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(54) Title: EPILATORY COMPOSITIONS

(57) Abstract: An epilatory composition of the adhesive type comprises a gel-like matrix material, for example of a rosin-based or sugar-based material, together with 0.1-5wt% of a branched polyalkene, for example polyisobutene. The resulting compositions offer skin care benefits whilst maintaining excellent viscoelastic and adhesive properties.

EPILATORY COMPOSITIONS

Field of the Invention:

This invention relates to an epilatory composition,
5 its manufacture and use.

Background Art:

Epilatory compositions formed of viscoelastic materials are well known. The viscoelastic materials may
10 in certain embodiments be rosinous materials. In other embodiments they may be sugar-based.

In some products the epilatory compositions may be supplied in the form of strips, retained between cellophane sheets. The cellophane sheets may have
15 coatings of polyvinyl chloride, which acts as a barrier preventing the composition, or components of it, from migrating through the sheets; and also having the correct adhesive properties for use. In use, the user peels away one of the cellophane sheets, presses the epilatory strip
20 firmly onto the area to be plucked, then pulls one end of the remaining cellophane sheet sharply away from the area. The hairs trapped in the composition are removed from the treated area along with, optimally, all of the composition, still attached to the remaining backing
25 strip.

In an alternative approach a composition may be warmed, and then applied to the skin by means of a spatula or other applicator. Strips of fabric are then applied so that they adhere to the epilatory composition. The strips
30 are then pulled sharply to remove the epilatory material, and hair, from the skin.

The resinous materials have excellent viscoelastic properties for epilatory compositions of the type described above but may irritate the skin of some users,
35 if they fail to follow the instructions given.

It would be desirable to locate an ingredient which is beneficial in terms of skin care, but which does not compromise to any significant degree the viscoelastic and the adhesive properties of epilatory compositions, whether rosinous or sugar-based.

Any discussion of documents, acts, materials, devices, articles or the like which
5 has been included in the present specification is solely for the purpose of providing a context for the present invention. It is not to be taken as an admission that any or all of these matters form part of the prior art base or were common general knowledge in the field relevant to the present invention as it existed before the priority date of each claim of this application.

10

Disclosure of the Invention:

In accordance with a first aspect of the present invention there is provided an epilatory composition comprising a matrix material of the adhesive type, wherein the composition includes a branched polyalkene in an amount of up to at least 0.1% and up
15 to 3% of the total weight of the composition.

The matrix material may comprise a tackifying polymeric material, for example a tackifying aliphatic or aromatic resin.

The matrix material may comprise a sugar-based material. Examples of specifications describing epilatory compositions based on heating sugar(s) with acids
20 (such as citric acid) are disclosed in GB 901624, GB 1242083, GB 2231494A, and GB 2157951A.

The matrix material may comprise a rosinous material, for example a rosin ester and/or colophony.

The branched polyalkene is suitably a polyalkene having C₁₋₄ alkyl groups,
25 preferably methyl groups, projecting from a carbon backbone. Preferably the branched polyalkene comprises units derived from

isobutene. These may have been homopolymerised, to form polyisobutene, or may have been copolymerised with other unsaturated materials, preferably other alkenes.

5 Most preferably the branched polyalkene used is fully saturated. Depending on the manufacturing process this may mean that it has been hydrogenated.

The branched polyalkene may be regarded as a polymer
10 having a carbon backbone carrying a proportion of pendent alkyl groups, preferably methyl groups. Preferably the carbon backbone carries both hydrogen atoms and pendent groups. The numerical ratio of pendent alkyl groups to hydrogen atoms on the backbone is suitably in the range
15 0.1:1-10:1, preferably 0.5:1-3:1, and most preferably 0.8:1-1.2:1 (such hydrogen atoms are directly on the backbone; hydrogen atoms within the pendent alkyl groups are not included). Especially preferred is a ratio of substantially 1:1, as is obtained with homopolymeric
20 isobutene.

