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OPTICAL BRIGHTENING DENTAL COMPOUND

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This invention relates to improvements in dentifrices useful for brightening teeth. More particularly, the present invention relates to an improved dentifrice containing brightening agents which effectively adhere to the surfaces of teeth and thereby create an illusion of brightening the whiteness of the teeth.

The present application is a continuation-in-part application of pending U.S. patent application, Serial No. 200,342 filed June 6, 1962, now abandoned, which is a continuation-in-part of U.S. patent application, Serial No. 485,825 filed February 2, 1955, and now abandoned.

Many attempts have been made in the dentifrice art to provide means for whitening the teeth or for preventing discoloration thereof. These various attempts have been directed primarily to abrasive type compositions which attempt to remove the discoloration from the surface of the teeth. Despite all efforts made heretofore, discoloration of the teeth still occurs.

It has now been found that the phenomenon of optical brightening may be utilized in making the outer surface of teeth appear whiter, cleaner, and more attractive through incorporation of an optical brightener as an ingredient or component in dentifrice compositions.

Optical brighteners or "optical bleaches" are well known in the detergent industry where they have been used both for the whitening of soaps and for enhancing the whiteness of fabrics washed with detergents. The brightening effect of these brighteners is created by use of materials that absorb ultraviolet light and fluoresce in the visible portion of the spectrum. Preferably, the fluorescence is in the blue region of the spectrum in order to overcome the yellow that is normally encountered. One of the substantial advantages offered by optical brighteners over conventional "bluing" agents is that optical brighteners actually enhance rather than reduce the amount of light reflected from the surface.

In considering the feasibility of utilizing optical brighteners as applied to the formulation of dentifrices, it was found that it was necessary to take several factors into account. The problem of retention of the optical brighteners in the mouth where unique physico-chemical conditions prevail constitute a system altogether different from the relatively uncomplicated system encountered in laundering operations. Accordingly, the fundamental factors involved in ascertaining whether or not the concept of the present invention was feasible of accomplishment included: discovery of a suitable material or materials having the requisite fluorescent characteristics and which possess adequate resistivity to the solubilizing action of the saliva and enzymes present therein; and discovery of a solution for achieving appropriate fixation of such a relatively saliva-insoluble optical brightener on the surface of teeth. The latter characteristic may be denominated as "substantivity."

Canadian Patent No. 500,625 proposes the inclusion of optical brighteners in dentifrices. However, it has been found that the brightening of the teeth with such dentifrices is temporary and fugitive. The brighteners do not adhere to the teeth, as they are removed by saliva or water or in consequence of the aforesaid physical chemical conditions in the mouth.

As a result of the investigations carried out in furtherance of the aforesaid concepts, it has been found that

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optical brightening of the teeth can be attained; that it is possible to achieve requisite substantivity; and that the materials used therefor can be incorporated in dentifrices to provide tooth pastes, creams and the like having the desirable properties of a dentifrice enhanced by optical brightening of the teeth.

It is an object of this invention, therefore, to provide a dentifrice composition containing additives which impart an optical illusion of greater whiteness to teeth.

It is also an object of this invention to provide a dentifrice effective in correcting discoloration, dullness and general yellowish tinge of teeth by adherence of certain optical brighteners to the surface of the teeth and thereby creating an illusion of whiter, cleaner and more attractive teeth.

It is a further object of this invention to provide a generally saliva insoluble optical brightener which may be combined with suitable film-forming higher molecular weight fatty amines for effective adherence to the surface of teeth.

These and other objects will become readily apparent from the following detailed description.

In its fundamental aspects, the present invention results by incorporating certain optical brighteners in dentifrices containing film-forming higher molecular weight fatty amines which effectively adhere to the surfaces of teeth without adverse reaction therewith.

Optical brighteners which have been found suitable for use as ingredients of the novel dentifrices of this invention include the di-substituted coumarins, typified by fluorescing beta-methyl-umbelliferone (4-methyl-7-hydroxycoumarin) and 4-methyl-7-diethylamino-coumarin. These di-substituted coumarins are found to fluoresce in the blue region of the spectrum.

It has been found that the minimum concentration of optical brightener suitable for use herein and capable of producing an optical effect of brightness of teeth, is 0.01% by weight of the composition. The maximum concentration of the optical brightener above which no noticeable increase in substantivity is observed is about 0.1% by weight of the composition.

