.01) A61Q 11/00 (2006.01)
A61K 8/73 (2006.01)

(21) International Application Number:

PCT/CN2016/110743

(22) International Filing Date:

19 December 2016 (19.12.2016)

(25) Filing Language:

English

(26) Publication Language:

English

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(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,
CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO,
DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN,
HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KH, KN, KP, KR,
KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG,
MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM,
PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC,
SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR,
TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
KM, ML, MR, NE, SN, TD, TG).

Published:

— with international search report (Art. 21(3))

(54) Title: ORAL CARE COMPOSITIONS INCLUDING CHARCOAL

(57) Abstract: An oral care composition including a dentifrice and a film suspended in the dentifrice, wherein the film includes charcoal.



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ORAL CARE COMPOSITIONS INCLUDING CHARCOAL

BACKGROUND

Conventional oral care products or compositions (*e.g.*, toothpastes, whitening gels, *etc.*) often include or incorporate functional, aesthetic, and/or ornamental elements or features to enhance consumer acceptance and/or experience. For example, conventional dentifrices often incorporate colors or colored elements to provide an aesthetic effect that consumers find pleasing, which promotes the use of the dentifrices. Conventional oral care products may also incorporate functional, aesthetic, and/or ornamental elements to distinguish or identify products in the marketplace having particular properties. For example, substantially clear dentifrices, such as toothpastes and gels, often incorporate colored elements to indicate the presence of flavors.

While the incorporation of the functional, aesthetic, and/or ornamental elements into conventional oral care products have proven to enhance consumer acceptance and distinguish products in the marketplace, the type, selection, or number of the elements that have been successfully incorporated into the oral care products is limited. For example, activated carbon or charcoal is recognized by consumers for its ability to naturally adsorb or bind unwanted impurities, toxins, and/or chemicals. The incorporation of charcoal into oral care products, such as substantially clear toothpastes, however, eliminates the transparency or clarity of the toothpastes and results in black or dark toothpastes that are neither visually appealing or accepted by consumers.

What is needed, then, are improved oral care products incorporating activated carbon or charcoal for improved aesthetics and/or therapeutic effects.

BRIEF SUMMARY

This summary is intended merely to introduce a simplified summary of some aspects of one or more embodiments of the present disclosure. Further areas of applicability of the present invention will become apparent from the detailed description provided hereinafter. This summary is not an extensive overview, nor is it intended to identify key or critical elements of the present teachings, nor to delineate the scope of the disclosure. Rather, its purpose is merely to present one or more concepts in simplified form as a prelude to the detailed description below.

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The foregoing and/or other aspects and utilities embodied in the present disclosure may be achieved by providing an oral care composition, including a dentifrice; and a film suspended in the dentifrice, wherein the film includes charcoal.

In another embodiment, the film further includes a water soluble polymer selected from the group consisting of cellulose ether, methacrylates, polyvinylpyrrolidone, and mixtures thereof.

In another embodiment, the film includes a cellulose ether.

In another embodiment, the cellulose ether is selected from the group consisting of hydroxypropyl methyl cellulose (HPMC), hydroxypropyl cellulose, hydroxyethyl cellulose, methyl cellulose, carboxymethyl cellulose, and mixtures or combinations thereof.

In another embodiment, the cellulose ether is HPMC.

In another embodiment, the charcoal is present in an amount of from about 1 wt% to about 10 wt%, based on a total weight of the film.

In another embodiment, the charcoal is present in an amount of from about 2 wt% to about 6 wt%, based on a total weight of the film.

In another embodiment, the charcoal is derived from a natural source.

In another embodiment, the charcoal has a particle size less than or equal to 75 μm .

In another embodiment, the charcoal has a particle size of from about 3 μm to about 9 μm .

In another embodiment, the film further comprises starch.

In another embodiment, the starch is corn starch.

In another embodiment, the film does not include titanium dioxide.

In another embodiment, the film does not include any dyes.

In another embodiment, the film does not include any pigments.

Further areas of applicability of the present invention will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples, while indicating some preferred aspects of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention.

DETAILED DESCRIPTION

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The following description of various preferred aspect(s) is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses.

As used throughout, ranges are used as shorthand for describing each and every value that is within the range. Any value within the range may be selected as the terminus of the range. In addition, all references cited herein are hereby incorporated by reference in their entireties. In the event of a conflict in a definition in the present disclosure and that of a cited reference, the present disclosure controls.