A preferred material is hydrogenated polyisobutene, a readily available material currently used in cosmetics. Grades are available under the trade marks POLYSYNLANE and
25 PARLEAM, from Rossow Cosmétiques, France, or Nof Corporation, Japan.

An especially preferred material is non-hydrogenated polyisobutene, a readily available material currently used
30 in cosmetics. Grades are available under the trade mark INDOPOL, from BP Chemicals, UK.

Suitably the branched polyalkene provides up to 20% of the total weight of the composition, preferably up to 15%, more preferably up to 10%, and most preferably up to 5%. Especially preferred is an amount up to 3% of the total
5 weight of the composition.

Suitably the branched polyalkene provides at least 0.1% of the total weight of the composition, preferably at least 0.5%, most preferably at least 0.9%.

10

Suitably the branched polyalkene has a weight average molecular weight in the range 1,000 to 100,000, preferably 3,000 to 30,000.

15 Suitably the branched polyalkene is in the nature of a highly viscous liquid.

Preferably the branched polyalkylene is in the nature of a waxy or tacky solid or semi-solid.

20

We have found that the inclusion of a branched polyalkylene in an epilatory composition of the adhesive type produces a valuable skin care benefit, even when present in a small amount. The benefit is such that the
25 irritation which certain epilatory compositions can elicit in some users is eased, or avoided altogether. Excellent adhesive and viscoelastic properties are also achieved.

The matrix material may comprise a sugar-based
30 material and a rosinous material in admixture. The following paragraphs further define such mixtures.

Suitably, the epilatory composition of the present invention comprises greater than or equal to 70% by wt, preferably greater than or equal to 75% by wt, preferably greater than or equal to 80% by wt, preferably greater than or equal to 82% wt of sugar-based material.

Suitably, the epilatory composition of the present invention comprises less than or equal to 95% by wt, preferably less than or equal to 92.5% by wt, preferably less than or equal to 90% by wt, more preferably less than 90% by wt, more preferably less than or equal to 88% by wt of sugar-based material.

Suitably, the epilatory composition of the present invention comprises greater than or equal to 5% by wt, preferably greater than or equal to 7.5% by wt, preferably greater than or equal to 10% by wt, more preferably greater than 10% by wt, most preferably greater than or equal to 12% by wt of rosinous material.

Suitably, the epilatory composition of the present invention comprises less than or equal to 30% by wt, preferably less than or equal to 25 by wt, preferably less than or equal to 20% by wt, most preferably less than or equal to 18% by wt of rosinous material.

A particularly preferred epilatory composition of the present invention comprises greater than 10% by wt and less than 30% by wt, especially greater than or equal to 12% by wt and less than or equal to 20% by wt, of rosinous material.

Unexpectedly, it has been found that by including a rosinous material in the epilatory compositions of the present invention within the aforementioned defined limits then the adhesive properties of the sugar-based composition may be significantly enhanced while maintaining the water rinsability characteristics of the sugar-based composition.

Suitably, the weight ratio of sugar-based material to rosinous material in the epilatory composition of the present invention is less than or equal to 19:1, preferably less than or equal to 15:1, preferably less than or equal to 13:1, preferably less than or equal to 10:1, preferably less than or equal to 9:1, most preferably less than or equal to 7.5:1.

Suitably, the weight ratio of sugar-based material to rosinous material in the epilatory composition of the present invention is greater than or equal to 2.3:1, preferably greater than or equal to 3:1, more preferably greater than or equal to 4:1, most preferably greater than or equal to 5:1.

A particularly preferred epilatory composition of the present invention comprises a weight ratio of sugar-based material to rosinous material of less than 9:1 and greater than or equal to 2.3:1, especially less than or equal to 7.5:1 and greater than or equal to 4:1.

Preferably, the rosinous material is in the form of droplets, which may be of any shape, dispersed within the matrix material. Typically, the droplets are spherical and/or ellipsoidal in shape.

Suitably, the average maximum cross-sectional dimension of the droplets of rosinous material, as measured by photon correlation spectroscopy, is greater
5 than or equal to 20 nm, more preferably greater than or equal to 30 nm, most preferably greater than or equal to 40 nm, especially greater than or equal to 50 nm.

