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DENTAL PREPARATION

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My invention relates to improvements in dental preparations, and particularly to tooth pastes, containing saponaceous bases in the presence of water, and usually having incorporated therewith a suitable abrasive in a finely divided or powdered state, and the same has for its object to provide a tooth paste which has enhanced or augmented detergent and cleansing properties and is effective to prevent the accumulation of tartar and oil films on the teeth without producing disagreeable taste sensations and deleteriously affecting the teeth and mucous membranes of the mouth.

Another object of the invention is to provide a composition of the character specified in which is incorporated an alkaline constituent functioning as an effective cleansing and detergent agent even in the presence of acidic mouth juices.

Another object of the invention is to provide a composition of the character specified in which the detergent augmenting component thereof is proportioned relative to the saponaceous base to prevent the latter from being precipitated or salted out.

Further, said invention has for its object to provide a composition of the character specified in which the detergency augmenting component thereof has an alkalinity sufficiently mild to produce desirable physiological reactions while serving as an effective detergent.

Further, said invention has for its object to provide a composition of the character specified in which the detergency promoting component thereof constitutes a chemical buffer capable of neutralizing or partly neutralizing acid or alkaline conditions in the mouth without appreciable variation in the alkalinity relied on for augmenting the detergent action.

Further, said invention has for its object to provide a composition of the character specified which has an augmented alkalinity of the desired physiological pH value enhancing the detergent action of the composition without detrimentally affecting the stability thereof.

Further, said invention has for its object to provide a composition of the character specified which, because of said buffer action, is very effective, even in the presence of acidic mouth secretions, as a detergent although characterized by an alkalinity physiologically mild.

Other objects will in part be obvious and in part be pointed out hereinafter.

I employ in my invention a base including suitable soaps (in the presence of water) which have considerable emulsifying power and are very ef-

fective in lowering surface tension. The usual soaps employed for the purpose are the sodium, potassium, calcium and similar soaps of higher fatty acids, a soap preferably being selected which does not harden upon standing.

I also employ in said base the usual abrasive in a finely divided or powdered state, such as calcium or magnesium carbonate. The cleansing or detergent power of such a base can be enhanced by the addition of alkaline salts such as the soluble alkalin-metal salts of weak acids that yield more hydroxyl ions in the solution, for example the alkalin-metal borates, carbonates, bicarbonates, tartrates, etc. On the other hand, the presence of an excess of hydroxyl ions is objectionable physiologically, either because of the taste or because of irritation of the mucous membranes of the mouth.

In the present invention I incorporate in the saponaceous base a soluble base and acidic combination which serves as a buffer. Buffers preferably comprise acids, or acid salts, and their corresponding basic salts capable of neutralizing acids or alkali without substantial variation in pH value, unless very large quantities of acid or alkali are added, the acid component of the buffer furnishing free —H— ions in the solution and the basic component furnishing free —OH— ions in the solution. The buffer preferred for use in the present invention, must conform to certain qualifications rendering the same particularly adapted for tooth pastes as hereinafter more fully described, for example, basic tri-sodium or tri-potassium phosphate and acidic sodium or potassium dihydrogen phosphate. The basic salt dissociates in solution to form dissociated —Na— or —K— ions which combine with the water to form NaOH or KOH furnishing in turn the —OH— ions in solution. The corresponding acid salt dissociates to furnish the —H— ions in solution. Therefore, if to this buffer in solution an acid is added, the —OH— ions combine with the —H— ions to form water and the remainder of the acid molecules combine with the —Na— or —K— ions to form a salt. If an alkali is added to the buffer solution, —OH— ions of the alkali combine with the —H— ions of the acid salt to form water H_2O , the pH value of alkalinity of the buffer remaining after either reaction substantially constant although neutralization of acids or alkali takes place.

The oral cavity contains bacteria which cause fermentation processes producing various acids, it being the function of the buffer employed in my invention to neutralize these acids while serving

as a detergent to wash the products away, or, if the mouth secretions are alkaline, to neutralize or correct the excess alkalinity to maintain a desirable physiologically pH value.

- 5 The buffer produces a tooth paste having an alkalinity of a pH value sufficient to effect detergent action without producing a disagreeable taste in the mouth and an irritating effect on the mucous membrane, the coacting components of the buffer being coordinated or compensating each other to effect the augmented cleansing action while producing desirable physiological reactions.

