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(54) Title: HAIR REMOVAL DEVICE COMPRISING AN ERODABLE COMPOSITION

(57) Abstract: A hair removal device is provided, comprising an erodable, solid moisturizing composition, the erodable, solid moisturizing composition comprising: a. A structuring polymer; b. At least 50% moisturizing hydrophobic phase by weight of the erodable, solid moisturizing composition, wherein at least 40% by weight of the moisturizing hydrophobic phase comprises materials which are liquid at 25°C.

HAIR REMOVAL DEVICE COMPRISING AN ERODABLE COMPOSITION

FIELD OF THE INVENTION

The present invention concerns the provision of a hair removal device comprising an erodable, solid moisturizing composition.

BACKGROUND OF THE INVENTION

Hair removal devices incorporating a chemical composition are known and shall be referred to herein as devices comprising an "onboard" composition. Reference can be made to WO 07/056509 which teaches the inclusion of an onboard soap composition in a wet shaving razor. It is also known to provide a wet shaving razor incorporating an onboard skin-engaging composition comprising large quantities of hydrophilic polymers, such as polyethylene oxide, to lubricate the skin. Reference is made, by way of example, to WO 97/02116 and WO 97/02117.

The patent applications referred to above relate to the provision of various advantages, such as additional lathering and soap-related benefits, or improved lubrication in the case of polyethylene oxide. It would alternatively or additionally be advantageous to be able to provide a skin moisturizing benefit via an onboard chemistry, especially to male users who may be less motivated to use skin moisturizers than females. The provision of a moisturizing benefit from an onboard chemistry may, however, have a number of difficulties associated with it.

Skin moisturization may be achieved in several different ways, but one important formulational route to achieving skin moisturization is to include materials which bind water, such as polyols. However, polyols derive their water-binding abilities in part from their significant hydrophilicity, which may render them unsuited for use in any context involving water, such as is the case during wet shaving – they may be washed away during the initial stages of a shave. An alternative approach might be to use occlusive, hydrophobic materials which cover the skin and therefore act to retain water already present in the skin. These materials are occlusive hydrophobic emollients which are less likely to be washed away during use in a highly aqueous environment. WO 06/108522, discloses the use of small amounts of hydrophobic emollients in an onboard chemistry. However, formulations comprising significant proportions of hydrophobic emollients generally have mechanical and/or rheological properties which render them unsuitable for use as an onboard chemistry. For example, many hydrophobic emollients are liquids or low

viscosity gels which flow easily and/or whose integrity may become substantially impaired by contact with hair, especially stiff male beard hair. One possible result, is that the emollient formulation may be mostly or entirely delivered at the start of the first use, over-delivering for that first use and leaving little or nothing for future uses of the hair removal device. Other hydrophobic emollients, such as some waxes, may not confer sufficient flexibility to an emollient composition. A further perceived problem associated with compositions comprising significant proportions of hydrophobic emollients is that they may increase drag across the skin, due to their affinity with the hydrophobic skin surface. An increase in friction is perceived as being a problem, because it is believed to result in a less pleasant hair removal experience.

SUMMARY OF THE INVENTION

According to a first aspect of the invention, a hair removal device is provided, comprising an erodable, solid moisturizing composition, the erodable, solid moisturizing composition comprising:

a. A structuring polymer;
b. At least 50% moisturizing hydrophobic phase by weight of the erodable, solid moisturizing composition, wherein at least 40% by weight of the moisturizing hydrophobic phase comprises materials which are liquid at 25°C.

According to a second aspect of the invention, the use of a hair removal device according to the first aspect to remove hair and moisturize the skin is provided.

DETAILED DESCRIPTION OF THE INVENTION

The "moisturizing hydrophobic phase", as herein defined, does not comprise and is separate from the structuring polymer.

As used herein, the term "solid" when used in relation to the erodable, solid moisturizing composition refers to compositions which are solid at 25°C.

As used herein, the term "water-insoluble" when used in relation to the structuring polymer, means "very slightly soluble", according to the United States' Pharmacopeia (USP) definition in

31/NF 26 Vol. 2 General Notices, Page Xvii., or less than "very slightly soluble", which, using the USP definition, means that more than 1000 parts of solvent (water, in this case) are needed to dissolve 1 part of solute (the structuring polymer, in this case) at Standard Temperature and Pressure.

As used herein, the term "soluble in" when describing the ability of the structuring polymer to dissolve in the moisturizing hydrophobic phase means "soluble", according to the United States' Pharmacopeia definition in 31/NF 26 Vol. 2 General Notices, Page Xvii., or less than "soluble", which, using the USP definition, means that less than 30 parts of solvent (the moisturizing hydrophobic phase, in this case) are needed to dissolve 1 part of solute (the structuring polymer, in this case) at the melting point of the structuring polymer.

