Title: COMPOSITION

Abstract: A toothpaste composition comprising a first formulation and a second formulation which are in contact with one another when dispensed from a container, the first toothpaste formulation comprising X% by weight of an abrasive (A) having a scattering centre concentration such that its light transmittance is from 0 to 70% and the second composition comprising from 0 to 0.9X by weight of an abrasive (B) having a scattering centre concentration such that its light transmittance is from 0 to 70%.
The present invention relates to a multi-component toothpaste composition comprising abrasives.

WO99/55297 (Colgate) discloses a dual component dentifrice in which each component comprises a siliceous abrasive.

US-B1-6 346 235 (Colgate) discloses a dual component toothpaste comprising silica abrasives.

EP-A-0 397 452 (Beecham) discloses a toothpaste composition comprising abrasives.

WO 99/39685 (Unilever) discloses a dual component toothpaste wherein the two separate phases are dispensed from the same container and both comprise silica abrasives.

WO 99/63960 (P&G) discloses a toothpaste comprising silicas having specific refractive indices and that the toothpaste has a clear appearance.

US 2005/0163727 (Doyle) discloses two-phase compositions comprising dental abrasives.


GB 1 271 944 (Beecham) discloses a striped toothpaste composition.
US 6 682 717 (Alcan) discloses a tooth care composition comprising abrasive components.

US 6 521 216 (P&G) discloses a dual component toothpaste comprising abrasives.

Despite the prior art there is a need for improved oral compositions comprising improved abrasive systems having better visual appearance.

Accordingly, the present invention provides a toothpaste which maximises the cleaning effect provided by contained abrasives while minimising the restrictive effects presented by their presence in the formulation, in particular their opacifying effect on clear gels.

Accordingly, the present invention provides a toothpaste composition comprising a first formulation and a second formulation which are in contact with one another when dispensed from a container, the first toothpaste formulation comprising X% by weight of an abrasive (A) having a scattering centre concentration such that its light transmittance is from 0 to 70% and the second composition comprising from 0.1 to 0.9X by weight of an abrasive (B) having a scattering centre concentration such that its light transmittance is from 0 to 70%.

Preferably, the second composition comprises 0.2 to 0.7, more preferably from 0.4 to 0.6 and especially preferably 0.5X of abrasive B.
Preferably, X is from 1 to 5% by weight of the first formulation, more preferably from 2 to 4% and especially 3% by weight of the first formulation.

The scattering centres are points within a particle which scatter light and therefore reduce the amount of light that passes through it. It can be measured quite simply by measuring the transmission of light through a mixture of the abrasive in the liquid phase of the toothpaste. This is achieved by placing into a cuvette a quantity of the abrasive in a liquid phase which, for clear gels, consists of aqueous sorbitol (at 70% in water) and water in the weight ratios of 90:10. Typically 0.5 g of the abrasive are mixed with 12 g of the 70% sorbitol in water solution and the light transmission measured at 589 nm.

Preferably, the abrasive (A) in the first formulation has a scattering centre concentration such that its light transmittance is from 0 to 50% more preferably from 10 to 40%. Preferably, the abrasive (B) in the second formulation has a scattering centre concentration such that its light transmittance is from 0 to 50% more preferably from 10 to 40%.

Preferably, the abrasive (B) in the second formulation is the same as abrasive (A).

Preferably, the second formulation is a visually clear gel. By visually clear is meant that a person with 20:20 eyesight can read a size 12 Times Roman font through a 1 ml cuvette filled with the formulation.
Preferably, the first formulation of the toothpaste composition comprises from 2 to 40%, more preferably from 5 to 15% and most preferably from 8 to 12% by volume of the composition. Using a reduced level of the first formulation allows the formulator greater flexibility with the second, and any further formulation in that the negative aspects to abrasive inclusion can be reduced to a minimum.

Preferably, the abrasive (A) in the first formulation is selected from abrasive silica, calcium carbonate, calcium pyrophosphate, calcined alumina, tungsten carbide, perlite, silicon carbide, polypropylene, polycarbonate, dicalciumphosphates, hydroxyapatites, trimetaphosphates, insoluble hexametaphosphates and mixtures thereof. More preferably, the abrasive in the first formulation is abrasive silica, perlite, silicon carbide or tungsten carbide. Most preferably, it is a silica based abrasive such as AC33 available from Ineos Silicas.

