ORAL CARE ULTRAMULSION BASED PRODUCTS

SUMMARY OF THE INVENTION

The present invention is directed to oral care ULTRAMULSION™ based oral care products, including, toothpastes, treated flosses and dental stimulators, interdental coating substances, oral rinses, mouth/throat conditioning internal treatment products, and anti-gingivitis products. All of these products are improved when an ULTRAMULSION™ dispersion containing silicone and a surfactant is used as taught herein. ULTRAMULSION™ is a trademark of WhiteHill Oral Technologies.

The ULTRAMULSION™ dispersions of the present invention combine certain characteristics of emulsions with certain features of microemulsions. Like conventional emulsions, they are two phase systems comprising a silicone dispersed in a continuous, surfactant phase, wherein the silicone is insoluble in the surfactant. Unlike conventional emulsions, but like microemulsions, these dispersions are stable. Unlike microemulsions, but like conventional emulsions, mechanical work is required to form ULTRAMULSION™ dispersions. Unlike microemulsions, but like conventional emulsions, these ULTRAMULSION™ dispersions are not formed spontaneously. Like conventional emulsions, the ULTRAMULSION™ dispersions do not contain a cosolvent commonly found in microemulsions. Of course, the ULTRAMULSION™ dispersions of the present invention can be easily dispersed in various liquids such as water to obtain stable dispersions. These dispersions of ULTRAMULSION™ dispersions in water have excellent utility in various non-oral care products.

For the purposes of the present invention:

a. "stable" is defined as follows; a dispersion of the ULTRAMULSION™ dispersion in water when subjected to centrifuging in a 100 G environment for 5 minutes, less than about 10% by weight of the ULTRAMULSION™ dispersion separates from the continuous water phase and/or a substantial portion (i.e., >50%) of the dispersed phase resists separation. This latter definition is particularly applicable

to higher viscosity silicones.

b. "water-free" means that the ULTRAMULSION™ dispersion of silicone and surfactant is substantially free from water.

c. "solvent free" means that the ULTRAMULSION™ dispersion of silicone and surfactant is substantially free from co-solvents such as ethanol, isopropanol, and the like.

d. "oriented" means that the polar moieties of the "uncoiled" polydimethylsiloxane in the ULTRAMULSION™ dispersion are generally aligned in one plane with the hydrophilic oil seeking moieties aligned in a second plane such as illustrated in Fig. 2.

e. "monolayer" means that the monomolecular film of the ULTRAMULSION™ dispersion of the present invention when dispersed in water is attracted to teeth and mouth surfaces by secondary bonding force to form a substantive coating thereon.

As described above, one preferred embodiment of the present invention relates to various oral care products containing stable dispersions of certain high viscosity silicones in certain surfactants; wherein:

a. the dispersed silicones, which are insoluble in said surfactant, are oriented by the surfactant such that when dispersed in water they are particularly adept at forming oriented coatings on teeth and mouth surfaces with enhanced substantivity, and

b. the particle size of the dispersed silicone is from between about 0.1 and about 10 microns, with a particle size distribution such that from between about 80 and 95% of the dispersed silicone is within this particle size range. In certain embodiments, between 80-95% of two dispersed silicones is less than 1 - 2 microns in particle size. These stable dispersions are described as ULTRAMULSION™ dispersions, which, together with their physical properties, when contained in oral care products, provide these oral care products with distinctive conditioning, moisturizing, protecting, etc. properties where the non continuous silicone phase functions as a reservoir for various oral care treatment substances.

The present invention relates to various oral care rinses containing, stable, dispersions of certain high viscosity silicones in certain surfactants; wherein:

a. the dispersed silicones, which are insoluble in said surfactant, are oriented by the surfactant such that when dispersed in water they are particularly adept at forming

oriented, coatings on surfaces of the mouth with enhanced substantivity, and

b. the particle size of the dispersed silicone is from between about 0.1 and about 10 microns, with a particle size distribution such that from between about 80 and 95% of the dispersed silicone is within this particle size range. These stable dispersions are described as ULTRAMULSION™ dispersions, which, together with their physical properties, when contained in oral care rinses, provide these rinses with enhanced substantivity to mouth surfaces, where the non continuous silicone phase functions as a reservoir for various active ingredients contained therein, including but not limited to an essential mixture of thymol, eucalyptol, menthol and methyl salicylate.

The present invention relates to unique interdental delivery devices, other than dental floss, which are suitable for cleaning, massaging, and/or treating surfaces of teeth and gums including interproximal and subgingival areas; wherein these devices contain ULTRAMULSION™ dispersions of high viscosity silicones dispersed in surfactants, these dispersions are released into the oral cavity from these devices during use wherein the dispersed silicone:

a. is insoluble in the surfactant and oriented so as to form coatings in the oral cavity with enhanced substantivity,

b. functions as a reservoir for various lipid soluble and/or liquid dispersible ingredients to be released onto oral cavity surfaces, and

c. has a particle size from between about 0.1 and about 10 microns with from between about 80% and about 95% of the particles within this range.

The present invention relates to various oral care products containing stable, dispersions of certain high viscosity silicones in certain surfactants for use in treating mucus containing surfaces such as in the mouth, throat and stomach and intestine and the surface of the esophagus which contains no mucus.

a. the dispersed silicones, which are insoluble in said surfactant, are oriented by the surfactant such that when dispersed in water they are particularly adept at forming oriented coatings on mouth, throat and esophagus and stomach surfaces with enhanced substantivity, and

b. the particle size of the dispersed silicone is from between about 0.1 and about 10 microns, with a particle size distribution such that from substantially all of the dispersed silicone is within this particle size range. These stable dispersions are

described as ULTRAMULSION™ dispersions, which, together with their physical properties, when contained in mouth, throat, esophagus, stomach and intestine treatment properties, when contained in products, provide these products with substantive coating protection properties where the discontinuous silicone phase of said coating functions as a reservoir for various liquid suitable treatment substances, suitable for release onto the surface being treated.

The present invention relates to various toothpastes containing, stable, dispersions of certain high viscosity silicones in certain surfactants; wherein:

a. the dispersed silicones, which contain triclosan, 2,4,4'-triclosan-2'-hydroxy/epoxy/ether, are insoluble in said surfactant, are oriented by the surfactant such that when dispersed in water they are particularly adept at forming oriented, nonhelical coatings on surfaces of the mouth with enhanced substantivity, and

b. the particle size of the dispersed silicone is from between about 0.1 and about 10 microns, with a particle size distribution such that from between about 80 and 95% of the dispersed silicone is within this particle size range. These stable dispersions are described as ULTRAMULSION™ dispersions, which, together with their physical properties, when contained in toothpastes, provide the toothpaste with enhanced with enhanced substantivity to mouth surfaces, where the non continuous silicone phase functions as a reservoir for the triclosan contained therein.

The present invention relates to various oral care products containing, stable, dispersions of certain high viscosity silicones in certain surfactants; wherein:

a. the dispersed silicones, which are insoluble in said surfactant, are oriented by the surfactant such that when dispersed in water they are particularly adept at forming oriented, coatings on surfaces of the mouth with enhanced substantivity, and

b. the particle size of the dispersed silicone is from between about 0.1 and about 10 microns, with a particle size distribution such that from between about 80 and 95% of the dispersed silicone is within this particle size range. These stable dispersions are described as ULTRAMULSIONS, which, together with their physical properties, when contained in oral care products, provide these oral care products with enhanced substantivity to mouth surfaces, where the non continuous silicone phase functions as a reservoir for various active ingredients contained therein.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 illustrates the "coiled" molecular configuration proposed for polydimethylsiloxanes.

Fig. 2 illustrates the proposed molecular configuration of oriented polydimethylsiloxanes after ULTRAMULSION™ dispersion processing;

Fig. 3 illustrates schematically an ULTRAMULSION™ dispersion process of the present invention; and

Figs. 4 and 5 illustrate that the ULTRAMULSION™ dispersions of the present invention produced via various high shear dispersing means having particle size distribution of 80+ % under 10 microns.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, Fig. 1 illustrates the accepted "coiled" configuration advanced for polydimethylsiloxanes, wherein the methyl moieties are oriented outwardly while the oxygen moieties are oriented inwardly toward the axis of the coil or helix. This configuration does not readily promote, bonding between the oxygen moieties and compatible surfaces such as tooth enamel.

Fig. 2 illustrates the "uncoiled oriented" configuration proposed for polydimethylsiloxanes that have been dispersed in the stable, ULTRAMULSION™ dispersions of the present invention, wherein the oxygen moieties are generally oriented in one plane distinct from that of the methyl moieties. This proposed uncoiled oriented configuration appears to support the unique and unexpected stability, bonding and enhanced substantivity properties of the ULTRAMULSION™ dispersions of the present invention, as evidenced by the various coating applications of these ULTRAMULSION™ dispersions to teeth. See the Examples provided below.

Fig. 3 illustrates the ULTRAMULSION™ dispersion process of the present invention wherein a nonionic surfactant and a polydimethyl-siloxane 1, substantially free from water and co-solvent, are mixed in vessel 2, provided with mixing means 3, heat source 4, and inert head space 5. The heated and mixed surfactant-poly-

dimethylsiloxane 6, is then subjected to high shear dispersion at an elevated temperature in dispersing means 7, to produce the ULTRAMULSION™ dispersion 8, of the present invention. The high shear dispersion device (7) is typically selected from among devices manufactured by Ross, IKA Works, etc. Other energy sources such as flow-through ultrasonic cells may be used as well.

Fig. 4 is a chart describing the particle size distribution of an ULTRAMULSION™ dispersion of the present invention containing from about 50 to 95% by weight nonionic surfactant and from about 5 to 50% by weight polydimethylsiloxane (2.5 million cs) produced in a continuous process with an IKA Works dispersing means, (high shear dispersing) with an inlet temperature of 140° C and an outlet temperature of 210° C.

Fig. 5 is a chart describing the particle size distribution of an ULTRAMULSION™ dispersion of the present invention containing from about 50 to 95% by weight nonionic surfactant and from about 5 to 50% by weight polydimethylsiloxane (2.5 million cs) produced in a batch process with a Ross M/E 100 LC dispersing means fitted with a 20 mesh screen, operated at a temperature from about 120° to 160°C.