Unless otherwise specified, all percentages and amounts expressed herein and elsewhere in the specification should be understood to refer to percentages by weight. The amounts given are based on the active weight of the material.

Additionally, all numerical values are "about" or "approximately" the indicated value, and take into account experimental error and variations that would be expected by a person having ordinary skill in the art. It should be appreciated that all numerical values and ranges disclosed herein are approximate values and ranges, whether "about" is used in conjunction therewith.

The present inventors have surprisingly and unexpectedly discovered that a film formed from a matrix including a water soluble polymer, such as a methylcellulose, and starch sufficiently suspends and/or incorporates charcoal or activated carbon into the matrix thereof. Particularly, a matrix including a hydroxyalkyl methylcellulose polymer and starch is capable of sufficiently entraining, suspending, or otherwise incorporating charcoal or activated carbon therein. The film formed from the matrix and including the charcoal may be suspended, mixed, or otherwise incorporated into a substantially clear dentifrice to produce an oral care composition, where the charcoal does not bleed into the dentifrice.

Compositions

Compositions disclosed herein may be or include a dentifrice composition having flakes of a film suspended therein. Compositions disclosed herein may also be or include the film suspended or dispersed in the dentifrice composition. The film may be a water hydratable film including a homogenous mixture or matrix of a water soluble polymer, such as a hydroxyalkyl cellulose polymer, and starch. The homogenous mixture or matrix of the film may sufficiently entrain, suspend, or otherwise incorporate charcoal or activated carbon. The charcoal may be a therapeutic, cosmetic, and/or a decorative agent. For example, the charcoal dispersed in the film

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may provide therapeutic benefits, such as detoxification. In another example, the charcoal dispersed in the film does not provide any therapeutic benefits, but instead communicates or informs the consumer of the presence of charcoal in the dentifrice. For example, the charcoal dispersed in the film may be only a decorative agent, thereby providing an aesthetically pleasing and/or consumer acceptable decorative dentifrice that enhances consumer experience and/or acceptance.

The film of the dentifrice composition may be or include a homogenous mixture of one or more water soluble polymers and one or more starches. In at least one embodiment, the water soluble polymers include cellulose ethers, methacrylates, polyvinylpyrrolidone, and the like, and combinations or mixtures thereof. For example, the water soluble polymer includes a cellulose ether, selected from one or more of hydroxyalkyl cellulose polymers, such as hydroxypropyl methyl cellulose (HPMC), hydroxypropyl cellulose, hydroxyethyl cellulose, methyl cellulose, carboxymethyl cellulose, and mixtures or combinations thereof. In a preferred embodiment, the water soluble polymer includes one or more hydroxyalkyl cellulose polymers. Illustrative hydroxyalkyl cellulose polymers may be or include, but are not limited to, hydroxypropyl methyl cellulose, hydroxyethylpropyl cellulose, hydroxybutyl methyl cellulose, carboxymethyl cellulose, and the like, and mixtures or combinations thereof. In a preferred embodiment, the hydroxyalkyl cellulose polymer is a low viscosity hydroxypropyl methyl cellulose polymer (HPMC). For example, the HPMC polymer may have a viscosity of from about 1 millipascal seconds (mPa.s) to about 40 mPa.s, as determined as a 2 wt% aqueous solution of the HPMC at 20°C using a Ubbelohde tube viscometer. In a preferred embodiment, the HPMC has a viscosity of about 3 mPa.s to about 20 mPa.s at 20°C. HPMC is commercially available from Dow Chemical Company as METHOCELTM E5 LV. METHOCELTM E5 LV is a USP grade, low viscosity HPMC having 29.1% methoxyl groups and 9% hydroxypropyl group substitutions. In a 2 wt% solution, the METHOCELTM has a viscosity of 5.1 mPa.s at 20°C as measured with a Ubbelohde tube viscometer.