Vehicles which have been found suitable for use as solvents for the optical brighteners and which possess the requisite "substantivity" as above defined include film-forming agents such as fatty amines blended preferably with mineral oil. The films, containing fluorescent materials dissolved or distributed therein are found to effectively hold the brightness on the surface of teeth for extended periods of time.

Generally, the vehicles for the optical brighteners that impart the requisite "substantivity" thereto may form about 0.1 percent of the dentifrice composition although other adequate amount may also be employed such as from about .05 to about 2.0 percent by weight of the dentifrice composition.

The amines which may be preferably blended with mineral oil, are higher molecular fatty amines having an average carbon content of from 10 to about 18 carbon atoms, as exemplified by decylamine, tetradecylamine, hexadecylamine, octadecylamine, and the corresponding unsaturated amines, as for example, oleylamine, and the like. Combinations of these various higher molecular fatty amines are also usefully employed as vehicles for the optical brighteners. When mineral oil is employed as part of the vehicle, an amount of about 1 part by weight to about 3 parts by weight per part by weight of fatty amine is found useful.

The fluorescent materials or optical brighteners, aforesaid, and the vehicles therefor which impart the requisite substantivity to the brighteners may be incorporated in a variety of formulations of dentifrices which embody

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the well-known basic components of such compositions, for example, pulverulent minerals which are sometimes designated as "abrasives" and typified by calcium phosphate, magnesium phosphate, calcium carbonate, and the like. Various other materials such as flavoring ingredients, glycerine, detergents or surfactants, carboxymethyl cellulose, natural or synthetic gums and related gum-like materials may also be employed.

The following are examples of dentifrices made in accordance with this invention.

Example 1

A paste-like dentifrice is compounded having the following composition:

Ingredient:	Amount
Carboxy methyl cellulose (medium viscosity)	grams-- 6.20
Water -----do-----	125.00
Glycerine -----do-----	142.00
Soluble saccharine -----do-----	0.325
Sodium lauryl sulfate -----do-----	17.50
Di-calcium phosphate -----do-----	200.00
Mineral oil (heavy) -----do-----	5.00
Decylamine -----do-----	2.50
Spearmint oil -----ml-----	3.0
4-methyl-7-hydroxy-coumarin -----grams--	0.50

Example 2

A dentifrice is manufactured in accordance with the basic composition as set forth in Example 1 except that 4-methyl-7-diethylamino-coumarin is used in the place of the 4-methyl-7-hydroxy-coumarin of Example 1.

It is to be understood that the foregoing detailed description is given merely by way of illustration and that many variations may be made therein without departing from the spirit of this invention.

What is claimed is:

1. A paste-like dentifrice composition consisting essentially of a paste dentifrice base, a film-forming system comprising a fatty amine having an average carbon content of from 10 to about 18 carbon atoms and being present in an amount from 0.05% to 2% by weight of the dentifrice composition, and an optical brightener selected from the group consisting of 4-methyl-7-hydroxy-coumarin and 4-methyl-7-diethylamine-coumarin, said optical brightener being present in an amount from about 0.01% by weight to about 0.1% by weight of the dentifrice composition.

2. A paste-like dentifrice composition consisting essentially of a paste dentifrice base, a film-forming system comprising a fatty amine having an average carbon content of from 10 to about 18 carbon atoms and mineral oil, said fatty amine being present in an amount from

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0.05% to 2% by weight of the dentifrice composition, said mineral oil being present in an amount of from about 1 part to about 3 parts by weight per part by weight of fatty amine, and an optical brightener selected from the group consisting of 4-methyl-7-hydroxy-coumarin and 4-methyl-7-diethylamine-coumarin, said optical brightener being present in an amount from about 0.01% by weight to about 0.1% by weight of the dentifrice composition.

3. A paste-like dentifrice composition consisting essentially of a paste dentifrice base, decylamine in an amount of from 0.05% to 2% by weight of the composition, and from 0.01% to about 0.1% by weight of the composition of 4-methyl-7-hydroxy-coumarin.

4. A paste-like dentifrice composition consisting essentially of a paste dentifrice base, decylamine in an amount of from 0.05% to 2% by weight of the composition, and from about 0.01% by weight to about 0.1% by weight of the composition of 4-methyl-7-diethyl-amino-coumarin.

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