Preferably, the abrasive (B) in the second formulation is selected from abrasive silica, calcium carbonate, calcium pyrophosphate, calcined alumina, tungsten carbide, perlite, silicon carbide, polypropylene, polycarbonate, dicalciumphosphates, hydroxyapatites, trimetaphosphates, insoluble hexametaphosphates and mixtures thereof. More preferably, the abrasive in the first formulation is abrasive silica, perlite, silicon carbide or tungsten carbide. Most preferably, it is a silica based abrasive available from Ineos Silicas.
Preferably, the composition is a striped toothpaste composition and the stripe comprises the first formulation. Thus, the benefits obtained by storing the bulk of the abrasive in the first formulation can be combined with the better visuals provided by the striped composition. Preferably, by using a plurality of stripes the concentrated abrasive can be spread out in the composition as a whole so as to avoid presenting onto the tooth surface concentrated abrading material.

Preferably, the first formulation is located coaxially within the second formulation on dispensing from the container. By coaxially is meant that the average centreline along the length of the first formulation of the dispensed paste lies substantially close to the average centreline of the entire dispensed paste. The term coaxial is not meant to represent any mathematical exactness. This prevents the user from spreading concentrated abrasive onto the tooth surface and also provides the user what appears to be a completely clear toothpaste, the opaque core being hidden within the gel ribbon.

Preferably, the first formulation and second formulation have substantially similar viscosities at 40°C (RV-TD at 5rpm). By substantially similar is meant that the viscosities are kept within 10 000 cps of each other.

The toothpaste may also comprise further abrasives providing they do not negatively impact the appeal of the toothpaste. Preferred further abrasives include any that have a Refractive Index matched to the Refractive Index of the
aqueous sorbitol based composition. These are commonly known as the low refractive index silicas. The low refractive index silicas used as abrasives in the present invention are silicas which have a refractive index which is matched to that of the aqueous sorbitol base with an apparent refractive index in the range of 1.41 - 1.47, preferably 1.435 - 1.445, preferably having a weight mean particle size of between 5 and 15 μm, a BET (nitrogen) surface area of between 10 and 100 m²/g and an oil absorption of about 70 - 150 cm³/100 g.

Typical examples of suitable low refractive index abrasive silicas having an R.I. of between 1.435 and 1.445 are Tixosil 63 and 73 ex Rhone Poulenc; Sident 10 ex Degussa; Zeodent 113 ex Zeofinn; Sorbosil AC 77 ex Ineos having an R.I. of approximately 1.440. Further examples can be found in EP-A-0,549,287 (Colgate) and in WO 94/10087 (Crosfield) which are hereby incorporated by way of Reference. The amount of these silicas in the composition generally ranges from 5-60% by weight, usually 5-20% by weight.

The liquid phase of the second formulation should be formulated such, that its refractive index closely matches the refractive index of the silicas as discussed above. The liquid phase usually comprises water and a humectant, the latter usually being sorbitol or glycerol. Water has an RI of 1.333, sorbitol (70% aqueous solution) has an RI of 1.457 and glycerine an RI of 1.473. Other humectants such as propylene glycol, polypropylene glycol and polyethylene glycol may also be present. The refractive index of the liquid phase can be calculated from the respective
refractive indices of the constituting ingredients. The most preferred abrasive of this type is AC77 available from Ineos Silicas.

The oral composition according to the invention comprise further ingredients which are common in the art, such as:

- antimicrobial agents, e.g. Triclosan, chlorhexidine, copper-, zinc- and stannous salts such as zinc citrate, zinc sulphate, zinc glycinate, sodium zinc citrate and stannous pyrophosphate, sanguinarine extract, metronidazole, quaternary ammonium compounds, such as cetylpyridinium chloride; bis-guanides, such as chlorhexidine digluconate, hexetidine, octenidine, alexidine; and halogenated bisphenolic compounds, such as 2,2' methylenepolys-(4-chloro-6-bromophenol);

- anti-inflammatory agents such as ibuprofen, flurbiprofen, aspirin, indomethacin etc.;

- anti-caries agents such as sodium- and stannous fluoride, aminefluorides, sodium monofluorophosphate, sodium trimeta phosphate and casein;

- plaque buffers such as urea, calcium lactate, calcium glycerophosphate and strontium polyacrylates;

- vitamins such as Vitamins A, C and E;