For purposes of the present invention, the term silicone means a clear, colorless substance containing polydialkylsiloxane polymers with average kinematic viscosities ranging from about 100,000 centistokes (cs) to about 50 million cs, preferably from about 1 million .cs to about 25 million cs, more preferably from about 1.5 million cs to about 10 million cs, and most preferably from about 2 million to about 5 million cs. This definition intentionally includes the so-called "gum" silicones having viscosities of 30 to 50 million cs. Certain high viscosity polydimethylsiloxanes having viscosities from about 2.5 million cs to about 4 million cs are particularly preferred for the oral care products of the present invention. Other polydimethylsiloxanes suitable for the present invention include "substituted" water insoluble silicones and mixtures of polydiorganosiloxanes and substituted water insoluble silicones. Specifically, water soluble silicones are excluded from the ULTRAMULSION™ dispersions of the present invention. See also Tables 1 and 2 below.

The viscosity of some silicones can be measured by means of a glass capillary

viscometer as set forth in Dow Corning Corporate Test Method CTM0004, July 20, 1970.

The silicone may be either a high viscosity polyalkyl siloxane as described in detail below, a polyaryl siloxane, a polyalkylaryl siloxane or a polyether siloxane copolymer. Mixtures of these silicones may also be used and are preferred in certain embodiments of the present invention.

The polyalkylaryl siloxanes that may be used include, for example, polymethylphenylsiloxanes having viscosities above 1 million centistokes at 20°C. Some of these siloxanes are available, for example, from the General Electric Company, from Dow Corning, and/or from Rhone-Poulenc.

The polyether siloxane copolymer that may be used is, for example, a polypropylene oxide modified dimethylpolysiloxane although ethylene oxide or mixtures of ethylene oxide and propylene oxide may also be used.

References disclosing suitable silicone fluids include U.S. Patent No. 2,826,551 to Green; U.S. Patent No. 3,964,500 to Drakoff; U.S. Patent No. 4,364,837 to Padner and British Patent No. 849,433 to Woolston. See also, *Silicon Compounds* distributed by Petrarch Systems, Inc., 1984. This reference provides a very good listing of suitable silicone materials.

Silicone materials found especially useful in the present compositions to provide good dry combing are silicone gums. Silicone gums described by Petrarch and others including U.S. Patent No. 4,152,416, May 1, 1979 to Spitzer et al., and Noll, Walter, "Chemistry and Technology of Silicones," Academic Press, New York (1968). Also describing silicone gums are various General Electric Silicone Rubber Product Data Sheets. "Silicone gum" materials denote high molecular weight polydiorgano-siloxanes having a viscosity up to about 50,000,000 cs. Specific examples include polydimethylsiloxane; polydimethylsiloxane; methylvinylsiloxane copolymer; polydimethylsiloxane; diphenylmethvinylsiloxane copolymer and mixtures thereof.

As noted above high viscosity polydimethylsiloxanes i.e., those above 100,000 cs are preferred in this invention. Particularly preferred are polydimethylsiloxanes having viscosities ranging from between about 2.5 million cs and about 50 million cs.

The safety of polydimethylsiloxanes for use in these various products is well documented. See Rowe et al., *Journal of Industrial Hygiene*, 30(6): 332-352 (1948).

See also Calandra et al., *ACS Polymer Preprints*, 17: 1-4 (1976) and Kennedy et al., *J. Toxicol. & Environmental Health*, 1: 909-920 (1976).

As noted above, the preferred polydimethylsiloxanes useful in the oral care compositions of the present invention are described as polymethylsiloxanes with the chemical composition

$$(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$$

wherein n is a whole number. These polydimethylsiloxanes have viscosities ranging up to about 50 million cs., and are generally described as having high molecular weight.

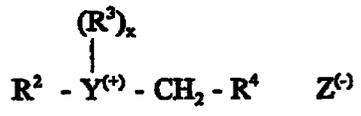
The particle size of the silicone in the ULTRAMULSION™ dispersions of the present invention can range from between about 0.1 and about 10 microns. In a preferred embodiment of the present invention the particle size of polydimethylsiloxanes in the ULTRAMULSION™ dispersion ranges from below 1 up to about 5 microns. The particle size distribution of the polydimethylsiloxanes in the ULTRAMULSION™ dispersions of the present invention generally range from between about 80% and about 95% of the particles under 10 microns. See especially Figs. 4 and 5. In a preferred embodiment of the present invention, from between about 80% and about 95% of the particles are under 5 microns. See also Table 2.

An essential component of the ULTRAMULSION™ dispersion of the present invention is a surfactant. The surfactant, may be selected from any of a wide variety of synthetic anionic, amphoteric, zwitterionic and nonionic surfactants. The surfactants suitable for the purposes of the present invention must function as the continuous phase and contain the discontinuous silicone phase.

Synthetic anionic surfactants can be exemplified by the alkali metal salts of organic sulfuric reaction products having in their molecular structure an alkyl radical containing from 8-22 carbon atoms and a sulfonic acid or sulfuric acid ester radical (NOTE: included in the term alkyl is the alkyl portion of higher acyl radicals). Preferred are the sodium, ammonium, potassium or triethanolamine alkyl sulfates, especially those obtained by sulfating the higher alcohols (C_8-C_{18} carbon atoms), sodium coconut oil fatty acid monoglyceride sulfates and sulfonates; sodium or potassium salts of sulfuric acid esters of the reaction product of 1 mole of a higher fatty alcohol (e.g., tallow or coconut oil alcohols) and 1 to 12 moles of ethylene oxide

ether sulfate with 1 to 10 units of ethylene oxide per molecule and in which the alkyl radicals contain from 8 to 12 carbon atoms, sodium alkyl glyceryl ether sulfonates; the reaction product of fatty acids having from 10 to 22 carbon atoms esterified with isethionic acid and neutralized with sodium hydroxide; water soluble salts of condensation products of fatty acids with sarcosine; and others known in the art.

Zwitterionic surfactants can be exemplified by those which can be broadly described as derivatives of aliphatic quaternary ammonium, phosphonium, and sulfonium compounds, in which the aliphatic radicals can be straight chain or branched, and wherein one of the aliphatic substituents contains from about 8 to 18 carbon atoms and one contains an anionic water-solubilizing group, e.g., carboxyl, sulfonate, sulfate, phosphate, or phosphonate. A general formula for these compounds is:



wherein R^2 contains an alkyl, alkenyl, or hydroxyl alkyl radical of from about 8 to 18 carbon atoms, from 0 to about 10 ethylene oxide moieties and from 0 to 1 glyceryl moiety; Y is selected from the group consisting of nitrogen, phosphorous, and sulfur atoms; R^3 is an alkyl or monohydroxyalkyl group containing 1 to about 3 carbon atoms; x is 1 when Y is a sulfur atom and 2 when Y is a nitrogen or phosphorous atom; R^4 is an alkylene or hydroxyalkylene of from 1 to about 4 carbon atoms and Z is a radical selected from the group consisting of carboxylate, sulfonate, sulfate, phosphonate, and phosphate groups. Examples include; 4-[N,N-di(2-hydroxyethyl)-N-octadecylammonio]-butane-1-carboxylate; 5-(S-3-hydroxypropyl-S-hexadecylsulfonio]-3-hydroxypentane-1-sulfate; 3-[P,P-diethyl-P-3,6,9-trioxatetradecocylphosphonio]-2-hydroxypropane-1-phosphate; 3-[N,N-dipropyl-N-3-dodecoxy-2-hydroxypropylammonio]-propane-1-phosphate; 3-[N,N-dimethyl-N-hexadecylammonio-propane-1-sulfonate; 4-[N,N-di(2-hydroxyethyl)-N-(2-hydroxydodecyl)ammonio]-butane-1-carboxylate; 3-[S-ethyl-S-(3-dodecoxy-2-hydroxypropyl)sulfonio]-propane-1-phosphate; 3-[P,P-dimethyl-P-dodecyl-phosphonio]-propane-1-phosphonate; and 5-(N,N-di(3-hydroxypropyl)-N-hexadecyl-ammonio]-2-hydroxypentane-1-sulfate.

Other zwitterionics such as betaines are also useful in the present invention. Examples of betaines useful herein include the higher alkyl betaines such as cocodimethyl carboxymethyl betaine, lauryl dimethyl carboxymethyl betaine, lauryl dimethyl alpha-carboxyethylene betaine, cetyl dimethyl carboxymethyl betaine, lauryl bis-(2-hydroxyethyl)carboxy methyl betaine, stearyl bis-(20-hydroxy-propyl)-carboxymethyl betaine, oleyl dimethyl gamma-carboxypropyl betaine, lauryl bis-(2-hydroxypropyl)alpha-carboxyethyl betaine, etc. The sulfobetaines may be represented by cocodimethyl sulfopropyl betaine, stearyl dimethyl sulfopropyl betaine, lauryl dimethyl sulfoethyl betaine, lauryl bis-(2-hydroxy-ethyl)sulfopropyl betaine and the like; amido betaines and amidosulfo betaines, wherein the $RCONH(CH_2)_3$ radical is attached to the nitrogen atom of the betaine are also useful in this invention. The amido betaines are preferred for use in some of the compositions of this invention. A particularly preferred composition utilizes an amido betaine, a quaternary compound, a silicone, a suspending agent and has a pH of from about 2 to about 4.

Examples of amphoteric surfactants which can be used in the ULTRAMULSION™ dispersions of the present invention are those which can be broadly described as derivatives of aliphatic secondary and tertiary amine in which the aliphatic radical can be straight chain or branched and wherein one of the aliphatic substituents contains from about 8 to about 18 carbon atoms and one contains an anionic water solubilizing group, e.g., carboxy, sulfonate, sulfate, phosphate, or phosphonate. Examples of compounds falling within this definition are sodium 3-dodecylamino-propionate, sodium 3-dodecylamino-propane sulfonate, N-alkyltaurines such as the one prepared by reacting dodecylamine with sodium isethionate according to the teachings of U.S. Patent No. 2,658,072, N-higher alkyl aspartic acids such as those produced according to the teachings of U.S. Patent No. 2,438,091, and the products sold under the trade name "Miranol" and described in U.S. Patent No. 2,528,378.