The hair removal device according to the invention may be any hair removal device, such as, but not limited to, a razor, an epilator or a hair removal device comprising a light source to degrade or destroy the hair and/or hair root. If the hair removal device comprises a light source, then the light source may generate coherent (laser) light or incoherent light and may be adapted to generate light continuously or in a discontinuous (pulsed) fashion.

Preferably, the hair removal device is a razor. In the case of a razor, then the solid moisturizing composition may advantageously be provided on the razor cartridge, is preferably configured as a strip located before and/or after the blade(s) in the direction of cutting and may even be configured as a ring entirely surrounding the blades. WO 97/02116, referred to above, illustrates locations in which such a strip may be placed. Advantageously, the solid moisturizing composition is configured as a strip disposed after the cutting blade(s) in the cutting direction and, in this case, a lubricating strip comprising polyalkylene glycol is preferably additionally disposed before the cutting blades in the cutting direction.

The present applicants have established that a hair removal device comprising an erodable, solid moisturizing composition rich in hydrophobic materials, but also comprising a structuring polymer to bestow appropriate wear properties to the moisturizing hydrophobic phase, may deposit an effective amount of hydrophobic materials onto the skin during a hair removal process and that it may do this during a plurality of successive uses of a hair removal device. Surprisingly, the present applicants have also established that the moisturizing hydrophobic

phase, while increasing drag, is actually appreciated by consumers, since it may assist in tensioning the skin, which is known to assist in the hair removal process.

Advantageously, the erodable, solid moisturizing composition comprised within a hair removal device according to the invention has a Chatillon Hardness at 25°C of 0.50 – 3.25kg, preferably 0.75 – 3.00kg, more preferably 1.00 – 2.50kg, measured according to the protocol provided hereinbelow. Within these ranges, beneficial rates of wear may be achieved.

The structuring polymer comprised within the erodable, solid moisturizing composition may be any polymer which bestows appropriate wear properties to the erodable, solid moisturizing composition and is preferably a polymer which may bestow a Chatillon Hardness in the above-defined ranges to the erodable, solid moisturizing composition.

According to one advantageous embodiment, the structuring polymer is water-insoluble to assist miscibility with or solubility in the moisturizing hydrophobic phase (at the melting point of the water-insoluble polymer). If the structuring polymer is miscible with or soluble in the moisturizing hydrophobic phase, then this may ensure a homogenous distribution of polymer throughout the moisturizing hydrophobic phase and thus more even wear properties. In addition, a water-insoluble structuring polymer may improve the durability of the polymer (and therefore also the erodable solid moisturizing composition) versus more hydrophilic polymers which may solubilise and wash away during hair removal processes that employ water, such as wet shaving.

According to the invention, the erodable, solid moisturizing composition comprises from 2% to 50%, preferably from 3% to 40%, more preferably 4% to 12% of structuring polymer by weight of the erodable, solid moisturizing composition.

Advantageously, the structuring polymer comprises a block copolymer. More advantageously, the block copolymer comprises a di-block copolymer, a tri-block copolymer, a multi-block copolymer, a radial block copolymer, a random block copolymer, or a mixture of these polymers. More advantageously still, the block copolymer comprises a tri-block copolymer.

In the case in which the block copolymer comprises a tri-block copolymer, then the tri-block copolymer preferably comprises a linear ABA tri-block polymer. Without wishing to be bound

by theory, applicants believe that the A blocks aggregate creating domains, within which the moisturizing hydrophobic phase may accumulate, connected together by the B-blocks. This structure may provide an appropriate hardness to bestow the requisite wear properties to the erodable, solid moisturizing composition, while also being flexible enough to be processed and not to crack or break during processing and/or use.

Advantageously, the linear ABA block copolymer comprises styrene-butadiene-styrene (SBS) block copolymer, styrene-isoprene-styrene (SIS) block copolymer, styrene-ethylenebutylene-styrene (S-EB-S) block copolymer, or mixtures thereof. More advantageously, the linear ABA block copolymer preferably comprises styrene-ethylenebutylene-styrene (S-EB-S) block copolymer. More advantageously still, the weight ratio of styrene to butadiene in the S-EB-S is in the range 20:80 to 40:60 and preferably around 30:70.

Particularly useful commercially available ABA block copolymers include Versagel™ materials available from Penreco and the Kraton™ G series, especially G-6150, G-1651, G-1652 and 1654.

