

# SILICON-FREE DEODORANT FORMULATION

## **FIELD OF THE INVENTION**

The present invention relates to the field of cosmetics and concerns specifically a deodorant composition for personal hygiene. More specifically, the present invention relates to a long lasting, silicon-free deodorant composition highly efficacious in controlling the body odor and substantially free from skin irritating components effects.

## **BACKGROUND OF INVENTION**

Body odor results from the presence of foul causing bacteria such as *Corynebacterium xerosis* and *Staphylococcus epidermis* in the human skin, which produce fatty acids. These smell causing substances are mainly organic molecules such as amines, ketones, aldehydes, alcohols and other related products having different structures and functionality.

A wide variety of deodorant products are commercially available for reducing body odor and act as bactericidal or bacteriostatic agents.

US20110002856A1 discloses a fragrance composition, comprising at least 50% volatile solvent, to delay the release of volatile solvents from the compositions.

JP6518740B2 discloses personal care composition comprising cyclic oligosaccharides, fragrances, and volatile solvents.

EP1912619B1 provides an anhydrous antiperspirant composition comprising less than 10% by weight of water; from 2 to 25% by weight of solubilized aluminum-containing antiperspirant active; from 20 to 50% by weight of ethanol and from 20 to 55% by weight of one or more solubiliser oils.

However, most of these formulations or compositions comprise alcohol, silicone D5, iso-dodecane, water etc. All these substances possess one or more drawbacks and are thus unsafe for personal use.

Furthermore, silicone containing deodorants are not much liked by many consumers due to high cost, oily/ sticky feel and are less effective in odor elimination. Similarly, water-based deodorants cannot prevent the body odor due to low strength wherein very slow evaporation results in

decreasing the strength rapidly, leading to easy bacterial growth. Iso-dodecane containing deodorants are also not very popular due to high cost and less capability to reduce the bacterial population. Other issues relate to stains on the fabric due to the high concentration of oil and skin irritation after application of such deodorant compositions.

Hence, there is a need in the art to provide a stable, long lasting and silicon-free deodorant composition which has effective deodorant activity. Additionally, the deodorant composition of the present invention has an excellent sensorial feel such as faster evaporation with no oily feeling as well as no chemical residues on skin and associated aesthetics like no stains on fabric when applied on fabric, as desired of such compositions.

### **OBJECTIVES OF THE INVENTION**

An important objective of the present invention is to provide a cosmetic preparation which is an antiperspirant and/or deodorant composition having a durable odor control property.

Another object of the present invention is to provide a deodorant composition including a solubilized fragrance oil composition and fragrance additive.

Yet another object of the present invention is to provide a method for manufacturing a deodorant composition which shows reduced or no stains on the fabric.

Still another object of the present invention is to provide a long-lasting, anti-microbial and silicon-free deodorant composition.

### **SUMMARY OF THE INVENTION**

The following summary is provided to facilitate an understanding of some of the innovative features unique to the disclosed embodiments and is not intended to provide a full description of the invention. A full appreciation of the various aspects of the preferred embodiments disclosed herein can be gained by reading the entire specification, claims, drawings, and abstract as a whole.

The technical problem to be solved by the present invention is to provide an effective, inexpensive and safe, alcohol-free deodorant composition. In an aspect, the present invention provides a novel deodorant composition for topical use comprising:

- (i) Solubilized Fragrance oil;
- (ii) Fragrance Additive; and
- (iii) purified water.

In another aspect, the present invention provides a process for manufacturing the deodorant composition comprising solubilized fragrance oil, formulation fragrance additives with water as a base.

The deodorant composition according to the present invention is silicon-free and has long lasting efficacy. The composition additionally has a good sensorial feel with no oily/sticky effect or irritation on the skin with reduced stains on fabric.

Further areas of applicability of the present invention will become apparent from the detailed description provided hereinafter. It should be understood that the detailed description and specific examples while indicating the preferred embodiment of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention.

### **DETAILED DESCRIPTION OF THE INVENTION**

At the very outset, it may be understood that the ensuing description only illustrates a particular form of this invention. However, such a particular form is only an exemplary embodiment, without intending to imply any limitation on the scope of this invention. Accordingly, the description and examples are to be understood as exemplary embodiments for teaching the invention and not intended to be taken restrictively.

The details of one or more embodiments of the invention are set forth in the accompanying description below including specific details of the best mode contemplated by the inventors for carrying out the invention, by way of example. It will be apparent to one skilled in the art that the present invention may be practiced without limitation to these specific details.