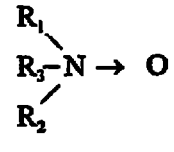
Nonionic surfactants, which are preferably used in combination with an anionic, amphoteric or zwitterionic surfactant, can be broadly defined as compounds produced by the condensation of alkylene oxide groups (hydrophilic in nature) with an organic hydrophobic compound, which may be aliphatic or alkyl aromatic in nature. Examples of preferred classes of nonionic surfactants are:

1. The polyethylene oxide condensates of alkyl phenols, e.g., the condensation products of alkyl phenols having an alkyl group containing from about 6 to 12 carbon atoms in either a straight chain or branched chain configuration, with ethylene oxide, the said ethylene oxide being present in amounts equal to 10 to 60 moles of ethylene oxide per mole of alkyl phenol. The alkyl substituent in such compounds may be derived from polymerized propylene, disobutylene, octane, or nonane, for example.

2. Those derived from the condensation of ethylene oxide with the product resulting from the reaction of propylene oxide and ethylenediamine products which may be varied in composition depending upon the balance between the hydrophobic and hydrophilic elements which is desired. For example, compounds containing from about 40% to about 80% polyoxyethylene by weight and having a molecular weight of from about 5,000 to about 15,000 resulting from the reaction of ethylene oxide groups with a hydrophobic base constituted of the reaction product of ethylene diamine and excess propylene oxide, said base having a molecular weight of the order of 2,500 to 3,000 are satisfactory.

3. The condensation product of aliphatic alcohols having from 8 to 18 carbon atoms, in either straight chain or branched chain configuration, with ethylene oxide, e.g., a coconut alcohol ethylene oxide condensate having from 10 to 30 moles of ethylene oxide per mole of coconut alcohol, the coconut alcohol fraction having from 10 to 14 carbon atoms.

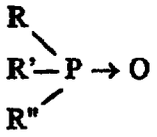
4. Long chain tertiary amine oxides corresponding to the following general formula:



wherein R_1 contains an alkyl, alkenyl or monohydroxy alkyl radical of from about 8 to about 18 carbon atoms from 0 to about 10 ethylene oxide moieties, and from 0 to 1 glyceryl moiety, and R_2 and R_3 contains from 1 to about 3 carbon atoms and from 0 to about 1 hydroxy group, e.g., methyl, ethyl, propyl, hydroxy ethyl, or hydroxypropyl radicals. The arrow in the formula is a conventional representation of a semipolar bond. Example of amine oxides suitable for use in this invention include dimethyl-dodecylamine oxide, oleyldi(2-hydroxy-ethyl)amine oxide,

dimethyloctylamine oxide, dimethyl-decylamine oxide, dimethyltetradecylamine oxide. 3,6,9-trioxaheptadecyl-diethylamine oxide, di(2-hydroxyethyl)-tetracylamine oxide, 2-dodecoxyethyldimethylamine oxide, 3-dodecoxy-2-hydroxypropyldi-(3-hydroxy-propyl)amine oxide, dimethylhexadecylamine oxide.

5. Long chain tertiary phosphine oxides corresponding to the following general formula:



wherein R contains an alkyl, alkenyl or monohydroxyalkyl radical ranging from 8 to 18 carbon atoms in chain length from 0 to about 10 ethylene oxide moieties and from 0 to 1 glyceryl moiety and R' and R'' are each alkyl or monohydroxyalkyl groups containing from 1 to 3 carbon atoms. The arrow in the formula is again the conventional representation of a semipolar bond. Examples of suitable phosphine oxides are: dodecyldimethylphosphine oxide, tetradecyl-dimethyl-phosphine oxide, tetradecyl-methylethylphosphine oxide. 3,6,9-trioxaocta-decyldimethylphosphine oxide, cetyldimethylphosphine oxide, 3-dodecoxy-2-hydroxypropyl-di(2-hydroxyl)-phosphine oxide, stearyldimethylphosphine oxide, cetylethylpropylphosphine oxide, cetyldiethylphosphine oxide, dodecyl-diethylphosphine oxide, tetradecyl-diethylphosphine oxide, dodecyldipropylphosphine oxide, dodecyldi(2-hydroxyethyl)phosphine oxide, tetradecyl-methyl-2-hydroxydodecyldimethylphosphine oxide.

6. Long chain dialkyl sulfoxides containing one short chain alkyl or hydroxy alkyl radical of 1 to about 3 carbon atoms (usually methyl) and one long hydrophosphinic chain which contain alkyl, alkenyl, hydroxyalkyl, or keto alkyl radicals containing from about 8 to about 20 carbon atoms, from 0 to about 10 ethylene oxide moieties and from 0 to 1 glyceryl moiety. Examples include octadecyl menthyl sulfoxide, 2-ketotridecyl methyl sulfoxide, 3,6,9,-trioxooctadecyl 2-hydroxyethyl sulfoxide, dodecyl menthyl sulfoxide, oleyl 3-hydroxypropyl sulfoxide, tetradecyl menthyl sulfoxide, 3-methoxytridecyl methyl sulfoxide, 3-hydroxytridecyl methyl sulfoxide, 3-hydroxy-4-dodecoxy-butyl methyl sulfoxide.

Many additional nonsoap surfactants are described in McCUTCHEON'S,

DETERGENTS AND EMULSIFIERS, 1979 ANNUAL, published by Allured Publishing Corporation. Particularly preferred nonionic surfactants are nonionic poloxamer surfactants of block copolymers of ethylene oxide and propylene oxide ranging from flowable liquids of varying viscosities, to paste, prills and cast solids with molecular weights from 1,100 to 150,000. Suitable nonionic surfactants are manufactured and marketed by BASF Corporation under the trademarks Pluronic. Particularly preferred nonionic surfactants are Pluronic F-68, F-88, F-108 and Pluronic F-127. These are described in a BASF brochure entitled "Pluronic and Tetronic Block Copolymer Surfactant." These nonionic surfactants suitable for the present invention can be described by the following structure:

$$OH\text{-}(CH_2CH_2)_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

where x, y and x' are whole numbers. Surprisingly, the nonionic surfactants of choice for the ULTRAMULSION™ dispersions of the present invention are reported in the referenced brochure to have marginal detergency, emulsification and wetting properties.

As noted above, the preferred nonionic poloxamer surfactants useful in the coating compositions of the present invention are described as polyoxyethylene-polyoxypropylene block copolymers such as Pluronic F-68, F-88, F-108 and F-127 (BASF) which have molecular weights of at least about 1000 such as those described in U.S. Patent Nos. 4,343,785, 4,465,663, 4,511,563 and 4,476,107.

Emulsions of various coating substances including polydimethylsiloxanes in various surfactants including nonionic surfactants are disclosed and claimed in U.S. Patents 4,911,927, 4,942,034; 4,950,479; 5,009,881; 5,032,387; 5,057,306; 5,057,307; 5,057,308, 5,057,309; 5,057,310, 5,098,711, 5,165,913 and 5,284,648. There is however, no teaching or suggestion in these references that these high viscosity silicone emulsions are stable nor that the "coating" substances are oriented as they are in the ULTRAMULSION™ dispersions of the present invention.

The ratio of surfactant to silicone in the ULTRAMULSION™ dispersion coating compositions of the present invention can range from between about 400:1 and about

1:2. In a preferred embodiment of the invention the ratio of surfactant to silicone is from between about 25:1 and 1:2.

The ULTRAMULSION™ dispersions of the present invention may be prepared as follows; generally, if not a liquid, the surfactant is first heated to a temperature at which it becomes a liquid. The silicone is then dispersed in the heated surfactant with various high shear dispersing means.

In one preferred method, the heated surfactant is mechanically stirred along with the silicone, to form a pre-emulsion mixture in which the silicone is uniformly dispersed in the surfactant in droplets of a larger size than desired for the ULTRAMULSION™ dispersions but small enough to optimize the subsequent high shear dispersions. This mixture is subjected to high-shear dispersions with a means such as the IKA-WORKS DISPAX-Reactor with at least one superfine generator, alternatively, a Ross Model M.E., 100 LC fitted with a 20 mesh screen or a ultrasonicator such as MEDSONIC XL2010 fitted with 800-C Flow Cell & 800-21CT 3/4 inch flanged horn can be used.

The discontinuous silicone phase of the ULTRAMULSION™ dispersion can also contain a wide range of lipid soluble and/or lipid dispersible oral care active ingredients ranging from antimicrobials to desensitizing/substances, to healants such as aloe to vitamins such as vitamin E, to flavorants, etc. These various ingredients in the silicone phase of the ULTRAMULSION™ dispersion perform in various oral care products as though they are contained in a "reservoir" as they continue to be available at the ULTRAMULSION™ dispersion oral surface interface, as long as the ULTRAMULSION™ dispersion coating remains substantive to mouth surfaces.

The various toothpastes of the present invention can be made by mixing the materials together and heating if necessary and following accepted manufacturing practices for these various products as described in detail below. In addition, other toothpastes are included in the present invention including whitening toothpastes, toothpastes for treating hyposensitivity, toothpastes for dry mouth sufferer, toothpastes for patients undergoing radiation therapy, etc.

The oral care products containing the ULTRAMULSION™ dispersions of the present invention will contain a variety of essential components ranging from surfactants and abrasives for cleaning, to whiteners, to gelling aids to flavorants etc.

These are detailed in various Examples described below.

In addition to the foregoing, other oral care products are included in the present invention, such as chewing gums, prophylactic pastes and denture wearer products to treat stomatitis. While also in the latter the ULTRAMULSION™ dispersion provides the base functioning as a carrier for specific active ingredients such as *Candida* yeast sp. antifungal agents such as stannous fluoride.