As discussed above, the structuring polymer comprised within the erodable, sold moisturizing composition may comprise a random block copolymer. An example of a suitable random block copolymer is ethylene vinyl acetate (EVA) which is a copolymer of ethylene and vinyl acetate. Advantageously, the amount of ethylene comprised within the EVA polymer is from 65-90%, preferably from 70-85% by weight of the EVA to give beneficial wear properties. A commercially available range of EVA is called Elvax™, which is commercialised by DuPont.

According to the invention, the erodable, solid moisturizing composition comprises at least 50% moisturizing hydrophobic phase by weight of the erodable, solid moisturizing composition. Preferably, the erodable, solid moisturizing composition comprises from 60% to 95% and more preferably from 70% to 90% moisturizing hydrophobic phase by weight of the erodable, solid moisturising composition.

The moisturizing hydrophobic phase may comprise emollient which is liquid, semi-solid and/or solid at room temperature, provided that at least 40%, preferably at least 60%, more preferably at least 70% by weight of the moisturizing hydrophobic phase comprises materials which are liquid at 25°C. Applicants have observed that high melting point hydrophobic materials are not

delivered as evenly and consistently as low melting point ones. Without wishing to be bound by theory, applicants believe that this has to do with the reduced tendency to spread of higher melting point hydrophobic materials. In addition, applicants have observed that a very high proportion of high melting point hydrophobic materials may give more uneven erosion of the solid moisturizing composition. Suitable materials to make up the liquid portion of the moisturizing hydrophobic phase are listed below. Preferred liquids comprise mineral oil, fractionated coconut oil, isopropyl isostearate, isopropyl myristate and mixtures thereof. Advantageously, no more than 80% by weight of the moisturizing hydrophobic phase comprises materials which are liquid at 25°C.

Advantageously, if solids or semi-solids are present, then the moisturizing hydrophobic phase comprises less than 20% and preferably less than 5% by weight of the solid moisturizing composition of materials, and more preferably no materials at all, having a melting point of more than 100°C. This is because excessive quantities of such materials may render the composition inflexible and therefore liable to crack during manufacture and/or use.

The moisturizing hydrophobic phase may comprise one or more hydrocarbons, fatty acids, fatty alcohols, esters, triglycerides, fats, butters, waxes, lipophilic skin active agents or mixtures thereof.

Liquid, semi-solid, or solid hydrocarbon emollients which may be comprised within the erodable, sold moisturizing composition include straight chain, branched chain, saturated and unsaturated hydrocarbons and mixtures thereof and they may comprise natural or synthetic hydrocarbon emollients and mixtures thereof. Preferred natural hydrocarbon emollients include petrolatum, mineral oil and mixtures thereof. Preferred synthetic hydrocarbon emollients include branched chain hydrocarbons, such as isohexadecane (such as Arlamol HD™ from Croda) and Polydecene (such as Puresyn 2™ from Exxon Mobil).

Liquid, semi-solid, or solid fatty alcohol or fatty acid emollients which may be comprised within the erodable, sold moisturizing composition include saturated and unsaturated higher alcohols, especially $C_{12} - C_{30}$ fatty alcohols and fatty acids, especially lauric, myristic, palmitic, stearic , arachidic or behenic.

Liquid, semi-solid, or solid ester emollients which may be comprised within the erodable, sold moisturizing composition include esters of a $C_{12} - C_{30}$ alcohol and mixtures thereof, especially isopropyl myristate, isopropyl isostearate and mixtures thereof.

Liquid, semi-solid, or solid triglyceride emollients which may be comprised within the erodable, sold moisturizing composition include synthetic or natural triglycerides, especially natural triglycerides derived from sunflower, avocado, olive, castor, coconut, cocoa and mixtures thereof. More preferred are coconut-derived triglycerides, such as the commercially available materials Myritol™ 312 and 318 (Cognis), Estasan™ (Croda) and Miglyol™ (Sasol).

Liquid, semi-solid, or solid fat and butter emollients which may be comprised within the erodable, sold moisturizing composition include coconut butter, shea butter and mixtures thereof.

Liquid, semi-solid, or solid wax emollients which may be comprised within the inventive composition include paraffin wax, microcrystalline wax, candellila, ozokerite and mixtures thereof. Preferably the emollient comprises paraffin wax. Advantageously, moisturizing hydrophobic phase comprises some wax because waxes may bestow further improved hardness and erodability to the solid moisturising composition, although, as discussed above, the presence of too much wax may render the composition inflexible and therefore liable to crack during manufacture and/or use. Preferably, the solid moisturising composition comprises from 2% to 20% and more preferably from 3% to 15% wax by weight of the solid moisturising composition.