The amount or concentration of the hydroxyalkyl cellulose polymers present in the film of the dentifrice composition may vary widely. In at least one embodiment, the amount of the hydroxyalkyl cellulose polymers present in the film of the dentifrice composition may be greater than or equal to about 10 wt% and less than or equal to about 75 wt% based on a dry weight of the film. For example, the amount of the hydroxyalkyl cellulose polymers present in the film of

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the dentifrice composition may be from about 10 wt%, about 15 wt%, about 20 wt%, about 25 wt%, about 30 wt%, about 35 wt%, or about 40 wt% to about 45 wt%, about 50 wt%, about 55 wt%, about 60 wt%, about 65 wt%, about 70 wt%, or about 75 wt% based on a dry weight of the film. In another example, the amount of the hydroxyalkyl cellulose polymers present in the film of the dentifrice composition may be greater than greater than 10 wt%, greater than 15 wt%, greater than 20 wt%, greater than 25 wt%, greater than 30 wt%, greater than 35 wt%, greater than 40 wt%, greater than 45 wt%, greater than 50 wt%, greater than 55 wt%, greater than 60 wt%, greater than 65 wt%, greater than 70 wt%, or greater than 75 wt% based on a dry weight of the film. In at least one embodiment, the amount of the hydroxyalkyl cellulose polymers present in the film of the dentifrice composition may be greater than 60 wt% based on a dry weight of the film. For example, the amount of the hydroxyalkyl cellulose polymers present in the film of the dentifrice composition may be greater than or equal to 68 wt% based on a dry weight of the film. In a preferred embodiment, the amount of the hydroxyalkyl cellulose polymers present in the film of the dentifrice composition may be about 69 wt% based on a dry weight of the film.

As discussed above, the film of the dentifrice composition may be or include a homogenous mixture of one or more hydroxyalkyl cellulose polymers and one or more starches. The starches may be or include but are not limited to, pregelatinized starches. For example, the starches may be a water swellable, physically modified and pregelatinized starch. The starches may be configured to increase the relative stiffness of the hydroxyalkyl methyl cellulose matrix or homogenous mixture. The starch of the film may be prepared by heating granular starch in the presence of water and optionally an organic solvent at a temperature not greater than 10°C above the gelatinization temperature thereof. The starch obtained from the heating of the granular starch may then be dried to obtain the water swellable, physically modified and pregelatinized starch. In a preferred embodiment, the pregelatinized starch is corn starch. In a more preferred embodiment, the pregelatinized starch is a pregelatinized, stabilized and crosslinked waxy maize starch.

The amount or concentration of the starches present in the film of the dentifrice composition may vary widely. In at least one embodiment, the amount of the starches present in the film of the dentifrice composition may be greater than or equal to about 10 wt% to about 26 wt% based on a dry weight of the film. For example, the amount of the starches present in the film of the dentifrice composition may be from about 10 wt%, about 12 wt%, about 14 wt%, or

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about 16 wt% to about 18 wt%, about 20 wt%, about 22 wt%, about 24 wt%, or about 26 wt%. In another example, the amount of the starches present in the film of the dentifrice composition may be from about 10 wt% to about 26 wt%, about 12 wt% to about 24 wt%, about 14 wt% to about 22 wt%, or about 16 wt% to about 20 wt%. In a preferred embodiment, the amount of the starches present in the film of the dentifrice composition may be about 16 wt% to about 19 wt%. For example, the amount of the starches present in the film of the dentifrice composition may be about 16 wt%. In another example, the amount of the starches present in the film of the dentifrice composition may be about 18.7 wt%. In at least one embodiment, a ratio of the hydroxyalkyl methyl cellulose to starch may be from about 1:3 to about 4:1.

The charcoal dispersed in the film may have particle sizes less than or equal to 75 μm . For example, the particles sizes of the charcoal may be substantially (*e.g.*, at least 90% or 95%) less than or equal to 75 μm . For example, at least 95% of the particles of charcoal may have a size less than or equal to 75 μm , less than or equal to 65 μm , less than or equal to 60 μm , less than or equal to 55 μm , less than or equal to 50 μm , less than or equal to 45 μm , or less than or equal to 50 μm . In a preferred embodiment, the particle size of the charcoal is less than or equal to 10 μm . For example, the particle size of the charcoal may be from about 3 μm to about 9 μm . In another example, the charcoal may have a mean particle size of about 5.5 or 5.6 μm . In a preferred embodiment, the charcoal is at least 90 wt% carbon, preferably at least 95 wt% carbon, and less than 10 wt% ash, preferably less than 5 wt% ash. The charcoal may be derived from any suitable source. For example, the charcoal may be derived from a natural source or origin. In at least one example, the charcoal is derived from natural bamboo. For example, the charcoal may be derived from burning bamboo without any chemical treatment (*e.g.*, natural). The charcoal dispersed in the film may be pharmacologically and physiologically non-toxic. The charcoal may or may not have a porous structure to provide adsorption properties.