10 If it were attempted to secure this result by the addition of enough basic salt to give the desired alkalinity, the improvement in detergent action would be transitory and slight because in an acid mouth the alkalinity would at once disappear by neutralization, unless the basic salt was in excess of that required to neutralize the acid, in which event undesirable physiological effects would be produced.

By the use of a buffer, such as the combination of the soluble tertiary salt of an alkalin-metal of phosphoric acid (M_3PO_4) and the corresponding alkalin-metal salt of phosphoric acid (MH_2PO_4) the alkalinity of the tooth paste is retained for an appreciable time and with it the detergent action of the paste in the mouth. I have found that the components of the buffer can be relatively proportioned to give an alkalinity of a value preventing undesirable physiological reactions while maintaining, because of the buffer action, effective detergent action, a mild alkalinity of a pH value of about 9 being found desirable physiologically for the average person, and very effective in detergent action.

The basic and acidic components of the buffer in the present invention, must be such as to effect the results above described in accordance with the principles of the invention. The basic salts and the corresponding acids or acidic salts employed for buffers are preferably such as to mix with the water containing saponaceous base in the form of a paste or emulsion without danger of salting out the soap or breaking the emulsion.

While various buffers comprising acids, or acid salts, and their corresponding basic salts may be employed in the present invention, provided such buffers conform to the specifications or qualifications above described, the basic and acidic sodium or potassium phosphates above mentioned are preferred. A buffer composed of the system of phosphates above mentioned does not produce an excess of alkalinity, that is, an excessive concentration of $-OH-$ ions in the mouth, although furnishing a reserve of $-OH-$ ions for the neutralization of acids without soon losing its alkalinity. The phosphate buffer is more effective as a detergent and more readily furnishes $-OH-$ ions, because of the solubility thereof, than the more insoluble basic salts like calcium carbonate or magnesium carbonate. The basic phosphate is also effective in aiding emulsification.

65 The basic component of the buffer employed in my invention is preferably incorporated in a quantity furnishing an excess of $-OH-$ ions over those required to effect the detergent action, which basic component, if employed alone, would render the composition disagreeable to the taste and irritating to the mucous membrane of the mouth. By the addition of the acidic component of the buffer, the pH value of alkalinity of the composition as a whole is brought within range, 75 not exceeding a pH value of about 9, to produce

desirable physiological reactions, the excess of $-OH-$ ions furnishing a reserve for the neutralization of acids without causing substantial change in the pH value of the composition, and hence in its detergency.

The quantity of buffer incorporated in the composition must be kept within limits preventing precipitation of the saponaceous component or breaking down of the emulsion. Utilizing the particular saponaceous base herein described as one example thereof, or bases somewhat modified in the constituents thereof or their relative proportions, I have found that the buffer components should not exceed in quantity approximately 3% of the entire composition, the basic component varying from about 1% to 2% and the acidic component varying from about $\frac{1}{2}\%$ to 1%.

One method of making the paste employing the sodium phosphate salts is as follows:

A suitable soap (about 10 parts by weight) is placed in a vessel in warm bath, and trisodium phosphate is added in quantity not to exceed about 1 to 2 parts to prevent salting out of the soaps, the phosphate being in solution in water. The trisodium phosphate is thoroughly mixed with the melted soap, the mixture assuming a stringiness and adhesiveness rendering the same suitable for the preparation of an emulsion. Glycerin (about 10 parts) is then added and the stirring continued for a few moments. The final product is a soft, smooth mass serving as a base for the preparation of the tooth paste.

To this base, while it is still warm, is added the abrasive, such as one of those above described (about 50 parts), a small amount of sodium salicylate as a preservative (about $\frac{1}{2}$ part), and a small amount of the mono-sodium phosphate (about $\frac{1}{2}$ to 1 part), the constituents being previously measured or weighed out and intimately mixed in dry state, and introduced along with about 5 parts of water, the whole being thoroughly mixed. To this mixture flavoring and coloring matter in solution (about 5 parts) may be added, if so desired, when the mixture attains room temperature.

The thick emulsion thus formed is allowed to stand for several days. It is then thoroughly mixed while adding water until the mixture contains about 23 parts of water, producing a stable emulsion of smooth texture.

