Extraction of Jasmine Essential Oil By Hydrodistillation method and Applications On Formulation of Natural Facial Cleansers

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Abstract. Jasmine essential oil has been studied and widely used for many centuries in many countries throughout the world. However, relatively little is explored about jasmine essential oil application. Here, we produced essential oil of jasmine by hydrodistillation method. The effect of distillation time, distillation temperature, feed size, water-raw material ratio to the yield of the distillation process was analyzed and recorded. With 6 hours, 120°C, grind fresh and ratio of 2:1 the yield was 0.092%. Antibacterial compounds of Jasmine essential oil were determined by measuring Gas Chromatography-Mass Spectrometry equipment. Jasmine essential oils are applied to develop the facial cleanser product that is safe for human. Jasmine facial cleanser will be a new product in Viet Nam’s cosmetic with many potentials.

1. Introduction
As a traditional medicinal herb and valuable natural spice, essential oil has many significant pharmacological effects [1-4]. Facial cleanser plays the functional role in eliminating dirt and different unwanted substances from the surface of human face skin. More recently, facial cleanser has progressed immensely in terms of popularity and production. The product does not only remove dust from the skin but also assists in acne treatment, and help relax on a daily basis [5-7]. However, cleanser surfactants can create immediately after wash tightness (AWT), as well as irritation, erythema, and barrier damage [8]. Jasmine (Jasminum Sambac) has been designated in folk medicines in many countries due to its multipurpose activities. Hongratanaworakit T. (2010) described the effect of jasmine oil and presented evidence for its application in aromatherapy for the mood improvement in humans and relief of depression [9]. In addition, Winai Sayowan et al (2013) has examined that jasmine oil has stimulatory influences on the function of the nervous system [10]. The material of jasmine oil could aid their utilization in perfume or cosmetics industry [11].

Conventionally, the essential oil is taken from plant raw material by different extraction methods [12,13]. including solvent extraction and steam distillation. However, these methods have drawbacks such as loss of volatile compounds, low yield, and accruement of toxic solvent residues [14,15]. In the industrial system, this process is still applied for different reasons such as simplicity of installations, ease of method performing. Despite the promising application of jasmine plant in cosmetics, facial cleanser extracts of jasmine has not been attempted in formulation and extraction. Therefore, this...
study aim to utilize jasmine essential oils, in conjunction with natural ingredients, to formulate a facial cleanser for treatment of acne, humectants and for washing. To be specific, we first determine the conditions during hydrodistillation to optimize the yielded extract of jasmine flowers. Following that, optimum parameters of jasmine essential oil in a facial cleanser formula is determined.

2. Material and methods

2.1. Materials

Jasmine flowers were taken in a garden in Tien Giang Province, Vietnam. The maximum preservation period is 5 days at a temperature from 10 – 15°C. All materials for facial skin cleanser were provided by 3C cosmetics company including water (aqua), emulsifiers wax, lauryl glucoside, Cocamidopropyl betaine, jasmine essential oil and almond oil, vitamin E, B3, preservative PE 1090, cetyl alcohol, SCI, foaming, and stearic acid.

2.2. Description of hydrodistillation process

Hydrodistillation is an advanced method for extracting essential oils from plants because of its ability to maintain the original quality of plants. Flowers was removed from leaves and wilt, weighed to 250 gr, ground and put into a 1000 ml globe. The hydrodistillation process is carried out at the flower-water ratio of 1:1 to 1:5, distillation temperatures from 110°C to 150°C and distillation time of 4 hours to 8 hours to find the optimal conditions. After the distillation process had completed, the essential oil is collected, dehydrated by Na2SO4 and stored in the jar.

Table 1. Processing parameters affecting the essential oil yield

| Description                  | Condition                        |
|------------------------------|----------------------------------|
| Distillation time (hour)     | 4h, 5h, 6h, 7h, 8h               |
| Temperature (°C)             | 110°C, 120°C, 130°C, 140°C, 150°C|
| Raw material size            | grind fresh, fresh, dry grind    |
| Material/water radio (g/ml)  | 1:1, 1:2, 1:3, 1:4, 1:5          |

2.3. The process for the preparation facial cleanser

The extract components are weighted accurately. Becher 1 contains water phase consist of the water-soluble components (water, Lauryl Glucoside, SCI, vitamin B3) are heated at 70°C at a speed of 20 rpm for 15 minutes. Becher 2 contains oil phase consisting of the oil-soluble components (almond oil, emulsifiers wax, cetyl alcohol, acid stearic) are heated at temperatures of 45 - 50°C at a speed of 20-24 rpm for 15 minutes. Two mixture is combined with glycerin, vitamin E, PE 1090, Cocamidopropyl betaine, Jasmine essential oil. The facial cleanser will be examined for pH, viscosity and organoleptic about the degree of cleansing.

2.4. Analysis the component of jasmine essential oil by GC-MS

GC/MS (Gas Chromatography-Mass Spectrometry) [16] is one of the most modern chromatography methods available today with high sensitivity and specificity and are used in the study and analysis of combined. GC-MS is an analytical method that combines the features of gas-chromatography and mass spectrometry to identify different substances within a test sample (SCION SQ 456-GC).

2.5. Analysis product achievement

The facial cleanser will be measuring for pH (Potential of Hydrogen) by LAB 850 device, viscosity with a Brookfield model and degree of cleansing is assessed organoleptic by 30 people.