The amount or concentration of the charcoal present in the film of the dentifrice composition may vary widely. In at least one embodiment, the amount of the charcoal present in the film of the dentifrice composition may be greater than or equal to about 1 wt% to about 20 wt% on a dry matter basis or from about 1 wt% to about 10 wt% on a dry matter basis. For example, the amount of the charcoal present in the film of the dentifrice composition may be from about 1 wt%, about 2 wt%, about 3 wt%, about 4 wt%, about 5 wt%, about 6 wt%, about 7 wt%, about 8 wt%, about 9 wt%, or about 10 wt% to about 12 wt%, about 13 wt%, about 14

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wt%, about 15 wt%, about 16 wt%, about 17 wt%, about 18 wt%, about 19 wt%, or about 20 wt%. In another example, the amount of the charcoal present in the film of the dentifrice composition may be from about 1 wt% to about 20 wt%, about 2 wt% to about 19 wt%, about 3 wt% to about 18 wt%, about 4 wt% to about 17 wt%, about 5 wt% to about 16 wt%, about 6 wt% to about 15 wt%, about 7 wt% to about 14 wt%, about 8 wt% to about 13 wt%, or about 9 wt% to about 12 wt%. In yet another example, the amount of the charcoal present in the film of the dentifrice composition may be from about 1 wt%, about 2 wt%, about 3 wt%, about 4 wt%, about 5 wt%, or about 6 wt% to about 7 wt%, about 8 wt%, about 9 wt%, about 10 wt%, about 11 wt%, or about 12 wt%. In another example, the amount of the charcoal present in the film of the dentifrice composition may be from about 1 wt% to about 12 wt%, about 2 wt% to about 11 wt%, about 3 wt% to about 10 wt%, about 4 wt% to about 9 wt%, about 5 wt% to about 8 wt%, or about 6 wt% to about 7 wt%.

In at least one embodiment, the film does not include any one or more of titanium dioxide, titanium dioxide coated mica (TIMIRON®), chromium oxide greens, ultramarine blues and pinks and ferric oxides as well as water insoluble dye lakes prepared by extending calcium or aluminum salts of FD&C dyes on alumina such as FD&C Green #1 lake, FD&C Blue #2 lake, FD&C R&D #30 lake and FD&C # Yellow 15 lake. In another embodiment, the film includes titanium dioxide and/or titanium dioxide coated mica (TIMIRON®). In at least one embodiment, the film does not include any dyes and/or pigments.

The present disclosure may provide a method for preparing the film matrix of the dentifrice composition. The film matrix may be prepared by mixing, combining, or otherwise contacting the hydroxyalkyl methyl cellulose polymer, the starch, and a compatible solvent with one another to form a film forming composition. The hydroxyalkyl methyl cellulose polymer and the starch may be dissolved or dispersed in the compatible solvent. In at least one embodiment, the starch and/or the hydroxyalkyl methyl cellulose polymer are mixed, dispersed, combined, or otherwise contacted with a compatible solvent, such as water, to form separate starch and/or hydroxyalkyl methyl cellulose polymer fluids or solutions before combining with one another. The hydroxyalkyl methyl cellulose may be mixed or combined with water and heated to aid the dispersion or solvation of the hydroxyalkyl methyl cellulose polymer in the water. In at least one embodiment, an alkylene glycol, such as propylene glycol, and/or a surfactant or emulsifier, such as TWEEN® 80, may be added to the heated hydroxyalkyl methyl

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cellulose polymer solution prior to combining the hydroxyalkyl methyl cellulose polymer solution with the starch solution.

The method for preparing the film matrix may also include contacting the charcoal with the film forming composition. In at least one embodiment, the hydroxyalkyl methyl cellulose polymer, the starch, the compatible solvent, and the charcoal are combined with one another. In another embodiment, the hydroxyalkyl methyl cellulose polymer, the starch, and the charcoal are combined with one another to form a mixture, such as a powdered mixture, and the powdered mixture is combined with the compatible solvent. In yet another embodiment, the hydroxyalkyl methyl cellulose polymer, the starch, and the compatible solvent are combined with one another to form the film forming composition, and the charcoal is mixed, dispersed, or otherwise contacted with the film forming composition.

