

## ENFLEURAGE ESSENTIAL OIL FROM JASMINE AND ROSE USING COLD FAT ADSORBENT

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### ABSTRAK

*Flower essential oils can't be taken by distillation, which is the oils' component will damage because of hydrolysis and polymerization process. High-boiling components can't be transported by water vapor so its yield and quality of the oil product is low. The alternative method for producing flower essential oils is an enfleurage process. Enfleurage is essential oil extraction process using cold fat, where the scent of flowers is absorbed by fat. The aim of the research is to obtain information about the optimum conditions based on essential oils of flowers through enfleurage method. Enfleurage process was begun with prepared the adsorbent which was made from mixing of vegetable fat and animal fat in ratio of 1:1. Fat was heated up to 60 °C further stirring for 15 minutes. As long as stirring, the fat mixture was mixed with benzoate and stirred for 2 hours. After the adsorbent was ready, a chassis was smeared with a layer of fat and flowers were palced in surface of fat for 1, 3, 5, 7, 9 and 11 days. The process was repeated with change the flowers every 24 hour with fresh flowers. When contact time had finished, fat was extracted using alcohol and it was separated by vacum distillation. The maximum yield was obtained for 5 days 0.89 % for jasmine, 0.88 % for rose and 0.84 % for frangipani. The enfleurage process is an effective method to produce flowers essential oils. The success of it depends on type of adsorbent, the level of florescence, as well as enfleurage's period.*

**Kata kunci** : Adsorbent, Animal fat, Enfleurage, Flower's essential oils, Vegetable fat

### I. Introduction

Essential oil or also known as ethereal oil is a concentrated, hydrophobic liquid that contains hundreds of aromatic compounds, organic constituents, including hormones, vitamins and other natural elements. These compounds are extracted from leaves, stems, flowers, bark, roots or other elements of a plant. Essential oil contains highly volatile components.

Essential oils are used for many different reasons and in different ways. They have a profound effect on the central nervous system, relieving depression and anxiety, reducing stress, and relaxing. Many essential oils are used in perfumery. It takes many pounds of flowers to construct ounce of essential oil. Moreover essential oil is utilized as aromatherapy which is a form medicine. Many essential oil often diluted and sometimes the oil is adulterated with synthetic chemicals. Commercially, essential oils are used in three primary ways as Flavors, Pharmaceuticals, and Odorants.

Essential oils can be extracted using a variety of methods, such as hydro distillation and solvent extraction, although some are not commonly used today. Some essential oils cannot be distilled without decomposition and thus are usually obtained by expression (lemon oil, orange oil) or by other mechanical means. In certain countries, the general method for obtaining citrus oil involves puncturing the oil glands by rolling the fruit over a trough lined with sharp projections that are long enough to penetrate the epidermis and pierce the oil glands located within outer portion of the peel (*ecuelle* method). A pressing action on the fruit removes the oil from the glands, and a fine spray of water washes the oil from the mashed peel while the juice is extracted through a central tube that cores the fruit. The resulting oil-water emulsion is separated by centrifugation. A variation of this process is to remove the peel from the fruit before the oil is extracted (Maliga, 2003).

Often, the essential oils content of fresh plant parts (flower petals) is so small that oil removal is not commercially feasible by the aforementioned methods. In such instances, an odorless, bland, fixed oil or fat is spread in a thin layer on glass plates. The flower petals are placed on the fat for a few hours; then repeatedly, the oil petals are removed, and a new layer of petals is introduced. After the fat has absorbed as much fragrance as possible, the oil may be removed by extraction with alcohol. This process, known as enfleurage, was formerly used extensively in the production of perfumes and pomades.

The principles of enfleurage are simple. Certain flowers (e.g. rose, or jasmine) continue the physiological activities of developing and giving off perfume even after picking. Every jasmine and rose flower resembles, so to speak, a tiny factory continually emitting minute quantities of perfume. Fat possesses a high power of adsorption and, when brought in contact with fragrant flowers, readily adsorbs the perfume emitted. This principle,

methodically applied on a large scale, constitutes enfleurage. During the entire period of harvest, which lasts for eight to ten weeks, batches of freshly picked flowers are strewn over the surface of a specially prepared fat base (corps), let there (for 24 h in the case of jasmine and longer in the case of tuberose), and then replaced by fresh flowers. At the end of the harvest, the fat, which is not renewed during the process, is saturated with flower oil. Thereafter, the oil is extracted from the fat with alcohol and then isolated.