3. Result and discussion

3.1. Jasmine essential oil distillation process

In a laboratory scale, a systematic study of the extraction temperature and time, parameters size, solvent composition, and solvent-to-material ratio was taken in order to discover the optimal level of hydrophilic antioxidants, lipophilic antioxidants, and fragrance compounds. As shown in Figure 1, extracts from dried ground samples was non-existent and fresh ground sample yielded 0.092%, indicating that solvent-solute diffusion out of the flowers and diffusion of the water solvent into the material can be restricted by the extraction method. In terms of the extraction yield, the conditions considered in this work material size of grind fresh was accepted as optimal [17]. Figure 2 shows that when the time extraction is longer, the yield of essential oil from 4h to 6h increases. However, when extending the time from 6h to 8h, the amount of oil obtained was almost unchanged because it has
almost reached the limit oil under the conditions [18]. Moreover, the extended time extraction and maintained exposure to high-temperature limits throughput at a large scale and potentially enhances the loss of solvent by evaporation. It is therefore recommended that an extraction time of 6 hours is employed.

Figure 3 shows the water-material ratio for 1:1 – 1:5 in the hydrodistillation process. At 1:1 ratio, the yield of distillation is lest. At 2:1 ratio, the yield has reached a max of the distillation process. All other extraction conditions were kept constant. Because water vapor is absorbed in the epidermis contains essential oils which break down the oil sacs and attracts the oil by steam. Less water cannot melt adhesives, essential oils do not escape. Using as enough water for distillation as greater the diffusion capacity of the oil into the water. The optimal solvent-to-material ratio is chosen as 2:1.

Figure 4 shows the extract yield of the extraction temperature. Because of diffusion coefficients and increased solubilities. When raising the temperature from 110 to 120°C, there is an increase in recovery from 0.37% to 0.92%. However, the temperature rises to 150°C following in a reduction in the recovery back to 0.36%. An extraction temperature of 120°C was preferred as optimal for overall extraction. The results show that the optimum harvesting conditions satisfy the distillation conditions. The oil was found to grounds, distilled at 120°C in 6 hours, the ratio of the solvent to 2:1. The extraction efficiency is 0.1% at laboratory scale. The content of compounds found in jasmine essential oils will be expressed by GC-MS gas chromatography.

3.2. The relative contents of these compounds in Jasmine essential oil by GC-MS.

The table 2 shows that the components of Jasmine essential oil are found by hydrodistillation process. Including 16 in research of Naves và Grampoloff (1942) has determined the chemical composition of
essential oil of Jasmine. GC/MS results show some components have high concentrations such as linalool (8.522 benzyl acetate (1.443%); the cis-3-Hexenyl benzoate (12.160%); α-epi-Muurolol (10.697%). These are the substances to creates the special scent of jasmine and the applications are in the production technology of cosmetics and flowers as linalool and benzyl acetate.

**Table 2.** Compositions of jasmine essential oil.

| Name                     | Content (%) |
|--------------------------|-------------|
| 1 Cis-Linalool oxide     | 1.898       |
| 2 Linalool               | 8.552       |
| 3 Bezyl acetate          | 1.443       |
| 4 Levomenthol            | 5.321       |
| 5 Cis-3-hexenyl benzoate | 12.160      |
| 6 α-epi-Muurolol         | 10.697      |
| 7 α-Cadinol              | 19.990      |

### 3.3. Formulation of Natural Facial Cleansers

This research has found appropriate parameters is showed in table 3. The facial cleanser has a pH of 6.78. The sample wasn’t layered and oxidated during for 6 months. The sample for measuring viscosity by NDJ-9s recent number of the device is 16100 mPa.s. Based on our acquaintance with the Jasmine essential oil, the sample ability is to remove dirt and moisturize to the skin. It is reduced irritation and dryness, through organoleptic estimation.

**Table 3.** The ingredients of facial cleanser.

| Name                     | Mass (gram) | Content (%) |
|--------------------------|-------------|-------------|
| Aqua                     | 24.5        | 49%         |
| Lauryl Glucoside         | 7           | 14%         |
| Emulsifiers Wax          | 2.5         | 5%          |
| Cetyl alcohol            | 1.5         | 3%          |
| SCI                      | 1           | 2%          |
| Cocamidopropyl betaine   | 5.5         | 11%         |
| Jasmine essential oil    | 1           | 2%          |
| PE1090                   | 0.5         | 1%          |
| Vitamin E                | 1           | 2%          |
| Axit Stearic             | 0.5         | 1%          |
| Almond oil               | 1           | 2%          |
| Vitamin B3               | 1           | 2%          |
| Glycerin                 | 3           | 6%          |

### 4. Conclusion

In this study, the optimal distillation conditions of Jasmine flowers are determined, distillation temperature is 120°C in 6 hours, the water-material ratio of 2:1. The result that the yield is 0.092% in laboratory-scale. The content of the compounds is found in the essential oil of jasmine will be performed by GC-MS analysis. Our Jasmine facial cleanser has pH is 6.78 suitably for using on face skin and organoleptic estimation has the ability to cleanse the skin from 30 people. Jasmine facial cleanser will provide a new product in Viet Nam’s cosmetic. However, the product should be evaluated about antibacterial and antioxidant properties, so that it can be developed into a commercial product.

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