The method for preparing the film matrix may also include casing the film forming composition, including the charcoal dispersed therein, on a releasable carrier or substrate and drying the film forming composition to form a sheet of the film or film matrix material. The substrate may have a surface tension that allows the film forming composition to coat or spread evenly without forming a destructive bond between the film and the substrate. Illustrative substrates may be or include, but are not limited to, glass, stainless steel, TEFLON®, polyethylene-impregnated paper, and the like. In at least one embodiment, the film forming composition may be dried to the film with heat. For example, the film forming composition may be dried in a drying oven, drying terminal, vacuum drier, or any other suitable drying system/equipment that does not adversely affect the components of the film.

A thickness of the film formed may vary widely. In at least one embodiment, the film may have a thickness greater than or equal to about 28 μm and less than or equal to about 60 μm .

The film formed from drying the film forming composition may be subsequently shaped into flakes. For example, the film may be cut and/or punched into one or more shaped flakes having a particle size from about 0.01 inches to about 0.50 inches, preferably from about 0.08 inches to about 0.25 inches.

In at least one embodiment, the film may include a protective barrier overcoat configured to increase a relative stability of the flakes. For example, prior to shaping the flakes via punching or cutting, the film may be coated with a protective barrier overcoat, such as a food

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grade shellack or an ethyl cellulose, to increase the relative stability of the flakes formed from the film.

The dentifrice or base dentifrice may be substantially clear. As used herein, the expression “substantially clear” may refer to a dentifrice (*e.g.*, toothpaste and/or gel) that is translucent or transparent. In at least one embodiment, the base dentifrice may include an orally acceptable vehicle, including a water-phase with a humectant, which is preferably glycerine or sorbitol or an alkylene glycol, such as polyethylene glycol or propylene glycol, where water is present in amount of about 5 wt% to about 10 wt% and the glycerine, sorbitol, and/or the alkylene glycol ingredients is present in an amount of about 30 wt% to about 80 wt% of the dentifrice, more typically about 50 wt% to about 70 wt% of the dentifrice.

The dentifrice may also include one or more thickeners or gelling agents. The one or more thickeners or gelling agents may be inorganic, organic, natural, and/or synthetic thickeners. The thickeners present are present in the dentifrice composition in an amount or concentration sufficient to form an extrudable, shape-retaining dentifrice that can be extruded from a tube onto a toothbrush without falling between the bristles of the toothbrush. In at least one embodiment, the amount or concentration of the thickeners present is from about 0.10 wt% to about 5 wt%, preferably about 0.2 wt% to about 1 wt%. Illustrative thickeners or gelling agents may include, but are not limited to, inorganic thickening silicas, such as amorphous silicas, which are available from Huber Corporation under the trade designation ZEODENTTM 165, Irish moss, iota-carrageenan, gum tragacanth, polyvinylpyrrolidone, and the like, and mixtures or combinations thereof.

In at least one embodiment, the dentifrice or base dentifrice may include one or more polishing agents. Illustrative polishing agents may be or include, but are not limited to, silica, calcined alumina, sodium bicarbonate, calcium carbonate, dicalcium phosphate, calcium pyrophosphate, and the like, and mixture or combinations thereof. In at least one embodiment, at least one of the polishing agents is visually and/or substantially clear. For example, at least one of the polishing agents may be or include a colloidal silica, such as ZEODENTTM 115, which is commercially available from Huber Corporation. The polishing agent may also be or include a alkali metal aluminosilicate complex having refractive indices close to the refractive indices of gelling agents and liquids (*e.g.*, water, humectants, etc.) utilized in the dentifrice. The amount of

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the polishing agents present in the dentifrice or base dentifrice composition may be from about 3 wt% to about 50 wt% based on a total weight of the dentifrice composition.