The success of enfleurage depends to a great extent upon the quality of the fat base employed. At most care must be exercised when preparing the corps. It must be practically odorless and of proper consistency. If the corps is too hard, the blossoms will not have sufficient contact with the fat, curtailing its power of adsorption and resulting in a subnormal yield of flower oil. On the other, if it is too soft, it will tend to engulf the flowers and the exhausted ones will adhere; when removed, the flowers will retain adhering fat, resulting in considerable shrinkage and loss of corps. The consistency of the corps must, therefore, be such that it offers a semihard surface from which the exhausted flowers can easily be removed. The process of enfleurage is carried out in cool cellars, and every manufacturer must prepare the corps according to the prevailing temperature in the cellars during the months of the flower harvest.

Many years of experience have proved that a mixture of one part of highly purified tallow and two parts of lard is eminently suitable for enfleurage. This mixture assures a suitable consistency of the corps in conjunction with high power of adsorption. The fat corps thus prepared is white, smooth, absolutely of uniform consistency, free of water and practically odorless. Some manufacturers also add small quantities of orange flower or rose water when preparing the corps. This seems to be done for the sake of convention. Such additions somewhat shade the odor of the finished product by imparting a slight orange blossom or rose note.

The principle of enfleurage method is adsorption using fat as adsorbent. Adsorption is the process through which a substance, originally present in one phase, is removed from that phase by *accumulation at the interface* between that phase and a separate (solid) phase. Adsorption is typically used in wastewater treatment to remove toxic or recalcitrant organic pollutants (especially halogenated but also non-halogenated), and to a lesser extent, inorganic contaminants, from the wastewater (Kim et al., 2008). There are many kind of adsorbent such as activated carbon, fat, silica gel, or zeolite but the adsorbent which can be used for enfleurage process is fat. Fat can adsorb the essential oil without changing its characteristic beside that this adsorbent is not expensive and easily to get it (Sukkata et al., 2009).

For these particular experiments, jasmine flowers, rose and frangipani were chosen. The aim of this research was to obtain maximum operation condition of essential oil based on flowers in bench scale, so that information can be used for flower essential oils plant design.

## II. Materials and Method

### II.1 Preparation of fat adsorbent

Adsorbent was prepared using mixing of vegetable fat and animal fat with ratio 1:1 (based on laboratory scale). These fat was heated up to 60 °C further stirring for 15 minutes. As long as stirring, the fat mixture was mixed with benzoate and stirred for 2 hours and the adsorbent was ready to be used.

### II.2 Enfleurage process

A chassis (50 cm x 40 cm x 5 cm) was smeared with a layer of fat and 1 kg flowers were placed in surface of fat for 1, 3, 5, 7, 9, 11 days. The process was repeated with change the flowers every 24 hour with fresh flowers. When contact time had finished, fat was extracted using alcohol with ratio alcohol/fat 1:1. The alcohol-fat was kept in refrigerator for 24 hour. After cooling process, the alcohol-fat was separated by filter paper and took the filtrate which consist of alcohol-essential oils which is called pomade. The pomade can be purified by vacuum distillation.

### II.3 Product characterization

The product was analysis using Gas Chromatography and FFA contents using titration method.

## III. Result and Discussion

### III.1 Fat consistency and % FFA

Free fatty acids (FFA) is a free fatty bond which contains in the fat. Fat is used for enfleurage process must not contain high FFA so it must be as small as possible. The highest FFA will cause fat easily to damage and doesn't durable (oxidized). Based on Table 1 FFA was obtained 0.0068% in ratio vegetable fat/ animal fat 1:1; 0.0072% and 0.075% when the ratio of fat vegetable/animal fat 1:2 and 2:3. Free fatty acid is oxidized at the double bond, if fat has high free fatty acids, it will easily damage and not durable. Therefore, the content of free fatty acids in the fat blend as absorbents should be reduced to minimum.