In addition the oral care products of this invention can contain a variety of nonessential optional components suitable for rendering such compositions more acceptable. Such conventional optional ingredients are well known to those skilled in the art, e.g., preservatives such as benzyl alcohol, methyl paraben, propyl paraben and imidiazolidinyl urea; cationic surfactants such as cetyl trimethylammonium chloride, lauryl trimethyl ammonium chloride, tricetyl methyl ammonium chloride, stearyldimethyl benzyl ammonium chloride, and di(partially hydrogenated tallow)-dimethylammonium chloride; thickeners and viscosity modifiers such as diethanolamide of a long chain fatty acid (e.g., PEG 3 lauramide), block polymers of ethylene oxide and propylene oxide such as Pluronic F88 offered by BASF Wyandotte, sodium chloride, sodium sulfate, polyvinyl alcohol, and ethyl alcohol; pH adjusting agents such as citric acid, succinic acid, phosphoric acid, sodium hydroxide, sodium carbonate, etc., perfumes; dyes; and, sequestering agents such as disodium ethylenediamine tetraacetate. Such agents generally are used individually at a level of from about 0.01% to about 10%, preferably from about 0.5% to about 5.0% by weight of the composition.

The discontinuous silicone phase of the ULTRAMULSION™ dispersion based toothpastes can also contain a wide range of lipid soluble and/or lipid dispersible oral care ingredients ranging from antimicrobials to desensitizing/substances, to healants such as aloe to vitamins such as vitamin E, to flavorants, etc. These various ingredients in the silicone phase of the ULTRAMULSION™ dispersion based toothpastes of the present invention perform similar to the triclosan, i.e., as though they are contained in a "reservoir". These various lipid soluble substances in the silicone phase continue to be available at the ULTRAMULSION™ dispersion oral surface interface as long as the ULTRAMULSION™ dispersion coating remains substantive to mouth surfaces. Effects attributed to this "reservoir" are described by

Rölla et al., *supra.*

The toothpastes containing the ULTRAMULSION™ and triclosan dispersions of the present invention will contain a variety of essential components ranging from surfactants and abrasives for cleaning, to whiteners, to gelling aids to flavorants etc. In addition the toothpaste products of the invention can contain a variety of nonessential optional components suitable for rendering such compositions more acceptable. Such conventional optional ingredients are well known to those skilled in the art, e.g., preservatives such as benzyl alcohol, methyl paraben, propyl paraben and imidiazolidinyl urea; cationic surfactants such as cetyl trimethylammonium chloride, lauryl trimethyl ammonium chloride, tricetyl methyl ammonium chloride, stearyldimethyl benzyl ammonium chloride, and di(partially hydrogenated tallow)-dimethylammonium chloride; thickeners and viscosity modifiers such as diethanolamide of a long chain fatty acid (e.g., PEG 3 lauramide), block polymers of ethylene oxide and propylene oxide such as Pluronic F88 offered by BASF Wyandotte, sodium chloride, sodium sulfate, polyvinyl alcohol, and ethyl alcohol; pH adjusting agents such as citric acid, succinic acid, phosphoric acid, sodium hydroxide, sodium carbonate, etc., perfumes; dyes; and, sequestering agents such as disodium ethylenediamine tetraacetate. Such agents generally are used individually at a level of from about 0.01% to about 10%, preferably from about 0.5% to about 5.0% by weight of the composition.

When used for internal (mouth or ingested) treatment products, the discontinuous silicone phase of the ULTRAMULSION™ dispersion can also contain a wide range of lipid soluble and/or lipid dispersible ingredients suitable for treating various surface conditions on lips in the mouth, or the throat, stomach and esophagus. These various ingredients in the silicone phase of the ULTRAMULSION™ dispersion perform their intended function in various treatment products etc. as though they are contained in a "reservoir" as they continue to be available at the ULTRAMULSION™ dispersion containing surfaces to be treated interface as long as the ULTRAMULSION™ dispersion coating remains substantive to said surface. These substantive treatment coatings are discussed in various examples below.

Such conventional optional ingredients are well known to those skilled in the art, e.g., preservatives such as benzyl alcohol, methyl paraben, propyl paraben and

imidazolidinyl urea; cationic surfactants such as cetyl trimethylammonium chloride, lauryl trimethyl ammonium chloride, tricetyl methyl ammonium chloride, stearyldimethyl benzyl ammonium chloride, and di(partially hydrogenated tallow)-dimethylammonium chloride; thickeners and viscosity modifiers such as diethanolamide of a long chain fatty acid (e.g., PEG 3 lauramide), block polymers of ethylene oxide and propylene oxide such as Pluronic F88 offered by BASF Wyandotte, sodium chloride, sodium sulfate, polyvinyl alcohol, and ethyl alcohol; pH adjusting agents such as citric acid, succinic acid, phosphoric acid, sodium hydroxide, sodium carbonate, etc., flavors; dyes; and, sequestering agents such as disodium ethylenediamine tetraacetate. Such agents generally are used individually at a level of from about 0.01% to about 10%, preferably from about 0.5% to about 5.0% by weight of the composition.

The treating surface conditions of lips and the esophagus as well as various mucus containing surfaces such as the mouth, throat, stomach and duodenum and intestines. These surfaces can be treated with various forms of the ULTRAMULSION™ dispersions of the invention ranging from gels and lotions for the lips, to liquids, for the mouth to liquid and syrups for the throat to liquids for the esophagus to liquids tablets for the stomach, duodenum and intestines.

For internal (e.g., the mouth, throat, etc.) treatment, the discontinuous silicone phase of the ULTRAMULSION™ dispersion can also contain a wide range of lipid soluble and/or lipid dispersible oral care active ingredients ranging from antimicrobials to desensitizing/substances, to healants such as aloe to vitamins such as vitamin E, to flavorants, etc. These various ingredients in the silicone phase of the ULTRAMULSION™ dispersion perform in various interdental delivery devices once they are released from the device as though they are contained in a "reservoir" as they continue to be available at the ULTRAMULSION™ dispersion oral surface interface, as long as the ULTRAMULSION™ dispersion coating remains substantive to mouth surfaces. Similar effects attributed to this reservoir effect are described by Rölla et al., *supra.*

The interdental delivery device of the present invention containing the ULTRAMULSION™ dispersions will contain a variety of essential components ranging from surfactants for cleaning, to whiteners, to flavorants etc. These are

detailed in various Examples described below.

The ULTRAMULSION™ dispersions of the invention are particularly useful in compositions used by professionals to clean teeth. The inclusion of stannous fluoride in the discontinuous phase of the emulsion is particularly attractive as a means of treating interproximal caries. See Segueto et al., *Journal of Dental Research*, Vol. 10, No. 1, pp. 90-96, 1961 and Peterson et al., *Northwest Dentistry*, 276-278, Sep./Oct. 1963. For oral care, the pH of the present compositions is preferably from 6 to 8.

The ULTRAMULSION™ dispersions of the invention are particularly useful in interdental devices whose use is under supervision of a professional. The inclusion of stannous fluoride in the discontinuous phase of the emulsion is particularly attractive as a means of treating interproximal caries. See Segueto et al., *Journal of Dental Research*, Vol. 10, No. 1, pp. 90-96, 1961 and Peterson et al., *Northwest Dentistry*, 276-278, Sep./Oct. 1963. The pH of the ULTRAMULSION™ dispersions for use with interdental devices is preferably from about 6 to 8.

Oral care rinses containing the ULTRAMULSION™ dispersions of the present invention may contain a variety of essential components ranging from other surfactants for cleaning, to other flavorants etc. In addition these oral care rinses may also contain a variety of nonessential optional components suitable for rendering such compositions more acceptable. Such conventional optional ingredients are well known to those skilled in the art, e.g., preservatives such as benzyl alcohol, methyl paraben, propyl paraben and imidiazolidinyl urea; cationic surfactants such as cetyl trimethylammonium chloride, lauryl trimethyl ammonium chloride, tricetyl methyl ammonium chloride, stearyldimethyl benzyl ammonium chloride, and di(partially hydrogenated tallow)- dimethylammonium chloride; thickeners and viscosity modifiers such as diethanolamide of a long chain fatty acid (e.g., PEG 3 lauramide), block polymers of ethylene oxide and propylene oxide such as Pluronic F88 offered by BASF Wyandotte, sodium chloride, sodium sulfate, polyvinyl alcohol, and ethyl alcohol; pH adjusting agents such as citric acid, succinic acid, phosphoric acid, sodium hydroxide, sodium carbonate, etc., perfumes; dyes; and, sequestering agents such as disodium ethylenediamine tetraacetate. Such agents generally are used individually at a level of from about 0.01% to about 10%, preferably from about 0.5% to about 5.0% by weight of the composition. The pH of the present

compositions for use with oral care rinse products is preferably from about 6 to 8.

Water is an essential component of most oral care products of the present invention which contain one or more of the various ULTRAMULSION™ dispersions described above. The water in these products is generally present at a level of from about 20% to about 95%, preferably from between about 60% and about 90%.

The following Tables provide a number of oral care examples utilizing the ULTRAMULSION™ dispersions of the present invention.