The use of “comprise”, “comprises”, “comprising”, “contain”, “contains”, “containing”, “include”, “includes”, and “including” are not intended to be limiting. It is to be understood that both the foregoing general description and this detailed description are exemplary and explanatory only and are not restrictive.

The foregoing broadly outlines the features and technical advantages of the present disclosure in order that the detailed description of the disclosure that follows may be better understood. It should be appreciated by those skilled in the art that the conception and specific embodiment disclosed may be readily utilized as a basis for modifying the disclosed methods or for carrying out the same purposes of the present disclosure.

### **Abbreviations**

AC 120- Acrylic polymers

EHG- Ethyl hexyl glycerin

PEG- Polyethylene glycol (PEG)

TPP- Sodium tripolyphosphate

In an important embodiment of the present invention, a deodorant composition is provided which is substantially alcohol and silicon free. The deodorizing composition of the present invention comprises fragrance additives and solubilized fragrance oil in a water base in the ratio range of 1:1 to 1:2.5.

In another embodiment, the present invention provides an alcohol-free deodorant composition comprising:

a fragrance in the range of 3-7%, an acrylic polymer in the range of 1-3%; hydrogenated castor oil in the range of 3-14%; a pH modifier in the range of 0.01-0.1%, an antimicrobial agent in the range of 0.01-0.08%, and a fixative in the range of 0.5-1.5%.

In another embodiment of the present invention, the fragrance comprises a solubilizer, a polyethylene glycol and TWEEN 20.

In another embodiment, the deodorant composition of the present invention further comprises a preservative in the range of 0.1-0.4%, and an emollient in the range of 0.5-1.5%.

In still another embodiment, the solubilizer is PEG40 hydrogenated castor oil.

In yet another embodiment, the antimicrobial agent is selected from the group consisting of silver citrate and benzalkonium chloride.

In another embodiment, the preservative is sodium benzoate.

In another embodiment, the fixative is dipropylene glycol.

In another embodiment, the emollient is glycerin.

In another important embodiment, the present invention provides a method of preparing the deodorant composition comprising the steps of:

- i. Mixing 3 to 7 gm of fragrance with an acrylic polymer for 4-6 mins to form a solution;
- ii. adding hydrogenated castor oil in said solution of step i and mixing for 10 min;
- iii. adding a preservative, a pH modifier; an antimicrobial agent; a fixative, an emollient or a combination thereof to said mixture obtained in step ii;
- iv. adding EHG (Ethyl hexyl glycerin) complex to said solution of step iii; and
- v. allowing the solution of step (iv) mix at 100rpm to obtain a deodorant composition.

In yet another embodiment, the present invention provides a method of preparing the EHG complex, comprising the steps of:

- a) suspending 0.5 gm of Ethyl hexyl glycerin (EHG) in water to form a heterogenous mixture;
- b) magnetic stirring of the heterogenous mixture obtained in step a);
- c) adding chitosan solution to the mixture and stirring for 15 minutes;
- d) adding 1 to 3 ml of 10% aqueous solution of Sodium tripolyphosphate and acrylic polymer to the heterogenous mixture per minute to obtain a final solution; and
- e) stirring the final solution for 10 minutes until the color of solution changes from translucent to whitish translucent.

In a further embodiment, the deodorant composition of the present invention is in the form of a liquid or aerosol spray.

In still another embodiment, the deodorant composition is used in a cosmetic formulation for reducing perspiration or deodorization.

The formulation/ composition of the present invention advantageously has more than two years of shelf-life at a pH of 6.5 - 7.5 along with cosmetically acceptable levels of different components such as antimicrobial ingredients, deodorant actives, fragrances additives and other functional actives, with uniform distribution in the composition. The different ingredients of the composition enhance the availability and uniform spread ability of said composition aiding in extended deodorant activity together with improved skin feel, good moisturizing and emollient effect on skin.

The present invention is further explained in the form of the following examples. The following examples particularly describe the manner in which the invention is to be performed. However, it is to be understood that the following examples are merely illustrative and are not to be taken as limitations upon the scope of the invention.

## **EXAMPLES**

### **Example 1: Preparation of the Deodorant Composition**

This Example illustrates the preparation of deodorant compositions in accordance with the present invention. Table 1 lists an exemplary deodorant composition in accordance with the present disclosure, wherein the ingredients are listed as weight percentage used for formulation.