Based on Guenther (1987), fat will be used for enfleurage process must have a certain consistency. The fat's consistency should not too hard or too soft (medium consistency). It can be seen visually, when laid of flowers on the surface of fat then did change of flowers every 24 hour so there are many fat which are discarded, this situation is because fat is too soft. To get better fat's consistency can be made by mixing two kinds of oils which have a different melting point.

Table 1 showed the result of fat consistency. The highest consistency was 9.89 mm/s for ratio vegetable fat/animal fat 2:3 and the smallest consistency was 8.85 mm/s for ratio vegetable fat/animal fat 1:1. It can be said that the higher ratio of vegetable fat/animal fat so the higher its consistency. Fat has high consistency will make adsorption process less optimal.

Tabel 1. % FFA and consistency of fat

	Ratio of vegetable fat/animal fat		
	1:1	1:2	2:3
% FFA	0.0068	0.0072	0.0075
Consistency of fat (mm/s)	8.85	8.94	9.89

This research is the development of preliminary study which had done for the laboratory scale. Based on the above results, the bench scale test using the ratio of vegetable fats/animal 1: 1.

### III.2 Yield of essential oil

The flowers that was used for this research, were jasmine, rose and frangipani with 60-80 % blossom level. In this condition, they have not fully blossomed so that the production of essential oils is still on process. According to Ketaren (1990), flowers will stop produce their essential oil when they have blossomed 100 %. Figure 1 showed the yield of essential oil using effleurage process.

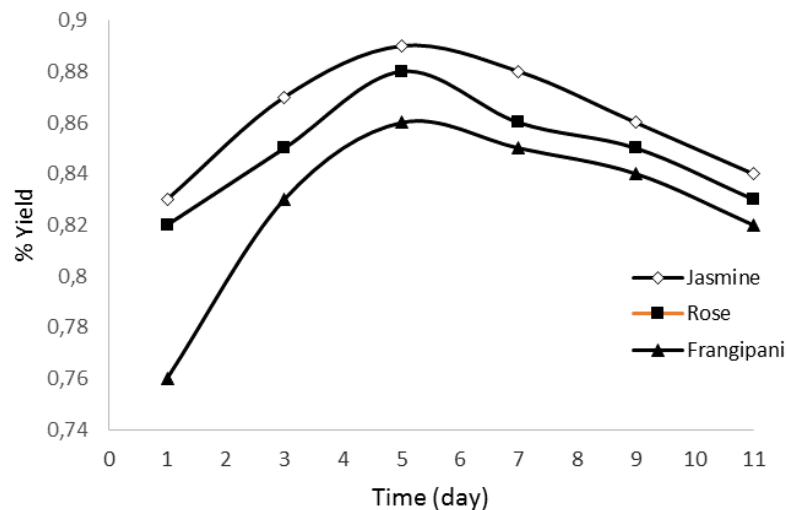


Figure 1. yield of essential oil

The best yield was obtained using the adsorbent with a ratio of vegetable fat/animal fat 1:1 with optimum storage time 5 days 0.89% for jasmine, 0.86% for rose and 0.86% for frangipani. While in the enflourage process which was more than 5 days the yield was decreasing. This condition because the longer storage would make fat to be rancid. The yield of essential oils were varied among contact time. However, they has been noted that the saturation point of fat depends on the essential oil content in the flowers and properties of the fat (Pensuk et al., 2007). In general, these yield generated on a bench scale doesn't much different from previous worked (Soe'eib et al., 2014).

### IV. Conclusion

- The enflourage process is an effective method to produce flowers essential oils. The success of it depends on type of adsorbent, the level of floescence, as well as enflourage's contact time.
- The best of fat consistency was 8.85 mm/s (ratio vegetable fat/animal fat 1:1).
- Flowers were used for enflourage process must has 50-6- % blossom level.
- The maximum yield was obtained for 5 days 0.89 % for jasmine, 0.88 % for rose and 0.84 % for frangipani.

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