TABLE 1

ORAL CARE ULTRAMULSION DISPERSIONS
% W/W

Example No.	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Components											
Dimethicone viscosity (cs)											
100,000	10	-	-	-	-	-	-	-	-	33	-
600,000	-	10	-	-	-	-	33	-	-	-	-
2,500,000	-	-	10	-	-	-	-	33	-	-	10
4,000,000	-	-	-	10	-	-	-	-	33	-	-
30,000,000	-	-	-	-	10	-	-	-	-	-	-
50,000,000	-	-	-	-	-	10	-	-	-	-	-
Poloxamer-188	-	-	-	-	-	-	-	-	-	67	-
Poloxamer-238	-	-	-	-	-	-	-	-	-	-	90
Poloxamer-338	90	90	90	90	90	90	-	-	-	-	-
Poloxamer-407	-	-	-	-	-	-	67	67	67	-	-

TABLE 2

ORAL CARE ULTRAMULSION COMPOSITIONS

% W/W

Example No.	12	13	14	15	16	17	18	19	20	21
Component										
Dimethicone viscosity (cs)										
600,000	-	11.6	-	-	-	10.0	-	-	-	-
2,500,000	10.0	-	-	11.9	11.9	-	-	-	-	14.0
4,000,000	-	-	11.9	-	-	-	-	-	10.0	-
30,000,000	-	-	-	-	-	11.6	-	-	-	-
50,000,000	-	-	-	-	-	-	11.6	10.0	-	-

TABLE 2 (Continued)

Example No.	12	13	14	15	16	17	18	19	20	21
Lipid Soluble Component										
Mixture Of:										
Thymol	0.063	0.063	1.0	2	3	4	0.1	0.2	0.3	0.4
Menthol	0.055	0.55	1.0	2	3	4	0.1	0.2	0.3	0.4
Eucalyptol	0.091	0.91	1.0	2	3	4	0.1	0.2	0.3	0.4
Methyl Salicylate	0.055	0.55	1.0	2	3	4	0.1	0.2	0.3	0.4
Surfactant										
Poloxamer-338	89.76	85.76	84.4	80.1	76.4	74.0	88.0	89.2	88.8	84.4

TABLE 3
Particle Size Distribution (%)

Example No.	Product Composition	<1μ	<2μ	<3μ	<4μ	<5μ	>10μ
22	67/33 Poloxamer 338/100,000 cs. Dimethicone	44	50	4	1	1	0
23	90/10 Poloxamer 338/600,000 cs. Dimethicone	24	4	5	1	2	0
24	90/10 Poloxamer 407/2,500,000 cs. Dimethicone	2	3	63	24	8	0
25	90/10 Poloxamer 407/4,000,000 cs. Dimethicone	1.5	6	0.51	43.5	14	0

TABLE 4

ORAL CARE
% W/W

Example No.	26	27	28	29	30	31	32	33	34	35
Component										
Dimethicone viscosity (cs)										
600,000	-	11.6	-	-	-	10.0	-	-	-	-
2,500,000	10.0	-	-	11.9	11.9	-	-	-	-	14.0
4,000,000	-	11.6	-	-	-	-	-	-	-	-
30,000,000	-	-	-	-	-	11.6	-	-	-	-
50,000,000	-	-	-	-	-	-	11.6	10.0	-	-
Lipid Soluble										
Component Mixture Of:										
Thymol - 24%	-	-	-	-	-	-	-	-	-	-
Menthol - 16%	1	0.0	-	-	-	-	-	-	-	-
Eucalyptol - 36%	-	-	-	-	-	-	-	-	-	-
Methyl Salicylate - 24%	-	-	-	-	-	-	-	-	-	-
Stannous Fluoride	-	-	-	-	1.75	-	-	-	-	-
Triclosan	-	1.16	1.16	-	-	-	1.16	1.16	-	2.0
Chorhexidine	-	-	-	-	-	-	-	-	-	-
Metronidazole	-	-	-	1.3	-	-	-	-	-	-
Benzocaine	-	-	-	-	1.0	-	-	-	-	-
Surfactant										
Poloxamer 338	80.0	97.24	87.24	86.8	87.25	89.0	87.24	87.24	80.0	84.0

TABLE 5
ULTRAMULSION TOOTHPASTE COMPOSITIONS
% W/W

Example #	36	37	38	39	40	41	42	43	44	45	46	47
Component												
Dicalcium Phosphate Dihydrate	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0	49.0
Sorbitol - 70% Aq.	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0	18.0
Water	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67	16.67
Glycerine	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0	10.0
SodiumCarboxyMethyl Cellulose	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Flavor	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Sodium Lauryl Sulfate	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8
Titanium Dioxide	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Sodium MonoFluoro Phosphate	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76	0.76
Sodium Saccharin	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27	0.27

TABLE 5 (continued)
ULTRAMULSION TOOTHPASTE COMPOSITIONS
% W/W

Example #	48	49	50	51	52	53	54	55	56	57	58	59
Component												
ULTRAMULSION™												
Example 1	2.0	-	-	-	-	-	-	-	-	-	-	-
Example 3	-	2.0	-	-	-	-	-	-	-	-	-	-
Example 6	-	-	2.0	-	-	-	-	-	-	-	-	-
Example 4	-	-	-	2.0	-	-	-	-	-	-	-	-
Example 7	-	-	-	-	2.0	-	-	-	-	-	-	-
Example 12	-	-	-	-	-	2.0	-	-	-	-	-	-
Example 14	-	-	-	-	-	-	2.0	-	-	-	-	-
Example 15	-	-	-	-	-	-	-	2.0	-	-	-	-
Example 18	-	-	-	-	-	-	-	-	2.0	-	-	-
Example 21	-	-	-	-	-	-	-	-	-	2.0	-	-

TABLE 6
ULTRAMULSION DENTAL FLOSS COMPOSITIONS
% W/W

EXAMPLE # Component	60	61	62	63	64	65	66
Dicalcium Phosphate Dihydrate	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Carrageenan	14.0	14.0	14.0	14.0	14.0	14.0	14.0
Insoluble Saccharin	2.2	2.2	2.2	2.2	2.2	2.2	2.2
Flavor	8.9	8.9	8.9	8.9	8.9	8.9	8.9
EDTA	0.2	0.2	0.2	0.2	0.2	0.2	0.2
Propyl Gallate	0.1	0.1	0.1	0.1	0.1	0.1	0.1
ULTRAMULSION™							
Example 4	60.6	-	-	-	-	-	-
Example 5	-	60 6	-	-	-	-	-
Example 6	-	-	60 6	-	-	-	-
ULTRAMULSION™							
Example 2	-	-	-	60 6	-	-	-
Example 3	-	-	-	-	60.6	-	-
Example 1	-	-	-	-	-	60.0	-
Example 10	-	-	-	-	-	-	60.6

Each composition was loaded on to 800 denier Nylon Dental floss at between 40 - 60 mg./yard.

TABLE 7
ULTRAMULSION BREATH SPRAY COMPOSITIONS
% W/W

Example #	**67**	**68**	**69**	**70**
Component				
Water	82.75	82.75	82.75	82.75
Sorbitol - 70% Aq.	8.5	8.5	8.5	8.5
Glycerin	3.0	3.0	3.0	3.0
Xanthan Gum	0.4	0.4	0.4	0.4
Sodium Saccharin	0.4	0.4	0.4	0.4
Sodium Benzoate	0.3	0.3	0.3	0.3
EDTA	0.05	0.05	0.05	0.05
Flavor	0.6	0.6	0.6	0.6
ULTRAMULSION™				
Example 3	4.0	-	-	-
Example 4	-	4.0	-	-
Example 5	-	-	4.0	-
Example 9	-	-	-	4.0

TABLE 8

ULTRAMULSION DRY-MOUTH SPRAY COMPOSITIONS

Pump Spray

% W/W

Example #	71	72	73
Component			
Water	93.86	93.86	93.86
Xanthan Gum	0.7	0.7	0.7
Sorbitol - 70% Aq.	3.5	3.5	3.5
Potassium Chloride	0.1	0.1	0.1
Sodium Chloride	0.06	0.06	0.06
Calcium Chloride	0.02	0.02	0.02
Potassium Phosphate Dihydrate	0.04	0.04	0.04
Flavor	0.06	0.06	0.06
Propyl Gallate	0.1	0.1	0.1
ULTRAMULSION™			
Example 2	1.5	-	-
Example 4	-	1.5	-
Example 6	-	1.5	-

TABLE 9

ULTRAMULSION TEETHING GEL COMPOSITIONS
% W/W

Example #	74	75
Component		
Water	45.7	45.7
Sorbitol - 70% Aq.	34.3	34.3
Glycerine	5.0	5.0
Potassium Sorbate	0.151	0.151
Sodium Saccharin	0.075	0.075
Citric Acid	0.1	0.1
Methyl Paraben	0.15	0.15
Propylene Glycol	10.0	10.0
SodiumCarboxyMethyl Cellulose	2.52	2.52
ULTRAMULSION™		
Example 4	2.0	-
Example 6	-	2.0

TABLE 10
ULTRAMULSION ORAL CARE COMPOSITIONS
% W/W

Example No.	76	77	78	79	80	81	82	83	84	85	86
Component											
Dimethicone viscosity (cs)											
100,000	10	-	-	-	-	-	-	-	-	33	-
600,000	-	10	-	-	-	-	33	-	-	-	-
2,500,000	-	-	10	-	-	-	-	33	-	-	10
4,000,000	-	-	-	10	-	-	-	-	33	-	-
30,000,000	-	-	-	-	10	-	-	-	-	-	-
50,000,000	-	-	-	-	-	10	-	-	-	-	-
Triclosan	1	2	3	4	5	6	2	4	6	8	10
Poloxamer-188	-	-	-	-	-	-	-	-	-	59	-
Poloxamer-238	-	-	-	-	-	-	-	-	-	-	80
Poloxamer-338	89	88	87	86	85	84	-	-	-	-	-
Poloxamer-407	-	-	-	-	-	-	65	63	61	-	-

TABLE 11

ULTRAMULSION ORAL CARE COMPOSITIONS

% W/W

Example No.	**87**	**88**	**89**	**90**	**91**	**92**	**93**	**94**	**95**	**96**
Component										
Dimethicone viscosity (cs)										
600,000	-	11.6	-	-	-	10.0	-	-	-	-
2,500,000	10.0	-	-	11.9	11.9	-	-	-	-	14.0
4,000,000	-	11.6	-	-	-	-	-	-	-	-
30,000,000	-	-	10	-	-	-	-	-	11.6	-
50,000,000	-	-	-	-	-	-	11.6	10.0	-	-
Lipid Soluble										
Triclosan	10	1.16	1.16	1.3	1.0	1.75	1.16	1.16	5	2.0
Surfactant										
Poloxamer-338	80.0	75.64	88.84	86.8	87.15	88.25	87.24	88.84	83.4	84.0

TABLE 12

Example No.	97	98	99	100	101
DIMETHICONE					
2,500,000 cs.	10	10	10	10	--
4,000,000 cs.	--	--	--	--	10
LIPID SOLUBLES/DISPERSABLE					
Dextromethophenyl Hydrobromide	1.0	--	--	--	--
Dextromethophenyl Hydrobromide	--	2.0	--	--	--
Dextromethophenyl Hydrobromide	--	--	1.0	--	--
Fragrance #17.92.3415 (IFF)	--	--	--	1.5	1.0
SURFACTANT					
Poloxamer-338	89.0	88.0	89.0	88.5	89.0