Suitably, the average maximum cross-sectional
10 dimension of the droplets of rosinous material, as measured by photon correlation spectroscopy, is less than or equal to 5000 nm, preferably less than or equal to 1500 nm, preferably less than or equal to 1000 nm, most preferably less than or equal to 500 nm.

15 Preferably the epilatory composition comprises at least 60% wt/wt of the matrix material, for example rosinous material and/or sugar-based material, preferably at least 70% wt/wt, more preferably at least 80% wt/wt.

20 Preferably the epilatory composition is a so-called "cold" epilatory composition (that is, one which can be applied at ambient temperature without reheating).

25 Preferably the epilatory composition comprises a particulate material in admixture with the matrix material. Preferably the particulate material is a colloidal material. Preferably it has particles of mean diameter 1-200 nm, more preferably 5-100 nm, and most
30 preferably 10-50 nm.

Preferably the particles, when present in the epilatory composition, are in an amount of at least 1% wt

on total weight of composition, more preferably at least 2%, and most preferably at least 3%. Suitably they are present in an amount up to 20% on total weight of composition, and preferably up to 10%.

5

Preferred particulate materials for use in the present invention are siliceous materials. Especially preferred is fumed silica.

10 Fumed silica is currently manufactured in a process that involves flame hydrolysis of silicon tetrachloride, in an oxy-hydrogen flame. It is a colloidal form of silica having silanol groups, able to participate in hydrogen bonding. Fumed silica typically comprises
15 colloidal particles of mean diameter 1-200 nm. Preferably the fumed silica is of mean diameter 5-100 nm, more preferably 10-50 nm. The external surface area is typically in the range 15-380 m²/g. Fumed silicas are typically non-porous and thus have no internal surface
20 area. They may be hydrophobic and of use in the present invention but preferred fumed silicas for use in the present invention are hydrophilic.

The epilatory composition may suitably comprise up to
25 40%, preferably up to 20%, of other components, which may include one or more of a natural wax, a fragrance, a polymer, an essential oil, a silicone oil, a colorant, an anti-oxidant or a paraffin or mineral oil.

30 Preferably the epilatory composition is such that its elastic modulus exceeds its viscous modulus at all frequencies up to 0.1 rad/s at 50°C. Preferably the elastic modulus of the epilatory composition exceeds its

viscous modulus at all frequencies up to 1 rad/s at 50°C,
more preferably at all frequencies up to 2 rad/s at 50°C.

In certain embodiments, notably epilatory compositions
5 having a sugar-based matrix material, the elastic modulus
may exceed the viscous modulus at all frequencies up to 20
rad/s at 50°C.

Preferably at certain higher frequencies
10 (representative of the rapid removal of the epilatory
composition from the user's skin), the elastic modulus
also exceeds the viscous modulus, at temperatures within
the temperature range 20-50°C.

15 Preferably the elastic modulus exceeds the viscous
modulus (when measured at 35°C) at a frequency of at least
10,000 rad/s, more preferably at a frequency at least
5,000 rad/s.

20 Thus, preferably the epilatory composition is such
that, at ambient temperatures, at low frequencies of
applied stress the elastic modulus exceeds the viscous
modulus; at high frequencies of applied stress the elastic
modulus exceeds the viscous modulus; and at moderate
25 frequencies, in between, the viscous modulus exceeds the
elastic modulus. The epilatory composition in transit and
storage corresponds to the low frequency condition, and
the non-viscous nature of the composition aids shape
stability in storage and transit; the application of the
30 epilatory composition to the skin corresponds to the
moderate frequency condition, and the viscous nature of
the composition aids application and good contact with
hair and skin; and pulling the epilatory composition

sharply from the skin corresponds to the high frequency condition, the non-viscous, glassy nature of the composition aiding effective hair removal. The transition between the low frequency condition and the moderate
5 frequency condition is known as the gel point. The transition between the moderate frequency condition and the high strain rate condition is known as the glass transition.