The amount of Na_3PO_4 incorporated in the saponaceous base is less than that which salts out the soap, preferably not appreciably in excess of 2 parts for 10 parts of soap in the presence of water. The NaH_2PO_4 is added in sufficient quantity, preferably not appreciably in excess of 1 part for 10 parts of soap, to reduce the pH of the composition to that desired, pH 9, the two components of the buffer producing a composition of desirable alkalinity and effective as a detergent without detrimentally affecting the character of the paste or emulsion.

The composition of my invention is a paste or emulsion of mild alkalinity, and very effective as a detergent, the constituents forming a smooth, stable emulsion of the proper consistency.

Having thus described my said invention what I claim and desire to secure by Letters Patent is:

1. A composition of the character described comprising a soap, an abrasive in a finely divided state, glycerin, and water, the mixture forming a pasty emulsion, and a buffer incorporated in said emulsion and including a basic component and an acidic component relatively proportioned to maintain a substantially constant pH value of

alkalinity having a desirable physiological reaction while providing a reserve of ions for neutralization of the mouth juices, said basic component not exceeding about 1 to 2% of the composition and said acidic component not exceeding $\frac{1}{2}$ to 1% of the composition to prevent the precipitation of the saponaceous component thereby.

2. The hereindescribed method of making dental compositions which comprises warming a soap, placing therein a basic salt in solution in a quantity to form, when a predetermined amount of an acidic salt is added to the mixture, a buffer of a pH value slightly on the alkaline side without salting out of the soap, mixing the mass, adding glycerin and stirring until the mass is homogeneous, adding a powdered abrasive and said predetermined amount of acidic salt to the mixture together with water and mixing the ingredients, allowing the mass to stand for several days, and adding water.

3. A dentifrice including an excipient, and basic and acidic buffer forming constituents incorporated therein, said constituents being relatively proportioned to form a mixture having a pH value greater than 7 and less than approximately 9, and functioning as such buffer within a range capable of resisting change in the pH value thereof in both directions in the presence of pH modifying substances in the mouth.

4. A dentifrice comprising soap, an abrasive, and a buffer incorporated therein in proportions to prevent precipitation of the soap in the presence of water, the components of the buffer being relatively proportioned to have a pH value within a range greater than 7 and less than 9 and to function as such buffer within a range capable of resisting change in the pH value thereof in both directions in the presence of pH modifying substances in the mouth.

5. A dentifrice including a saponaceous base, and basic and acidic buffer forming constituents incorporated therein for enhancing the alkalinity of the composition and to increase the detergent qualities thereof, said buffer being proportioned to prevent precipitation of the saponaceous base

in the presence of water, and the constituents thereof being relatively proportioned to function as a buffer for resisting change in the pH value thereof in both directions in the presence of pH modifying substances in the mouth and within a pH range on the alkaline side producing desirable taste reactions not exceeding a pH value of approximately 9.

6. A dentifrice including a saponaceous base having incorporated therein basic and acidic phosphates of an alkaline metal forming a buffer, the constituents of said buffer being relatively proportioned to form a mixture having a pH value greater than 7 and not exceeding a pH value of approximately 9 whereby to avoid producing disagreeable alkaline taste reactions in the mouth, and functioning as such buffer within a range capable of resisting change in the pH value thereof in both directions in the presence of pH modifying substances in the mouth.

7. A dentifrice comprising an excipient including a saponaceous base containing water, and a buffer comprising the corresponding basic and acidic salts of an alkaline metal and an acid incorporated in said excipient in an amount less than that liable to cause precipitation of the saponaceous component and not exceeding about 3% of the composition, said basic and acidic constituents being relatively proportioned to form a mixture having a pH value greater than 7 and not exceeding approximately 9 and functioning as such buffer within a range capable of resisting change in the pH value thereof in both directions in the presence of pH modifying substances in the mouth.

8. A dentifrice comprising soap, about 10 parts; glycerin, about 10 parts; an abrasive in a firmly divided state, about 50 parts; water, about 23 parts; and basic and acidic alkaline phosphates, about $1\frac{1}{2}$ to 3 parts, said phosphates being relatively proportioned to function as a buffer within a pH range on the alkaline side not exceeding a pH value producing disagreeable alkaline taste reactions in the mouth.

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