TABLE 13

ULTRAMULSION COMPOSITIONS FOR MOUTH AND LIPS
% W/W

A. Lip Balm Examples:	102	103
Mineral Oil-USP	220	250
Petroleum Jelly-USP	50	50
Ozokerite box	13.0	5.0
Paraffin box	12.0	17.0
ULTRAMULSION		
Example #3	3.0	-
Example #8	-	3.0

TABLE 14

B. Gel for Canker Sore Treatment	104	105
D.I. Water	56.1	46.6
Sorbitol - 70%	32.0	32.0
Propylene Glycol	-	-
Glycerin - USP	6.0	6.0
Potassium Sorbate	0.14	0.14
Sodium Saccharin	0.06	0.06
Sodium CMC	2.50	2.50
Flavor	0.20	0.20
camphor	0.50	0.50
ULTRAMULSION:		
Example #10	2.50	-
Example # 7	-	2.0

TABLE 15

EXAMPLES 106-108

Cough Drop or Sore Throat Compositions
% W/W

Example 106 (Cough Drop):

Glucose	26.5
Corn Syrup	40.0
Sugar	30.0
Flavor	0.5
ULTRAMULSION: Example #8	3.0

Example 107 (Cough Syrup):

Corn Syrup	15.0
Flavoring	0.3
D.I. Water	83.7
ULTRAMULSION: Example #15	1.0

Example 108 (Sore Throat Spray):

D.I. Water	74.55
Sorbitol-70% Aq.	20.0
Glycerine	3.0
Xanthan Gum	0.05
Flavor	0.40
ULTRAMULSION: Example #13	2.00

TABLE 16 - EXAMPLES 109 - 110

Example 109 (Alcohol Free Rinse for Trench Mouth)

D.I. Water	83.02
Sorbitol - 70% aq.	10.0
Glycerine - USP	3.0
Sodium Saccharin	0.06
Sodium Butyrate	0.44
EDTA	0.05
Xanthan Gum	0.03
ULTRAMULSION: Example #12	3.0

Example 110 (Dual Dispensed Mouthrinse Concentrate):

Phase A

Glycerine-Anhydrous	84.553
SiO-Zeodent 113	15.0
Stannous Fluoride	0.447

Phase B

D.I. Water	70.0
Flavor	4.6
Color Blue #1	0.001
ULTRAMULSION: Example #14	25.399

TABLE 17

Example 111 (Antacid Tablets):

Tablet:

A.	Mineral Oil	10.0
	Flavor	6.0
	Sodium Polyphosphate	2.0
	Corn Starch	0.6
	Sucrose	41.9
	Talc	0.5
	Calcium Carbonate	39.0
B.	ULTRAMULSION:	
	Example #3	5.0
	Phase A - Alone	95 0

Compounding Procedure for Example 111:

Phase A is dry blended together in a paddle mixer, e.g., Hobart, to form a so-called wet/dry granulation. Phase A is then heated to 65-70°C while mixing, and the ULTRAMULSION™ dispersion is added to the granulation. The ULTRAMULSION™ dispersion melts and "plates out" on the surface of each granulation particle. The resulting granulated material is cooled to room temperature and is tableted using 1.3 grams and 40,000 lbs.

TABLE 18

Example 112 (Antacid Liquid):

Phase A	
Calcium Carbonate	96.0
ULTRAMULSION:	
Example #7	4.0
Phase B	
Phase A	4.0
D.I. Water	85.4
Sucrose	6.0
Flavor	1.5
Xanthan Gum	0.1
Glycerine	3.0

Compounding Procedure for Example 112:

Phase A is prepared by heating calcium carbonate in an air stream to 65-70%; the ULTRAMULSION™ dispersion is introduced at 65-70°C and melts in the hot air stream and "plates" each individual $CaCO^3$ particle. The material is cooled and prepared into a liquid antacid per Phase B.

Example 113 (Ulcer Treatment Tablet)

Aluminum Hydroxide Powder	55.0
Mineral Oil	14.5
Sodium Polyphosphate	22.0
Talc	0.5
ULTRAMULSION:	
Example #12	8.0

TABLE 19

INTERDENTAL DEVICE FORMULATIONS (% W/W)

Example #	114	115	116	117	118
Components:					
Sorbitol - 70% Aq.	7.5	7.5	8.0	9.0	7.0
Sodium Saccharin	0.4	0.4	0.4	0.4	0.4
Flavor	5.0	5.0	5.4	5.1	4.8
D.I. Water	75.1	75.1	71.2	74.5	78.8
ULTRAMULSION™					
Example 1	12	-	-	-	-
Example 3	-	12	-	-	-
Example 12	-	-	15	-	-
Example 14	-	-	-	11	-
Example 2	-	-	-	-	9

Procedure for Impregnating Interdental Stimulators

1. Material to be impregnated (e.g., wooden sticks) with the ULTRAMULSION™ dispersion (or formulation) is placed in suitable container capable of holding a vacuum, such as a desiccator, stainless steel covered reactor or similar device.

2. The liquid formulation is poured on top of the material and covered completely by the liquid. A perforated disk with ballast is placed on the material to keep from floating.

3. The container is then sealed, and vacuum applied for varying periods of time ranging from 1 min. to several hours with the preferred time being between 5-10 min.

4. Vacuum is maintained such that the liquid does not boil, but enough vacuum to remove entrapped air from the device.

TABLE 19 CONTINUED

Example of laboratory preparation using wooden Interdental Stimulators (IDS)

Collectively, 87.0 grams of wooden interdental stimulators (IDS) equals about 260 individual stimulators. This IDS batch was impregnated with the ULTRAMULSION™ dispersion formulation from Example 22 under vacuum, at 30 mm of mercury for a period of 10 minutes. The resulting impregnated IDS batch was removed from the remaining solution and dried at 40°C in convection oven for 1.5 hour. The IDS were dry and the final batch weight was 152.7 grams. This is a 56.9% increase in weight indicating the amount of dry formulation impregnated into the IDS.

The present invention has been described in detail, including the preferred embodiments thereof. However, it will be appreciated that those skilled in the art, upon consideration of the present disclosure, may make modifications and/or improvements on this invention and still be within the scope and spirit of this invention as set forth in the following claims.

WHAT IS CLAIMED IS:

1. An oral care product selected from the group consisting of rinses, sprays, gels, creams, toothpastes, tooth powders, dental floss, interproximal simulators, mints and chewing gum, wherein said product contains an aqueous-free ULTRAMULSION™ dispersion of a silicone in a surfactant wherein:

a. the silicone is insoluble in said surfactant, has a viscosity up to about 50 million cs, and a particle size up to about 10 microns.

b. the surfactant to silicone ratio in the ULTRAMULSION™ dispersion is from between about 400:1 and about 1:1; and the surfactant has an orienting effect on the silicone,

c. the ULTRAMULSION™ dispersion forms stable dispersions in aqueous containing oral care products, and

d. said oral care product exhibits enhanced substantivity to surfaces in the oral cavity while the dispersed silicone phase of said ULTRAMULSION™ dispersion functions as a reservoir for various lipid soluble and lipid dispersible oral care active ingredients.

2. An oral care product according to claim 1, wherein said ULTRAMULSION™ dispersion comprises a nonionic poloxamer surfactant and polydimethylsiloxane wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$OH\text{-}(CH_2CH_2)_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersion are from between about 1 and about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. the ULTRAMULSION™ dispersion dispersed in water based oral care products is stable.

3. A stable aqueous based oral care product containing a dispersed therein an ULTRAMULSION™ dispersion comprising a nonionic poloxamer surfactant and a polydimethylsiloxane insoluble in said surfactant wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$OH\text{-}(CH_2CH_2))_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersions are from between about 1 and about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. the ULTRAMULSION™ dispersion dispersed in water is stable.

4. An oral care product according to claim 7, wherein the ratio of said surfactant to said silicone is 9:1 and 90% of the silicone particles are from between about 1 and 3 microns.

5. An oral care product according to claim 7, wherein the ratio of said surfactant to said silicone is 2:1 and 100% of the silicone dispersion is less than 10 microns.

6. An oral care product according to claim 7, wherein the ratio of said surfactant

to said silicone is 1:1 and the silicone particles in said ULTRAMULSION™ dispersion are less than 10 microns.

7. An aqueous based rinse containing an ULTRAMULSION™ dispersion comprising a nonionic poloxamer surfactant and polydimethylsiloxane insoluble in said surfactant wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$OH\text{-}(CH_2CH_2))_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 100,000 million and about 4 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersion are from between about 1 and about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2;

h. the ULTRAMULSION™ dispersion dispersed in water based rinse is stable, and

i. the polydimethylsiloxane contains various essential oil active ingredients.

8. An antigingivitis toothpaste wherein said toothpaste contains an aqueous-free ULTRAMULSION™ dispersion of a silicone in a surfactant wherein:

a. the silicone is insoluble in said surfactant, has a viscosity up to about 50 million cs, a particle size up to about 10 microns, and the silicone contains triclosan;

b. the silicone molecule is uncoiled from the helix state with the polar moieties oriented in one plane and the hydrophilic moieties generally opposite from said polar moieties;

c. the surfactant to silicone ratio in the ULTRAMULSION™ dispersion is from between about 400:1 and about 1:1; and the surfactant has an orienting effect on the silicone,

d. the ULTRAMULSION™ dispersion forms stable, aqueous in said toothpaste, and

e. said toothpaste exhibits enhanced substantivity to surfaces in the oral cavity while the dispersed silicone phase of said ULTRAMULSION™ dispersion functions as a reservoir for said triclosan. care active ingredients.

9. An oral care product according to claim 1, wherein said ULTRAMULSION™ dispersion comprises a nonionic poloxamer surfactant and polydimethylsiloxane wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$HO\text{-}(CH_2CH_2))_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. the concentration of the triclosan in the ULTRAMULSION© is from between about 0.1% and about 100%;

f. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersion are from between about 1 and about 10 microns;

g. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

h. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

i. the ULTRAMULSION™ dispersion dispersed in water based toothpaste is stable.