10 The elastic modulus G' (sometimes known as the storage modulus) corresponds to the energy which can be stored and released by a bulk material. The viscous modulus G'' (sometimes known as the loss modulus) corresponds to the energy dissipated by a bulk material due to friction
15 between its macromolecules when it is deformed.

$$G' = \frac{\sigma}{\gamma} \cos \delta$$

$$\gamma$$

$$G'' = \frac{\sigma}{\gamma} \sin \delta$$

20

$$\gamma$$

wherein σ is the stress amplitude, γ is the strain amplitude and δ is the out-of-phase coefficient.

25 The measurements quoted later are based on studies carried out into the rheology of the viscoelastic compositions in order to obtain a better understanding of their adhesive behaviour and their suitability as epilatory materials. These studies involved subjecting
30 the materials to dynamic investigations in which a sinusoidal strain at defined frequencies was applied to the materials and the resulting output force was measured. In these studies a stress control rheometer was used, the

SR rheometer commercially available from the company Rheometrics, using parallel plate geometry of 25 mm in diameter. The output force was found to include an in-phase elastic component G' and an out-of-phase viscous component G'' . The output force can be expressed as follows.

$$\begin{aligned}\sigma &= \sigma_0 \sin(\omega t + \delta) \\ &= \sigma_0 \cos\delta \sin\omega t + \sigma_0 \sin\delta \cos\omega t\end{aligned}$$

10

where ω is the test frequency and t is the time.

Within the linear stress-strain domain of the material G' is desirably lower than G'' at moderate frequency oscillation in order to prevent the material cracking and to ensure that the material has strong adhesion at the material/hair interface. The values of G' and G'' at moderate frequency oscillation are a measure of how readily the material wets the hairs. Moderate frequency oscillation is a long time process and corresponds to the time when the material is being applied to the skin. The lower values of G' and G'' at this moderate frequency, the better the material wets the hairs. Thus the hairs become well embedded in the material in a very short time (ie the time needed for spreading the material on the skin). However G' should be higher than G'' at high frequency oscillation (which mimics the action of the user in rapidly pulling the strip from the body) in order to remove hairs efficiently. Also, at low frequency oscillation, or no oscillation, G' is preferably higher than G'' , in accordance with this invention, in order to obtain the benefit of enhanced stability, even when warm.

20
25
30

The definitions given herein refer to stresses applied to the material within its linear stress-strain domain, which may typically be up to a few thousand Pa.

5 Preferably, therefore, the composition is of an elastic nature when unstressed.

 Preferably, therefore, the composition is of a viscous nature when moderately stressed, for example on
10 application to the skin.

 Preferably, therefore, the composition is of an elastic nature when highly stressed, for example on removal from the skin (as by abrupt pulling).

15 By ensuring that the epilatory composition satisfies the above parameters, it can be readily applied to the skin at body temperature, yet it is very efficient at removing hairs from the skin and, surprisingly, the user
20 experiences less pain.

 References in this specification to a material not under applied stress are to a material in the form of a flat sheet, resting on a horizontal surface.

25 If wished the epilatory composition of the present invention may be provided in a container, from which the user removes it using, for example, a spatula or an applicator fitted to the container, and applies it to the
30 skin. A fabric can then be used to pull the applied material in one piece from the skin. Alternatively, and preferably, the epilatory composition is supplied in the form of strips, sandwiched between sheets, for example of

cellophane, or paper or another non-woven material. In use, one sheet is removed from a strip of epilatory composition and that strip is then applied to the skin with the remaining sheet uppermost. The end of that sheet
5 is grasped and pulled sharply, to remove the strip of epilatory composition from the skin, along with hairs with which it is in contact.

Preferably an epilatory composition of the invention
10 is mildly acidic, for example having a pH in the range 4.5-6.5, preferably 5-6.

Preferred epilatory compositions of the present invention are such that residues are removable from the
15 user's skin by normal water washing.