In at least one embodiment, the dentifrice or base dentifrice may include one or more surfactants configured to increase prophylactic action and/or render the dentifrice more cosmetically acceptable. The one or more surfactants may be or include, anionic surfactants, cationic surfactants, and the like. Illustrative surfactants may include, but are not limited to, water-soluble salts of higher fatty acid monoglyceride monosulfates, such as the sodium salt of the monosulfated monoglyceride of hydrogenated coconut oil fatty acids, cocamidopropyl betaine, higher alkyl sulfates such as sodium lauryl sulfate, alkyl aryl sulfonates, such as sodium dodecyl benzene sulfonate, higher alkyl sulfoacetates, sodium lauryl sulfoacetate, higher fatty acid esters of 1,2-dihydroxy propane sulfonate, and the substantially saturated higher aliphatic acyl amides of lower aliphatic amino carboxylic acid compounds, such as those having 12 to 16 carbons in the fatty acid, alkyl or acyl radicals, and the like, and mixtures or combinations thereof. Illustrative amides may be or include, but are not limited to, N-lauroyl sarcosine, and the sodium, potassium, and ethanolamine salts of N-lauroyl, N-myristoyl, or N-palmitoyl sarcosine. The amount or concentration of the surfactants present in the dentifrice or base dentifrice composition may be from about 0.3 wt% to about 5 wt%, preferably about 0.5 wt% to about 2.0 wt% based on a total weight of the dentifrice.

The present disclosure may provide a method for preparing the dentifrice or dentifrice base. The method for preparing the dentifrice may include mixing, combining, or otherwise contacting water, humectants, such as glycerin, sorbitol, and/or polyethylene glycol to form a homogenous gel phase, and contacting a polishing agent with the gel phase. The method may also include adding a thickener, flavors, and/or surfactants to the gel phase to form the dentifrice. In at least one embodiment, the flakes of the film are added to the gel phase. In another embodiment, the flakes are added to the dentifrice. For example, the flakes are added to the dentifrice last to minimize the amount of shear stress applied to the flakes during prior mixing steps. The amount or concentration of the film (e.g., in the form of flakes) present in the dentifrice or base dentifrice may vary widely. In at least one embodiment, the amount of the film present in the dentifrice may be from about 0.05 wt% to about 1.0 wt%, preferably about 0.1 wt% to about 0.5 wt% by weight of the dentifrice composition.

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In at least one embodiment, the dentifrice in which the flakes of the film are incorporated or suspended is substantially clear. Accordingly, the dentifrice incorporating the flakes appear to include charcoal strips or flakes dispersed or suspended therein, which indicates the presence of charcoal to the consumer, thereby enhancing the consumer experience and/or acceptance. The flakes of the film dispersed or suspended in the dentifrice may be rupturable. For example, the flakes of the film may be rupturable when brushing teeth with the dentifrice. In another example, the mechanical agitation created during brushing may rupture the flakes, thereby releasing the charcoal into the dentifrice. The release of the charcoal into the dentifrice may indicate the presence of charcoal in the dentifrice to the consumer, thereby increasing consumer acceptance and/or enhancing the consumer experience of the dentifrice. The rupture of the flakes may also release the charcoal onto the surfaces of the oral cavity, such as the teeth and gums, thereby topically applying the charcoal to the surfaces of the oral cavity.

In at least one embodiment, the charcoal may be maintained substantially separate from the dentifrice ingredients or components during manufacture and storage, while subsequently being released when the dentifrice is applied topically to surfaces of the oral cavity. Accordingly, the charcoal contained in the flakes suspended in the dentifrice may not bleed into the dentifrice components until ruptured, thereby maintaining the dentifrice as a substantially clear toothpaste or gel.

EXAMPLES

The examples and other embodiments described herein are exemplary and not intended to be limiting in describing the full scope of compositions and methods of this disclosure. Equivalent changes, modifications and variations of specific embodiments, materials, compositions and methods may be made within the scope of the present disclosure, with substantially similar results.

Example 1

Films 1A-7A were prepared by combining the ingredients/components according to Table 1. To prepare each of the films 1A-7A, starch was combined with water in a mixer for at least 5 minutes. Water was added to a separate mixer and heated to a temperature of up to 75°C. After heating, titanium dioxide, if any, was added to the hot water and mixed for at least 5 minutes. The hydroxyalkyl cellulose polymer(s) was/were then added into the hot water and

mixed for at least 20 minutes or until a homogenous solution was obtained. The water was maintained at a temperature of at least 70°C when adding the hydroxyalkyl cellulose polymer(s). The starch solution was then added to the hydroxyalkyl cellulose polymer solution and mixed for an additional 20 minutes. Propylene glycol and TWEEN® 80 were then added and mixed for at least 5 minutes to prepare the film forming composition. The film forming composition was then cast on a polyethylene coated paper at 25°C and dried at 110 °C to form a solid thin film. The final compositions of each of the dried solid thin films are summarized in Table 2.