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10. A stable aqueous based toothpaste containing dispersed therein an ULTRAMULSION™ dispersion comprising a nonionic poloxamer surfactant and a polydimethylsiloxane containing triclosan insoluble in said surfactant wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$HO\text{-}(CH_2CH_2))_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. the triclosan is present at a concentration from between about 0.1 and about 0-6% by weight;

f. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersions are from between about 1 and about 10 microns;

g. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000; and

h. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2.

11. A toothpaste according to claim 7, wherein the ratio of said surfactant to said silicone is 9:1 and 90% of the silicone particles are from between about 1 and 3 microns and the triclosan level is from between about 0.1 and about 0.6%.

12. A toothpaste according to claim 7, wherein the ratio of said surfactant to said silicone is 2:1 and 100% of the silicone dispersion is less than 10 microns and the triclosan level is from between about 0.2 and about 0.5%.

13. A toothpaste according to claim 7, wherein the ratio of said surfactant to said silicone is 1:1 and the silicone particles in said ULTRAMULSION™ dispersion are less than 10 microns.

14. A treatment product selected from the group consisting of mouth treatment, throat treatment, esophagus treatment, stomach and intestine treatment products, wherein said product contains an aqueous-free ULTRAMULSION™ dispersion of a silicone in a surfactant wherein:

a. the silicone is insoluble in said surfactant, has a viscosity up to about 50 million cs, and a mean particle size up to about 10 microns.

b. the surfactant to silicone ratio in the ULTRAMULSION™ dispersion is from between about 400:1 and about 1:1; and the surfactant has an orienting effect on the silicone,

c. the ULTRAMULSION™ dispersion forms stable dispersions in aqueous containing treatment products, and

d. said treatment products exhibits enhanced substantivity to mouth, throat, esophagus, stomach and intestine surfaces ULTRAMULSION™coating functions as a reservoir for various lipid soluble and lipid dispersible treatment ingredients, which are available for release from said coating reservoir on to the surface being treated.

15. A treatment product according to claim 1, wherein said ULTRAMULSION™ dispersions comprises a nonionic poloxamer surfactant and polydimethylsiloxane wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$OH\text{-}(CH_2CH_2)_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein X, Y, and X' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. substantially all of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersions below about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block

copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. the ULTRAMULSION™ dispersion as dispersed in the water based treatment products is stable.

16. A stable aqueous based treatment product selected from the group consisting of: mouth treatment, throat treatment, esophagus treatment, stomach treatment and intestine treatment products, wherein said product containing dispersed therein an ULTRAMULSION™ dispersion comprised of a nonionic poloxamer surfactant and a polydimethylsiloxane insoluble in said surfactant wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number,

b. said surfactant has the chemical composition

$$OH\text{-}(CH_2CH_2)_x\text{-}(CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y\text{-}(CH_2CH_2O)_{x'}\text{-}H$$

wherein X, Y, and X' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 100,000 cs. and about 50 million cs;

d. the particle size of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. substantially all of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersions are from between about 1 and about 10 microns;

f. the polydimethylsiloxane in the ULTRAMULSION™ dispersion is uncoiled and oriented;

g. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

h. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

i. the ULTRAMULSION™ dispersion as dispersed in water is stable.

17. A treatment product according to claim 7, wherein the ratio of said surfactant to said silicone is 9:1 and 90% of the silicone particles are from between about 1 and 3 microns.

18. A treatment product according to claim 7, wherein the ratio of said surfactant to said silicone is 2:1 and 100% of the silicone dispersion is less than 10 microns.

19. A treatment product according to claim 7, wherein the ratio of said surfactant to said silicone is 1:1 and the silicone particles in said ULTRAMULSION™ dispersion are less than 10 microns.

20. An aqueous based antacid containing an ULTRAMULSION™ dispersion comprising a nonionic poloxamer surfactant and polydimethylsiloxane insoluble in said surfactant wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$OH\text{-}(CH_2CH_2))_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein X, Y, and X' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 1.5 million and about 4 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersions are from between about 1 and about 10 microns;

f. the polydimethylsiloxane in the ULTRAMULSION™ dispersion is uncoiled and oriented;

g. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

h. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

i. the ULTRAMULSION™ dispersion as dispersed in the water based antacid composition is stable.

21. An interdental delivery device containing an ULTRAMULSION™ dispersion of a silicone in a surfactant which is released into the oral cavity when the device is used to clean, massage and/or treat surfaces in the mouth, wherein:

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a. the silicone is insoluble in said surfactant, has a viscosity up to about 50 million cs, and a particle size up to about 10 microns.

b. the surfactant to silicone ratio in the ULTRAMULSION™ dispersion is from between about 400:1 and about 1:1; and the surfactant has an orienting effect on the silicone,

c. the silicone is oriented, exhibits enhanced substantivity to surfaces in the oral cavity and functions as a reservoir for various lipid soluble and lipid dispersible oral care active ingredients.

22. An interdental device according to claim 1, wherein said ULTRAMULSION™ dispersion comprises a nonionic poloxamer surfactant and polydimethylsiloxane wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$HO\text{-}(CH_2CH_2))_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersion are from between about 0.1 and about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. the ULTRAMULSION™ dispersion is loaded into the device at from between about 1 and about 25% by weight of said device.

23. An interdental delivery device coating containing an ULTRAMULSION™

dispersion comprising a nonionic poloxamer surfactant and polydimethylsiloxane insoluble in said surfactant wherein:

a. said polydimethylsiloxane is oriented has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$HO\text{-}(CH_2CH_2))_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 100,000 million and about 4 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersion are from between about 1 and about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. the polydimethylsiloxane contains various lipid suitable active ingredients.

24. An oral care product according to claim 2, wherein the ratio of surfactant to polydimethylsiloxane is 1:1 and at least 80% of the polydimethylsiloxane dispersed particles are between 1 and 9 microns.

25. An interdental device according to claim 1, wherein the ratio or surfactant to polydimethylsiloxane is 9:1 and about 90% of the polydimethylsiloxane dispersed particles are between 1 and 3 microns.

26. An interdental device according to claim 1, wherein the ratio or surfactant to polydimethylsiloxane is 2:1 and about 90% of the polydimethylsiloxane dispersed particles are between 1 and 3 microns.

27. An interdental device according to claim 2, wherein the ratio of surfactant to polydimethylsiloxane is 4:1 and about 90% of the polydimethylsiloxane dispersed particles are between 1 and 9 microns.

28. An interdental product according to claim 2, wherein the ratio of

surfactant to polydimethylsiloxane is 9.5 : 0.5 and about 100% of the polydimethylsiloxane dispersed particles are between 1 and 9 microns.

29. An interdental device according to claim 2, wherein the polydimethylsiloxane has a viscosity of 2.5 million cs and the surfactant is a solid at room temperature.

30. An oral care rinse wherein said rinse contains an aqueous-free ULTRAMULSION™ dispersion of a silicone in a surfactant wherein:

a. the silicone is insoluble in said surfactant, has a viscosity up to about 50 million cs, and a particle size up to about 10 microns;

b. the surfactant to silicone ratio in the ULTRAMULSION™ dispersion is from between about 400:1 and about 1:1; and the surfactant has an orienting effect on the silicone;

c. the ULTRAMULSION™ dispersion forms stable dispersions in aqueous containing oral care products, and

d. said rinse exhibits enhanced substantivity to surfaces in the oral cavity while the dispersed silicone phase of said ULTRAMULSION™ dispersion functions as a reservoir for various lipid soluble and lipid dispersible oral care active ingredients, selected from the group consisting of essential oils, triclosan, chlorhexidine phenol and its homologs, metronidazole, quaternary ammonium compounds and mixtures thereof.

31. An alcohol-free rinse according to claim 1, wherein said ULTRAMULSION™ dispersion comprises a nonionic poloxamer surfactant and polydimethylsiloxane wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$HO\text{-}(CH_2CH_2)_x\text{-}(CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y\text{-}(CH_2CH_2O)_{x'}\text{-}H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersion are from between about 1 and about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. wherein the ULTRAMULSION™ dispersion as dispersed in the water based oral care product is stable.

32. A stable aqueous based rinse containing up to 10% ethanol having dispersed therein an ULTRAMULSION™ dispersion comprising a nonionic poloxamer surfactant and a polydimethylsiloxane insoluble in said surfactant wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$HO\text{-}(CH_2CH_2))_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersions are from between about 1 and about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about

150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. the ULTRAMULSION™ dispersion as dispersed in water is stable; and

i. the oral care active ingredient is an essential oil mixture containing thymol, eucalyptol, menthol and methyl salicylate.

33. A rinse according to claim 7, wherein the ratio of said surfactant to said silicone is 9:1 and 90% of the silicone particles are from between about 1 and 3 microns.

34. A rinse according to claim 7, wherein the ratio of said surfactant to said silicone is 2:1 and 100% of the silicone dispersion is less than 10 microns.

35. A rinse according to claim 7, wherein the ratio of said surfactant to said silicone is 1:1 and the silicone particles in said ULTRAMULSION™ dispersion are less than 10 microns.

36. A rinse containing an ULTRAMULSION™ dispersion comprising a nonionic poloxamer surfactant and polydimethylsiloxane insoluble in said surfactant wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$HO\text{-}(CH_2CH_2))_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 100,000 million and about 4 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersion are from between about 1 and about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block

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copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2;

h. the ULTRAMULSION™ dispersion as dispersed in the water based rinse is stable, and

i. the polydimethylsiloxane contains the essential oil active ingredients, menthol, eucalyptol, thymol and methyl salicylate.

AMENDED CLAIMS
[received by the International Bureau on 8 November 1996 (08.11.96); original claims 4-36 replaced by amended claims 1-36 (9 pages)]

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. the ULTRAMULSION™ dispersion dispersed in water based oral care products is stable.

3. A stable aqueous based oral care product containing a dispersed therein an ULTRAMULSION™ dispersion comprising a nonionic poloxamer surfactant and a polydimethylsiloxane insoluble in said surfactant wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$OH\text{-}(CH_2CH_2)_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersions are from between about 1 and about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. the ULTRAMULSION™ dispersion dispersed in water is stable.

4. An oral care product according to claim 3, wherein the ratio of said surfactant to said silicone is 9:1 and 90% of the silicone particles are from between about 1 and 3 microns.