Liquid, semi-solid, or solid lipophilic skin active agent emollients which may be comprised within the inventive composition include oil soluble vitamins, such as vitamin E derivatives, including vitamin E acetate and tocopherol nicotinate; oil-soluble vitamin A derivatives, such as retinyl palmitate; lanolin; ceramides; sterols and sterol esters; salicylic acid; camphor; eucalyptol; essential oils and mixtures thereof.

The erodable, sold moisturizing composition may comprise one or more additional components which bestow a suitable melt viscosity to the composition, such as oil phase gellants, to facilitate improved processing, provided that the additional component(s) do not significantly reduce the hardness or erodability of the erodable, sold moisturizing composition. Examples of such

components are trihydroxystearin, which is commercially available as Thixcin R™ (manufactured by Elementis Specialities), ethylene vinyl acetate (EVA) and mixtures thereof.

A erodable, sold moisturizing composition comprised within the hair removal device of the invention may be manufactured by heating the elements of the moisturizing hydrophobic phase to a suitable temperature to melt them, typically approximately 130°C, after which the structuring polymer is added and mixed well until the structuring polymer has dissolved. The mixture is then cooled, typically to approximately 90°C, after which any additional ingredients may be added. In a final step, the mixture is poured into suitable containers or moulds and allowed to cool to room temperature.

Once the mixture has set, it may be affixed to a hair removal device in any appropriate fashion. One such approach would involve mechanically fitting the composition onto the hair removal device. Alternatively, the composition may be directly or indirectly adhered to the hair removal device by means of an adhesive composition. One method of indirect adherence involves casting the solid moisturizing composition onto a sheet of an appropriate substrate, such as an acetate sheet, which sheet is then adhered to the hair removal device, for example mechanically or via an adhesive.

Chatillon Hardness test

Equipment: Chatillon TCD 200 equipped with a digital force gauge

Sample preparation

1. Fully melt and cast lipid into 60ml weigh boat (70mm X 70mm X 24mm)
2. Store lipid at 25°C overnight to equibrilate
3. Carefully remove lipid from weigh boat prior to hardness testing

Machine Preparation

A)

1. Prepare Chatillon TCD 200 and digital force gauge according to manufacturers instructions.
2. Set the ramp speed to 47 mm / min

B) Measuring the hardness value at 25°C:

1. The pointed geometry should be attached to the shaft of ramp for this test method.
2. Place the lipid sample as prepared above and on its side onto the metal base plate directly below the centre of the shaft of the ramp. The mid-point of the lipid should be in line with the centre of the shaft of the ramp.
3. With the lipid in place below the flat plate the speed set at 47 mm/min and the digital force gauge set at "C Peak" as above, depress the "Down" button on the Chatillon TCD200.
4. Stop the Chatillon TCD200 just as the probe touches the surface of the lipid and set the distance counter to zero.
5. Reset the force gauge so that it reads zero
6. Depress the "Down" button on the Chatillon TCD200 until the distance counter reads 13mm, record C Peak reading.

Examples

The following examples disclose solid moisturizing compositions, which were incorporated into razors as a strip disposed after the blade in the cutting direction. In use, they were observed to remove hair and deposit the solid moisturizing composition onto the skin from which hair had been removed.

Example 1

Trade Name	INCI Name	% w/w
White soft paraffin	Petrolatum	44.0
Mineral oil	Paraffinum Liquidum	44.0
Kraton G1650E	Hydrogenated Styrene/Butadiene copolymer	5.0
Thixcin R	Trihydroxystearin	2.0
Paraffin Wax SP206	Paraffin	5.0

The composition of Example 1 is manufactured by heating the hydrocarbons and waxes to 130°C, then adding the linear ABA tri-block polymer (Kraton G1650E) and mixing well until polymer has fully dissolved. The mixture is then cooled to 90°C and the Thixcin added, after which the mixture is poured into a mould and allowed to cool to room temperature.

The Chatillon Hardness of the formulation of Example 1 is 1.7.

Example 2

Trade Name	INCI Name	% w/w
Fractionated coconut oil	Caprylic/Capric Triglyceride	85.0
Paraffin Wax SP206	Paraffin	7.5
Kraton GRP6935	Hydrogenated Styrene/Butadiene copolymer	5.0
Synthetic Beeswax	Arachidyl Behenate	2.5

The composition of Example 2 is manufactured by heating the hydrocarbons and waxes to 130°C, then adding the linear ABA tri-block polymer (Kraton GRP6935) and mixing well until polymer has fully dissolved. The mixture is then cooled to 90°C, after which the mixture is poured into a mould and allowed to cool to room temperature.