[illegible]

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Table 2
Dried Film Compositions

Ingredient	1A	2A	3A	4A	5A	6A	7A
Starch (wt%)	19.07	19.88	19.88	19.42	19.23	20.65	21.34
Titanium Dioxide (wt%)	4.77	0.00	0.00	0.00	0.00	0.00	2.59
Hydroxyalkyl Cellulose Polymer(s) (wt%)	61.96	64.60	64.60	63.13	62.50	67.10	69.35
Propylene Glycol (wt%)	9.53	9.94	9.94	9.71	9.61	10.32	10.67
Surfactant(s) (wt%)	2.38	2.48	2.48	2.43	2.40	2.58	2.67
CI Pigment Black 7 (wt%)	2.04	--	--	--	--	--	--
Charcoal Activated Carbon (wt%)	0.25	3.10	4.29	5.31	6.25	6.25	6.46
Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Each of the films was then shaped into flakes and combined with a substantially clear dentifrice to determine the efficacy of the charcoal flakes suspended in the dentifrice. It was observed that the flakes of the films containing the charcoal were successfully suspended within the substantially clear dentifrice, and no observable bleeding of the charcoal into the ingredients or components of the dentifrice were observed. It was further observed that films containing titanium dioxide were not as dark as films not containing the titanium dioxide.

The present disclosure has been described with reference to exemplary embodiments. Although a limited number of embodiments have been shown and described, it will be appreciated by those skilled in the art that changes may be made in these embodiments without departing from the principles and spirit of the preceding detailed description. It is intended that the present disclosure be construed as including all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.

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CLAIMS

What is claimed is:

1. An oral care composition, comprising:
a dentifrice; and
a film suspended in the dentifrice, wherein the film comprises charcoal.
2. The oral care composition of claim 1, wherein the film further comprises a water soluble polymer selected from the group consisting of cellulose ether, methacrylates, polyvinylpyrrolidone, and mixtures thereof.
3. The oral care composition of claim 2, wherein the film comprises a cellulose ether.
4. The oral care composition of claim 3, wherein the cellulose ether is selected from the group consisting of hydroxypropyl methyl cellulose (HPMC), hydroxypropyl cellulose, hydroxyethyl cellulose, methyl cellulose, carboxymethyl cellulose, and mixtures or combinations thereof.
5. The oral care composition of claim 4, wherein the cellulose ether is HPMC.
6. The oral care composition of any one of claims 1 to 5, wherein the charcoal is present in an amount of from about 1 wt% to about 10 wt%, based on a total weight of the film.
7. The oral care composition of any one of claims 1 to 6, wherein the charcoal is present in an amount of from about 2 wt% to about 6 wt%, based on a total weight of the film.
8. The oral care composition of any one of claims 1 to 7, wherein the charcoal is derived from a natural source.
9. The oral care composition of any one of claims 1 to 8, wherein the charcoal has a particle size less than or equal to 75 μm .

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10. The oral care composition of any one of claims 1 to 9, wherein the charcoal has a particle size of from about 3 μm to about 9 μm .
11. The oral care composition of any one of claims 1 to 10, wherein the film further comprises starch.
12. The oral care composition of claim 11, wherein the starch is corn starch.
13. The oral care composition of any one of claims 1 to 10, wherein the film does not include titanium dioxide.
14. The oral care composition of any one of claims 1 to 10, wherein the film does not include any dyes.
15. The oral care composition of any one of claims 1 to 10, wherein the film does not include any pigments.

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2016/110743

A. CLASSIFICATION OF SUBJECT MATTER

A61K 8/97(2017.01)i; A61K 8/73(2006.01)i; A61Q 11/00(2006.01)i

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)

A61K; A61Q

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)

CNMED;CPRSABS;CNABS;CNKI; DUXIU;DWPI;EPODOC;CA:smell,film, flake,mouth, charcoal, carbon,oral, toothpaste, dentifrice

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	CN 103417390 A (GUANGZHOU LIBY ENTPR CO LTD) 04 December 2013 (2013-12-04) abstract, claims 1-3	1-15



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

05 September 2017

Date of mailing of the international search report

22 September 2017

Name and mailing address of the ISA/CN

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2016/110743

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
CN	103417390	A	04 December 2013	CN	103417390	B	18 November 2015