A preferred epilatory composition of the present invention comprises, in accordance with the definitions given previously:

20 at least 60%wt of a sugar-based matrix material;
0-30%wt of a rosin-based matrix material;
0.1-5%wt of a branched polyalkene;
1-20%wt of a particulate material; and
25 0-40%wt of additional components.

An especially preferred epilatory composition of the present invention comprises, in accordance with the definitions given previously:

30 at least 70%wt of a sugar-based matrix material;
2-20%wt of a rosin-based matrix material;
0.5-5%wt of a branched polyalkene;

1-5%wt of a particulate material; and
0-20%wt of additional components.

In accordance with further aspects there are provided a method of manufacturing an epilatory composition, as defined above; an epilatory product, for example a strip of such an epilatory composition or a dispenser containing such a composition, having an applicator to deposit a sheet thereof on the skin or a user; and a method of epilation, using such a composition or product.

Throughout this specification the word "comprise", or variations such as "comprises" or "comprising", will be understood to imply the inclusion of a stated element, integer or step, or group of elements, integers or steps, but not the exclusion of any other element, integer or step, or group of elements, integers or steps.

The invention will now be further described, by way of example.

Example 1

A composition was made with the following ingredients:

Ingredients	% wt/wt
Inverted sugar base:	
Sugar (sucrose)	78.3
Citric acid monohydrate	1.3
DERMULSENE RA 405	1.5
Water	7.4
DERTOLINE RC2 rosinous material	7
HDK N20 fumed silica	2
PARLEAM SV polyisobutene	1
KOH (50% in water)	1.5

DERMULSENE RA 405 is a collophonium emulsion available from DRT-Granel.

DERTOLINE RC2 is a collophonium derived resin, available from DRT-Granel.

HDK N20 is a fumed silica powder available from Wacker.
PARLEAM SV, also called POLYSYNLANE SV, is an hydrogenated
polyisobutene polymer available from Rossow Cosmetiques,
France. The SV grade denotes the super high viscosity
5 grade.

Method of manufacture

1. Preparation of an inverted sugar-based material:

10

a. Prepare an inverted sugar (sugar/citric
acid/water) - cool down to 60°C and maintain the tank
temperature at 60°C during the process;

b. Add 1.5% of DERMULSENE RA 405 and mix slowly
15 during 30 minutes;

c. Adjust the viscosity of the mix to 130 Pa.s (at a
reference temperature of 35°C) by adding water.

2. Dispersion of rosin and PARLEAM SV in the sugar base

20

a. Add the PARLEAM SV previously preheated in the
oven at 60°C, to the inverted sugar-based material from
Step 1, and incorporate it by mixing;

b. Then add the DERTOLINE RC2 previously preheated in
25 the oven at 60°C and incorporate it by mixing;

3. Formula gelation

a. Add the HDK N20 and homogenise using a high speed
30 turbine at 10rpm.

b. Add the potassium hydroxide under stirring. The resulting composition at ambient temperature had the appearance of a viscous gel.

5 4. Formula characterisation

- a. pH of the composition (dilute 50% in water) = 5.6
- b. gel point at 35°C ($G' = G''$) = 18 rad/s
- c. viscosity at 35°C = 210 Pa.s

10

The resulting gel product could be formed in standard manner into water rinsable cold wax strips.

15 The composition is particularly suitable for sensitive skin. To this end, it is predominantly sugar-based; the rosinous material content is low (but sufficient to promote good performance); and it contains PARLEAM SV.

20 Preliminary tests indicate that the composition does not flow at high temperatures such as would be found during summer months in warm countries, and that other required properties are very good. The PARLEAM SV component appears not to have caused any adverse effect on the properties of the composition.

25

Example 2

A composition was made with the following ingredients:

Ingredients	% wt/wt
Inverted sugar base (same as Example 1)	95.5
HDK N20	2
PARLEAM SV	1
KOH (50% in water)	1.5

The sugar base and the PARLEAM SV were incorporated as described in Example 1.

5

The composition had the following properties:

pH (dilute 50% in water) = 5.44

gel point at 35°C = 6.25 rad/s

10 viscosity at 35°C = 190 Pa.s.