- plant extracts;
desensitising agents, e.g. potassium citrate, potassium chloride, potassium tartrate, potassium bicarbonate, potassium oxalate, potassium nitrate and strontium salts;

anti-calculus agents, e.g. alkali-metal pyrophosphates, hypophosphite-containing polymers, organic phosphonates and phosphocitrates etc.;

biomolecules, e.g. bacteriocins, antibodies, enzymes, etc.;

flavours, e.g. peppermint and spearmint oils;

proteinaceous materials such as collagen;

preservatives;

opacifying agents;

colouring agents;

pH-adjusting agents;

sweetening agents;

pharmaceutically acceptable carriers, e.g. starch, sucrose, water or water/alcohol systems etc.;

surfactants, such as anionic, nonionic, cationic and zwitterionic or amphoteric surfactants;
humectants such as glycerol, sorbitol, propylene glycol, xylitol, lactitol etc.;

binders and thickeners such as sodium carboxymethyl-cellulose, xanthan gum, gum arabic etc. as well as synthetic polymers such as polyacrylates and carboxyvinyl polymers such as Carbopol®;

polymeric compounds which can enhance the delivery of active ingredients such as antimicrobial agents can also be included. Examples of such polymers are copolymers of polyvinylmethylether with maleic anhydride and other similar delivery enhancing polymers, e.g. those described in DE-A-3,942,643 (Colgate);

buffers and salts to buffer the pH and ionic strength of the oral care composition; and

other optional ingredients that may be included are e.g. bleaching agents such as peroxo compounds e.g. potassium peroxydiphosphate, effervescing systems such as sodium bicarbonate/citric acid systems, colour change systems, and so on.

Liposomes may also be used to improve delivery or stability of active ingredients.

Embodiments of the invention will now be described with reference to the following non-limiting examples.
EXAMPLES

The following toothpaste formulations were made using known processes.

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>90%</th>
<th>10%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingredient</td>
<td>% BASE</td>
<td>% STRIPE</td>
</tr>
<tr>
<td>Water</td>
<td>9.8278</td>
<td>8.63</td>
</tr>
<tr>
<td>70% (aq) sorbitol</td>
<td>63</td>
<td>63</td>
</tr>
<tr>
<td>Polyethylene glycol (PEG 32)</td>
<td>4</td>
<td>4</td>
</tr>
<tr>
<td>Sodium fluoride</td>
<td>0.32</td>
<td>0.32</td>
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<tr>
<td>Sweetener</td>
<td>0.25</td>
<td>0.25</td>
</tr>
<tr>
<td>Titanium dioxide</td>
<td>0</td>
<td>0.5</td>
</tr>
<tr>
<td>Colour</td>
<td>0.00072</td>
<td>0</td>
</tr>
<tr>
<td>Colour</td>
<td>0.002</td>
<td>0</td>
</tr>
<tr>
<td>Thickening silica</td>
<td>9</td>
<td>8.5</td>
</tr>
<tr>
<td>Abrasive silica (AC77)</td>
<td>8</td>
<td>8</td>
</tr>
<tr>
<td>Abrasive silica (AC33)</td>
<td>1.5</td>
<td>3</td>
</tr>
<tr>
<td>Cellulosic binder</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Sodium lauryl sulphate</td>
<td>1.8</td>
<td>1.8</td>
</tr>
<tr>
<td>Flavour</td>
<td>1.1</td>
<td>1.1</td>
</tr>
<tr>
<td>Flavour</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td></td>
<td><strong>100</strong></td>
<td>100</td>
</tr>
</tbody>
</table>
CLAIMS

1. A toothpaste composition comprising a first formulation and a second formulation which are in contact with one another when dispensed from a container, the first toothpaste formulation comprising X% by weight of an abrasive (A) having a scattering centre concentration such that its light transmittance is from 0 to 70% and the second composition comprising from 0.1 to 0.9X by weight of an abrasive (B) having a scattering centre concentration such that its light transmittance is from 0 to 70%.

2. A toothpaste composition according to claim 1 wherein the first formulation comprises from 2 to 40% by volume of the composition.

3. A toothpaste composition according to claim 1 or 2 wherein the first formulation comprises from 5 to 15% by volume of the composition.

4. A toothpaste composition according to any preceding claim wherein the abrasive in the first formulation is selected from abrasive silica, calcium carbonate, calcium pyrophosphate, calcined alumina, tungsten carbide, silicon carbide, polypropylene, polycarbonate and mixtures thereof.

5. A toothpaste composition according to any preceding claim wherein the abrasive in the second formulation is selected from abrasive silica, calcium carbonate,
calcium pyrophosphate, calcined alumina, tungsten carbide, silicon carbide, polypropylene, polycarbonate and mixtures thereof.

6. A toothpaste composition according to any preceding claim wherein the abrasive in the first formulation is a silica based abrasive.

7. A toothpaste composition according to any preceding claim wherein the abrasive in the second formulation is a silica based abrasive.

8. A toothpaste composition according to any preceding claim wherein the composition is a striped toothpaste composition and the stripe comprises the first formulation.

9. A toothpaste composition according to any preceding claim wherein the first formulation is located coaxially within the second formulation on dispensing from the container.