**Table 1**

| <b>S. No.</b> | <b>Components</b>        | <b>Quantity (in gm and ml)</b> |
|---------------|--------------------------|--------------------------------|
| 1.            | Purified water           | 85.2 ml                        |
| 2.            | Hydrogenated castor oil  | 5 gm                           |
| 3.            | Chitosan                 | 1 g/L                          |
| 4.            | Trisodium Poly Phosphate | 0.3 gm                         |

|     |                            |         |
|-----|----------------------------|---------|
| 5.  | Citric acid                | 0.05 gm |
| 6.  | Lactic acid                | 0.2 gm  |
| 7.  | Silver Citrate             | 0.05 g  |
| 8.  | Sodium Benzoate            | 0.2 gm  |
| 9.  | Acrylic Polymer Dispersion | 2 gm    |
| 10. | Fragrance                  | 10 gm   |
| 11. | Glycerin                   | 1 gm    |
| 12. | DiPropylene Glycol         | 1 gm    |

Said exemplary deodorant composition in accordance with the present invention was prepared by the following process:

#### I. Preparation of Chitosan solution

The Chitosan (Karandikar Organic Pvt Ltd, Karpol-LVC-80+) was taken in powder form. An aqueous solution of 1 g/L was prepared by dissolving chitosan in warm water in the presence of lactic acid.

#### II. Preparation of EHG complex

0.5g EHG was suspended in 45 g of water and the heterogeneous mixture obtained was stirred by magnetic stirring. 5 gm of Chitosan solution was added to the mixture. Chitosan addition helps achieve metastable state of emulsion. After 15 mins of stirring, a mixture of TPP (10% solution in water) and acrylic polymer (as received AC 120 Avalure) solution was slowly added to the mixture (0.1 g / minute). The final solution was kept under ambient stirring for 10 mins. The color of the solution changed from translucent to whitish translucent upon addition of TPP and upon continued stirring.

#### III. Preparation of the deodorant composition

5 gm of fragrance was mixed with 2 gms of Avalure AC 120 acrylic polymer dispersion followed by mixing for 5 minutes. 5 gm of hydrogenated castor oil was then added and mixed for 10 min. 0.2 gm of sodium benzoate was added as a preservative followed by 0.05 gm of citric acid as pH modifier. 0.05 gm of silver citrate, an antimicrobial agent was then added to said mixture. 1 gm of dipropylene glycol was added as a fixative agent followed by 1 gm of glycerin as an emollient.

0.5 gm of EHG complex was then added to the solution and said solution was allowed to mix at 100rpm to obtain a deodorant composition.

### **Example 2: Evaluation of the long-lasting activity and deodorizing effect of the composition**

The deodorants formulation prepared in accordance with the present invention were tested for physical, chemical and sensorial performance. All samples were sprayed in 150 mcl manual pump from a distance of 10 cm. Two sprays were made on single location of fabric as well as skin. While spraying on skin, forehead area was used. Table 2 below shows the respective test results.

**Table 2**

| <b>Parameters</b>  | <b>Sample A (Frag 1)</b> | <b>Sample B (Frag 2)</b> |
|--------------------|--------------------------|--------------------------|
| Lasting on Skin    | 6 hours                  | 4 hours                  |
| Lasting on Fabric* | 12 hours                 | 10 hours                 |

\* *Fabric (cotton 150 g/m)*

### **Example 3: Testing stain reduction of the deodorant formulation**

The deodorant composition was sprayed on a fabric to check its stain reduction activity. Figure 1A shows two fabric pieces sprayed with different deodorant solutions. The fabric labelled original was sprayed with deodorant containing fragrance oil named Makhallat, without any modifications. The fabric labelled ‘modified’ was sprayed with the deodorant formulation containing above embodiments. It was seen that the stains were lighter on the fabric labelled modified. It was noted that the interface between the sprayed and unsprayed area had different intensity in these two cases.

This difference in intensity is more evident in the case of Figure 1B. Figure 1B shows comparison of a commercial deo with current formulation on white fabric. The edges of the sprayed area are evident in the case of a commercial deo (area named Fogg) while they are blur in the case of Makhallat (this formulation). All spray were set at 150 microliters, fabrics were cleaned and dried before spraying, photos and fragrance intensity were recorded at the same time interval (6 hours) after spraying.

The visual results suggest that the formulation of the present invention reduces the stains on fabric. This is attributed the inventors’ ingenuity in formulating the composition of the present invention.

In the present formulation, long chain acrylic polymers restrict the movement of the fragrance oil and lower the degree of coagulation thus causing lesser stains. The reduced stains are particularly observed at the boundary of the sprayed liquid, where evaporation is prominent. Taking into account the thermodynamics, oil particles in water may have higher affinity towards standard solubilizers such as hydrogenated castor oil than acrylic polymers. Thus, in the present formulation the order of adding acrylic polymers and ratio of acrylic to solubilizers is critically important. The oil is added in water and immediately after this addition, acrylic polymers are added, followed by the hydrogenated castor oil.