Example 3

15 A composition for manufacture into an epilatory strip was made with the following ingredients.

Ingredients	% wt/wt
Inverted sugar base:	
Sugar (sucrose)	77.6
Citric acid monohydrate	1.3
DERMULSENE RA 405	1.3
Water	7.4
TEG rosinate	4.84
DEXTOLINE RC2 rosinous material	2.16
INDOPOL H2100 polyisobutene	1
KOH (50% in water)	1.4

TEG rosinate is triethylene glycol rosinate available from DRT-Granel.

5

INDOPOL H2100 is non-hydrogenated polyisobutene, molecular weight approx. 2,000, available from BP. Being non-hydrogenated it has unsaturation at the polymer termini.

10

The epilatory composition was prepared by the method described in Example 1, except:

In Step 1 the temperature was 65°C.

15

In Step 2 both rosins and the polyisobutene were premixed in a separate tank and added to the inverted sugar material at 65°C. Homogenisation for 5 minutes using a high speed turbine operated at 1,000 rpm ensured good dispersion of the rosins.

20

In Step 3a. the fumed silica was blended in using a high speed rotor/stator mixer/pump operated at 1,000 rpm for 15 minutes.

5 In Step 3b. the KOH was added in a single addition with stirring. The composition was then recirculated in the high speed rotor/stator mixer/pump. Friction increased the temperature to 80°C.

10 The gel point of the Example 3 composition, measured at 50°C, is 25 rad/s. Its viscosity, measured at 35°C, is 230 Pa.s. Its pH is 5.5.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. An epilatory composition comprising a matrix material of an adhesive type,
wherein the composition includes a branched polyalkene in an amount of at least 0.1%
5 and up to 3% of the total weight of the composition.
2. An epilatory composition according to claim 1, wherein the polyalkene has
pendent C₁₋₄ alkyl groups on the carbon backbone, the numerical ratio of the pendent
alkyl groups to hydrogen atoms on the carbon backbone being in the range 0.1:1 to
10 10:1.
3. An epilatory composition according to claim 1 or 2, wherein the branched
polyalkene contains units derived from isobutene.
- 15 4. An epilatory composition according to claim 3, wherein the branched
polyalkene consists of polyisobutene.
5. An epilatory composition according to any one of the preceding claims wherein
the branched polyalkene provides at least 0.5% and up to 3% of the total weight of the
20 composition.
6. An epilatory composition according to claim 1 or 2, wherein the matrix material
comprises a rosinous material and/or a sugar-based material, and provides at least 60%
of the weight of the epilatory composition.
- 25 7. An epilatory composition according to any one of the preceding claims wherein
the composition includes a particulate material which supplies 1-40% of the weight of
the epilatory composition.
- 30 8. An epilatory composition according to claim 7, wherein the particulate material
is a siliceous material.
9. An epilatory composition according to any one of the preceding claims wherein
the composition is of elastic nature when unstressed and of viscous nature when
35 moderately stressed, on application to the skin.

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10. An epilatory composition according to claim 9 wherein the composition is of elastic nature when highly stressed, on removal of the composition from the skin.
11. An epilatory composition according to any one of the preceding claims,
5 comprising
at least 60%wt of a sugar-based matrix material;
0-30% wt of a rosin-based matrix material;
0.1-3%wt of a branched polyalkene;
1-20%wt of a particulate material; and
10 0-40%wt of additional components.
12. An epilatory composition according to any one of the preceding claims, comprising:
at least 70%wt of a sugar-based matrix material;
15 2-20%wt of a rosin-based matrix material;
0.5-3%wt of a branched polyalkene;
1-5%wt of a particulate material; and
0-2%wt of additional components.
- 20 13. An epilatory product comprising an epilatory composition according to any one of the preceding claims, the product being selected from: strips of such a composition sandwiched between sheets which are peelable from the strips; and a dispenser containing such a composition, having an applicator adapted to deposit a sheet thereof on the skin of a user.
- 25 14. An epilatory composition or product substantially as hereinbefore described with particular reference to the examples.