The Chatillon Hardness of the formulation of Example 2 is 0.6.

Example 3

Trade Name	INCI Name	% w/w
White soft paraffin	Petrolatum	40.0
Mineral oil	Paraffinum Liquidum	40.0
Kraton G1650E	Hydrogenated Styrene/Butadiene copolymer	10.0
Paraffin Wax SP206	Paraffin	10.0

The composition of Example 3 is manufactured by heating the hydrocarbons and wax to 130°C, then adding the linear ABA tri-block polymer (Kraton G1650E) and mixing well until polymer has fully dissolved. The mixture is then cooled to 90°C, after which the mixture is poured into a mould and allowed to cool to room temperature.

Example 4

Trade Name	INCI Name	% w/w
White soft paraffin	Petrolatum	39.0
Mineral oil	Paraffinum Liquidum	39.0
Paraffin Wax SP206	Paraffin	10.0
Elvax 205W	Ethylene/Vinyl Acetate (EVA) copolymer	10.0
Thixcin R	Trihydroxystearin	2.0

The composition of Example 4 is manufactured by heating the hydrocarbons and wax to 130°C, then adding the linear ABA tri-block polymer (Kraton G1650E) and the ethyle/vinyl acetate copolymer (Elvax 205W) and mixing well until polymer has fully dissolved. The mixture is then

cooled to 90°C and the Thixcin added, after which the mixture is poured into a mould and allowed to cool to room temperature.

The Chatillon Hardness of the formulation of Example 4 is 1.25.

The dimensions and values disclosed herein are not to be understood as being strictly limited to the exact numerical values recited. Instead, unless otherwise specified, each such dimension is intended to mean both the recited value and a functionally equivalent range surrounding that value. For example, a dimension disclosed as "40 mm" is intended to mean "about 40 mm".

CLAIMS

What is claimed is:

1. A hair removal device comprising an erodable, solid moisturizing composition, the erodable, solid moisturizing composition comprising:
    a. A structuring polymer;
    b. At least 50% moisturizing hydrophobic phase by weight of the erodable, solid moisturizing composition, wherein at least 40%, preferably at least 60%, more preferably at least 70% by weight of the moisturizing hydrophobic phase comprises materials which are liquid at 25°C.

2. The hair removal device of claim 1, wherein the erodable, solid moisturizing composition has a Chatillon Hardness of 0.50kg to 3.50kg, preferably 0.75kg to 3.00kg, more preferably 1.00kg to 2.50kg.

3. The hair removal device of either preceding claim, wherein the erodable, solid moisturizing composition comprises from 2% to 50%, preferably from 3% to 40%, more preferably 4% to 12% structuring polymer by weight of the erodable, solid moisturizing composition.

4. The hair removal device of any preceding claim, wherein the structuring polymer is water-insoluble.

5. The hair removal device of any preceding claim, wherein the structuring polymer comprises a block copolymer.

6. The hair removal device of claim 5, wherein the block copolymer comprises a di-block copolymer, a tri-block copolymer, a multi-block copolymer, a radial block copolymer, a random block copolymer, or a mixtures of these polymers.

7. The hair removal device of claim 6, wherein the block copolymer comprises a linear ABA tri-block copolymer.

8. The hair removal device of claim 7, wherein the linear ABA block copolymer comprises styrene-butadiene-styrene (SBS) block copolymer, styrene-isoprene-styrene (SIS) block copolymer, styrene-ethylenebutylene-styrene (S-EB-S) block copolymer, or mixtures thereof.

9. The hair removal device of any preceding claim, wherein the erodable, solid moisturizing composition comprises from 60% to 95%, preferably from 70% to 90% moisturizing hydrophobic phase by weight of the solid moisturising composition.

10. The hair removal device of any preceding claim, wherein the liquid materials comprised within the moisturizing hydrophobic phase comprise comprise mineral oil, fractionated coconut oil, isopropyl isostearate, isopropyl myristate and mixtures thereof.

11. The hair removal device of any preceding claim, wherein the moisturizing hydrophobic phase comprises petrolatum, esters, triglycerides, waxes or mixtures thereof.

12. The hair removal device of any preceding claim, wherein the moisturizing hydrophobic phase comprises wax and preferably the solid moisturising composition comprises from 2% to 20% and more preferably from 3% to 15% wax by weight of the solid moisturising composition.

13. The hair removal device of any preceding claim, configured as a razor.

14. The razor according to claim 13, wherein the solid moisturizing composition is configured as a strip disposed on one or both sides of the cutting blade(s).

15. Use of a hair removal device according to any preceding claim to remove hair and moisturize the skin.