Further, Acrylic polymers also help retain the fragrance molecules as acrylic polymer used in this formulation is a film forming agent. This retention results in increasing the longevity of the fragrance on the fabric. Thus, the use of long chain acrylic polymers also makes the fragrance long lasting by slowing down the evaporation rate. Figure 2 shows the schematics of the oil in water emulsion formed by acrylic polymers and solubilizing agents.

#### **Example 4: Testing and Evaluation of the Physical Properties**

Physical properties such as appearance, viscosity, specific gravity, stability and safety of the deodorant composition of the present invention were determined and results are illustrated under Table 3 below.

**Table 3**

| <b>Property</b>       | <b>Result</b>               | <b>Comment</b>        |
|-----------------------|-----------------------------|-----------------------|
| Appearance            | Hazy to white turbid liquid | Oil in water emulsion |
| pH                    | 6.0 to 7.0                  | Mildly acidic         |
| Viscosity             | 2.0 – 5.0 cps               |                       |
| Specific Gravity      | 1.01 - 1.05                 |                       |
| Accelerated Stability | Stable emulsion for 30 days | Done at 50°C in oven  |
| Skin safety (BS 4011) | Pass                        | Clinical Study        |

#### **Advantages**

1. Deodorant formulation of the present invention is stable within a range of 10 – 60 °C.

2. Alcohol and silica free, long lasting deodorant formulation.
3. Reduced staining on Fabric.
4. Excellent sensorial feel.
5. Low-cost formulation
6. Vegan formulation.

It is to be noted that the present invention is susceptible to modifications, changes, and adaptations by those skilled in the art. Such modifications, changes adaptations are intended to be within the scope of the present invention.

**We Claim:**

1. An alcohol-free deodorant composition comprising:

a fragrance in the range of 3-7%, an acrylic polymer in the range of 1-3%; hydrogenated castor oil in the range of 3-14%; a pH modifier in the range of 0.01-0.1%, an antimicrobial agent in the range of 0.01-0.08%, and a fixative in the range of 0.5-1.5%.

2. The deodorant composition as claimed in claim 1, wherein the fragrance comprises a solubilizer, a polyethylene glycol and TWEEN 20.

3. The deodorant composition as claimed in claim 1, further comprising a preservative in the range of 0.1-0.4%, and an emollient in the range of 0.5-1.5%.

4. The deodorant composition as claimed in claim 2, wherein the solubilizer is PEG40 hydrogenated castor oil.

5. The deodorant composition as claimed in claim 1, wherein the antimicrobial agent is selected from the group consisting of silver citrate and benzalkonium chloride.

6. The deodorant composition as claimed in claim 1, wherein the preservative is sodium benzoate.

7. The deodorant composition as claimed in claim 1, wherein the fixative is dipropylene glycol.

8. The deodorant composition as claimed in claim 1, wherein the emollient is glycerin.

9. A method of preparing the deodorant composition as claimed in claims 1 to 7 comprising the steps of:

- vi. Mixing 3 to 7 gm of fragrance with an acrylic polymer for 4-6 mins to form a solution;
- vii. adding hydrogenated castor oil in said solution of step i and mixing for 10 min;
- viii. adding a preservative, a pH modifier; an antimicrobial agent; a fixative, an emollient or a combination thereof to said mixture obtained in step ii;
- ix. adding EHG (Ethyl hexyl glycerin) complex to said solution of step iii; and
- x. allowing the solution of step (iv) mix at 100rpm to obtain a deodorant composition.

10. A method of preparing the EHG complex defined in claim 8, comprising the steps of:

- a) suspending 0.5 gm of Ethyl hexyl glycerin (EHG) in water to form a heterogenous mixture;

- b) magnetic stirring of the heterogenous mixture obtained in step a);
- c) adding chitosan solution to the mixture and stirring for 15 minutes;
- d) adding 1 to 3 ml of 10% aqueous solution of Sodium tripolyphosphate and acrylic polymer to the heterogenous mixture per minute to obtain a final solution; and
- e) stirring the final solution for 10 minutes until the color of solution changes from translucent to whitish translucent.

11. The deodorant composition as claimed in claims 1 to 8, wherein the composition is in the form of a liquid or aerosol spray.

12. The deodorant composition as claimed in claims 1 to 8, as and when used in a cosmetic formulation for reducing perspiration or deodorization.