5. An oral care product according to claim 3, wherein the ratio of said surfactant to said silicone is 2:1 and 100% of the silicone dispersion is less than 10 microns.

6. An oral care product according to claim 3, wherein the ratio of said surfactant

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10. A stable aqueous based toothpaste containing dispersed therein an ULTRAMULSION™ dispersion comprising a nonionic poloxamer surfactant and a polydimethylsiloxane containing triclosan insoluble in said surfactant wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$HO\text{-}(CH_2CH_2))_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. the triclosan is present at a concentration from between about 0.1 and about 0-6% by weight;

f. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersions are from between about 1 and about 10 microns;

g. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000; and

h. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2.

11. A toothpaste according to claim 10, wherein the ratio of said surfactant to said silicone is 9:1 and 90% of the silicone particles are from between about 1 and 3 microns and the triclosan level is from between about 0.1 and about 0.6%.

12. A toothpaste according to claim 10, wherein the ratio of said surfactant to said silicone is 2:1 and 100% of the silicone dispersion is less than 10 microns and the triclosan level is from between about 0.2 and about 0.5%.

13. A toothpaste according to claim 10, wherein the ratio of said surfactant to said silicone is 1:1 and the silicone particles in said ULTRAMULSION™ dispersion are less than 10 microns.

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14. A treatment product selected from the group consisting of mouth treatment, throat treatment, esophagus treatment, stomach and intestine treatment products, wherein said product contains an aqueous-free ULTRAMULSION™ dispersion of a silicone in a surfactant wherein:

a. the silicone is insoluble in said surfactant, has a viscosity up to about 50 million cs, and a mean particle size up to about 10 microns.

b. the surfactant to silicone ratio in the ULTRAMULSION™ dispersion is from between about 400:1 and about 1:1; and the surfactant has an orienting effect on the silicone,

c. the ULTRAMULSION™ dispersion forms stable dispersions in aqueous containing treatment products, and

d. said treatment products exhibits enhanced substantivity to mouth, throat, esophagus, stomach and intestine surfaces ULTRAMULSION™coating functions as a reservoir for various lipid soluble and lipid dispersible treatment ingredients, which are available for release from said coating reservoir on to the surface being treated.

15. A treatment product according to claim 14, wherein said ULTRAMULSION™ dispersions comprises a nonionic poloxamer surfactant and polydimethylsiloxane wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$OH\text{-}(CH_2CH_2)_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein X, Y, and X' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. substantially all of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersions below about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block

copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. the ULTRAMULSION™ dispersion as dispersed in the water based treatment products is stable.

16. A stable aqueous based treatment product selected from the group consisting of: mouth treatment, throat treatment, esophagus treatment, stomach treatment and intestine treatment products, wherein said product containing dispersed therein an ULTRAMULSION™ dispersion comprised of a nonionic poloxamer surfactant and a polydimethylsiloxane insoluble in said surfactant wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$OH\text{-}(CH_2CH_2)_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein X, Y, and X' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 100,000 cs. and about 50 million cs;

d. the particle size of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. substantially all of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersions are from between about 1 and about 10 microns;

f. the polydimethylsiloxane in the ULTRAMULSION™ dispersion is uncoiled and oriented;

g. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

h. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

i. the ULTRAMULSION™ dispersion as dispersed in water is stable.

17. A treatment product according to claim 16, wherein the ratio of said surfactant to said silicone is 9:1 and 90% of the silicone particles are from between about 1 and 3 microns.



18. A treatment product according to claim 16, wherein the ratio of said surfactant to said silicone is 2:1 and 100% of the silicone dispersion is less than 10 microns.

19. A treatment product according to claim 16, wherein the ratio of said surfactant to said silicone is 1:1 and the silicone particles in said ULTRAMULSION™ dispersion are less than 10 microns.

20. An aqueous based antacid containing an ULTRAMULSION™ dispersion comprising a nonionic poloxamer surfactant and polydimethylsiloxane insoluble in said surfactant wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$OH\text{-}(CH_2CH_2)_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein X, Y, and X' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 1.5 million and about 4 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersions are from between about 1 and about 10 microns;

f. the polydimethylsiloxane in the ULTRAMULSION™ dispersion is uncoiled and oriented;

g. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

h. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

i. the ULTRAMULSION™ dispersion as dispersed in the water based antacid composition is stable.

21. An interdental delivery device containing an ULTRAMULSION™ dispersion of a silicone in a surfactant which is released into the oral cavity when the device is used to clean, massage and/or treat surfaces in the mouth, wherein:

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a. the silicone is insoluble in said surfactant, has a viscosity up to about 50 million cs, and a particle size up to about 10 microns.

b. the surfactant to silicone ratio in the ULTRAMULSION™ dispersion is from between about 400:1 and about 1:1; and the surfactant has an orienting effect on the silicone,

c. the silicone is oriented, exhibits enhanced substantivity to surfaces in the oral cavity and functions as a reservoir for various lipid soluble and lipid dispersible oral care active ingredients.

22. An interdental device according to claim 21, wherein said ULTRAMULSION™ dispersion comprises a nonionic poloxamer surfactant and polydimethylsiloxane wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$HO\text{-}(CH_2CH_2))_x - (CH_2\overset{CH_3}{\overset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersion are from between about 0.1 and about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. the ULTRAMULSION™ dispersion is loaded into the device at from between about 1 and about 25% by weight of said device.

23. An interdental delivery device coating containing an ULTRAMULSION™

dispersion comprising a nonionic poloxamer surfactant and polydimethylsiloxane insoluble in said surfactant wherein:

a. said polydimethylsiloxane is oriented has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$HO\text{-}(CH_2CH_2))_x - (CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y - (CH_2CH_2O)_{x'} - H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 100,000 million and about 4 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersion are from between about 1 and about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block copolymer having a molecular weight from between about 1,100 and about 150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. the polydimethylsiloxane contains various lipid suitable active ingredients.

24. An interdental device according to claim 23, wherein the ratio of surfactant to polydimethylsiloxane is 1:1 and at least 80% of the polydimethylsiloxane dispersed particles are between 1 and 9 microns.

25. An interdental device according to claim 23, wherein the ratio or surfactant to polydimethylsiloxane is 9:1 and about 90% of the polydimethylsiloxane dispersed particles are between 1 and 3 microns.

26. An interdental device according to claim 23, wherein the ratio or surfactant to polydimethylsiloxane is 2:1 and about 90% of the polydimethylsiloxane dispersed particles are between 1 and 3 microns.

27. An interdental device according to claim 23, wherein the ratio of surfactant to polydimethylsiloxane is 4:1 and about 90% of the polydimethylsiloxane dispersed particles are between 1 and 9 microns.

28. An interdental product according to claim 23, wherein the ratio of

surfactant to polydimethylsiloxane is 9.5 : 0.5 and about 100% of the polydimethylsiloxane dispersed particles are between 1 and 9 microns.

29. An interdental device according to claim 23, wherein the polydimethylsiloxane has a viscosity of 2.5 million cs and the surfactant is a solid at room temperature.

30. An alcohol-free oral care rinse wherein said rinse contains an aqueous-free ULTRAMULSION™ dispersion of a silicone in a surfactant wherein:

a. the silicone is insoluble in said surfactant, has a viscosity up to about 50 million cs, and a particle size up to about 10 microns;

b. the surfactant to silicone ratio in the ULTRAMULSION™ dispersion is from between about 400:1 and about 1:1; and the surfactant has an orienting effect on the silicone;

c. the ULTRAMULSION™ dispersion forms stable dispersions in aqueous containing oral care products, and

d. said rinse exhibits enhanced substantivity to surfaces in the oral cavity while the dispersed silicone phase of said ULTRAMULSION™ dispersion functions as a reservoir for various lipid soluble and lipid dispersible oral care active ingredients, selected from the group consisting of essential oils, triclosan, chlorhexidine phenol and its homologs, metronidazole, quaternary ammonium compounds and mixtures thereof.

31. An alcohol-free rinse according to claim 30, wherein said ULTRAMULSION™ dispersion comprises a nonionic poloxamer surfactant and polydimethylsiloxane wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$HO\text{-}(CH_2CH_2)_x\text{-}(CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y\text{-}(CH_2CH_2O)_{x'}\text{-}H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 2.5 million and about 50 million cs;

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150,000;

g. the ratio of surfactant to polydimethylsiloxane is from between about 400:1 and about 1:2; and

h. the ULTRAMULSION™ dispersion as dispersed in water is stable; and

i. the oral care active ingredient is an essential oil mixture containing thymol, eucalyptol, menthol and methyl salicylate.

33. A rinse according to claim 30, wherein the ratio of said surfactant to said silicone is 9:1 and 90% of the silicone particles are from between about 1 and 3 microns.

34. A rinse according to claim 30, wherein the ratio of said surfactant to said silicone is 2:1 and 100% of the silicone dispersion is less than 10 microns.

35. A rinse according to claim 30, wherein the ratio of said surfactant to said silicone is 1:1 and the silicone particles in said ULTRAMULSION™ dispersion are less than 10 microns.

36. A rinse containing an ULTRAMULSION™ dispersion comprising a nonionic poloxamer surfactant and polydimethylsiloxane insoluble in said surfactant wherein:

a. said polydimethylsiloxane has the chemical composition $(CH_3)_3SiO[SiO(CH_3)_2]_nSi(CH_3)_3$, wherein n is a whole number;

b. said surfactant has the chemical composition

$$HO\text{-}(CH_2CH_2)_x\text{-}(CH_2\underset{\displaystyle CH_3}{\underset{|}{C}}HO)_y\text{-}(CH_2CH_2O)_{x'}\text{-}H$$

wherein x, y, and x' are whole numbers;

c. the viscosity of the polydimethylsiloxane ranges from between about 100,000 million and about 4 million cs;

d. the particle size of most of the polydimethylsiloxane in the ULTRAMULSION™ dispersion is from between about 0.1 and about 10 microns;

e. from between about 80% and 95% of said polydimethylsiloxane particles in the ULTRAMULSION™ dispersion are from between about 1 and about 10 microns;

f. the nonionic surfactant is a polyoxyethylene-polyoxypropylene block

