Extraction and Formulation of Natural Perfume from Lemongrass and Jasmine Flower

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Abstract

Three methods are used for oil extraction namely solvent extraction, hydro distillation and enfleurage. Distillation based recovery processes such as steam and vacuum distillation are preferred for the extraction of essential oils from plant materials. Essential oils very complex in their chemical nature. Extraction of aromatic compounds from raw materials and using methods such as distillation, solvent extraction, expression or enfleurage. The aromatic compounds obtain from raw materials. Solvent extraction most used and economically important technique for extracting aromatics in the modern perfume industry. Raw materials are submerged in a solvent that can dissolve the desired aromatic compounds. Leaves of Cymbopogon citratus yield reddish-yellow oil with a strong odor and taste of lemons upon distillation. There is a very high content of citral in the leaves (70-80%). It also is used in soaps and medicine. Citral is extensively used in perfumes, bath salts, cosmetics. Quality of lemongrass oil is determined by content of citral the aldehyde responsible for the lemon odor.

The % yield of Lemongrass Oil using solvent extraction with different feed to solvents ration as 1:2 and 1:4. % Maximum yield perfume oil from lemongrass and jasmine flower for solvent Hexane and Ethyl Acetate and Diethyl Ether shows the 1.8 % and 2.0 % for feed to solvent ration as 1:4 gives maximum yield of perfume oil resp. Ethyl Acetate is the best suitable for extraction of Lemongrass Oil from the date seed. Ethyl Acetate can easily separate after extraction and has higher yield than other with low cost. Hexane is the suitable solvent for extraction of perfume oil from jasmine flower. So for extraction of oil from lemongrass and jasmine flower ethyl acetate and hexane can be used as a solvents.

Keywords – Lemongrass and Jasmine Oil, Hexane, Ethyl Acetate, Solvent Extraction Process, Natural Perfume.

1. INTRODUCTION

Perfume extraction process is distortion of the odor of the aromatic compounds obtained from the raw materials. Heat, harsh solvents and the exposure to oxygen which will denature aromatic compounds and odor, character or render odorless. Formulation of perfume involves knowing proportion in which essential oil and other materials to mixed to avoid skin irritation and increase intensity and longevity of perfume. Most imported perfumes are synthetic odorant which are not pure chemical substance but are mixture of organic compounds that are harmful when applied. There are limited perfume plants, from which perfume can be made lead to importation of perfume thereby causing the decline of foreign reserves and

unemployment. Essential oils found in many different plants. EO different from fatty oils because they evaporate or volatilize on contact with the air and they possess a pleasant taste and strong aromatic odor. Removed of EO from plant tissues without any change in composition. Essential oils complex their chemical nature. The two main groups are the hydrocarbon terpenes and the oxygenated and sulphured oils.

Literature Reviews

Perfume extraction is the extraction of aromatic compounds from raw materials using methods such as distillation, solvent extraction etc. Essential oils, absolutes, butters, depending on the amount of waxes in the extracted product. Here, in this work solvent extraction, Enfleurage method, hydro distillation and steam distillation methods used to extract essential oil from lemongrass leaves. Distillation based recovery processes such as steam and vacuum distillation are preferred for extraction of essential oils from plant materials. [1]

Four methods are used for oil extraction namely solvent extraction, hydro distillation and enfleurage. Solvent extraction 2.07 % yield of essential oil obtain. In enfleurage method 1.957% oil yield. 0.946% yield of oil by hydro distillation process. Steam distillation process give 0.70% yield of oil. Solvent extraction give highest yield because of less exposure air and heat. EO formulated in perfume using a fixative and carrier solvent. [1]

Formulation is mixture of ingredients prepared in a certain way and used for a specific purpose. 10 ml of lemongrass essential oil extract were measured and placed in a 120 ml beaker containing 5 ml of Methanol. 5 ml of the Fixatives added to the mixture to improve longevity of perfume. Solution shaken and poured into a 50 ml bottle. Extraction of essential oil from lemongrass. To determine yields using different extraction methods and formulation of perfume with essential oil produced. [1]

The aroma of oil of bergamot fruit was given by blending the oil in an oil diffuser. Perfumery oil by this method 0.912 gm of perfumery oil per 75 gm of dry lemon grass. Oil produced light ocher yellow in color with a tinge of pungent odor. Perfumery oil extracted using eco-friendly method and method economical. Perfumery oil when blended with oil of bergamot or oil of geranium used an air-freshener and deodorizer. Lemongrass oil helps to relax and tone muscles, relieve cramps, toothache, migraines & headaches & characteristic citrus lemony odor. Organic oil primarily used for perfumery application and insect repellent. [2]

300 g of lemongrass powder weighted and placed in a clean round bottomed flask and 700 ml of N-hexane solvent poured in to flask. Allowed to stand for 48 hours with continuous shaking with electrical shaker. Extract containing solvent decanted in beaker. This has highly volatile aroma molecules as well as non-aroma waxes. Solvent removed from extract using rotary evaporator at 40 ^{O}C. Waxy mass remains known as concrete. [3]

Aldehyde compounds such as β-citronellal, neral and geranial responsible for its antibacterial activity. Aldehydes as antimicrobial agent acted in dose-dependent manner. At low concentration they may cross link amino groups in cell wall and cytoplasm as well as inhibit enzymes with a thiol group at cytoplasmic membrane. EO of lemongrass inhibited bacterial growth by mechanism of attacking multiple

targets in bacterial cell included inhibiting biofilm formation, promoting intracellular material leakage. Effects depending concentration and amount of components. [5]

Extraction of aromatic compounds from raw materials using methods such as distillation, solvent extraction, expression or enfleurage. Extracts essential oils, absolutes, concretes or butters, depending on amount of waxes in extracted product. Heat, chemical solvents or exposure to oxygen in extraction process denature aromatic compounds, either changing their odor, character or rendering them odorless. [6]

Powdered dry lemongrass leaves (300 gms) added to 600ml of solvent (n-hexane) in a 1000 ml flask and stopped. For complete extraction all oil in lemongrass content allowed to stand for 38 hrs. after which the extract decanted into a 500 ml beaker. Ethanol (200 ml) added to dissolve extract. The mixture transferred to 1000 ml separating funnel and allowed to come to equilibrium which separated into two layers. The lower ethanol extract and the upper hexane layer carefully separated, collected into two separate 250 ml beakers and placed in a water bath at 60 ^{O}C. Remove excess ethanol leaving only natural essential oil. [9]

Jasmine essential oils are primarily used in the perfumery industry and have a very high commercial value due to its therapeutic properties. As Jasmine essential oils are composed of heat-sensitive chemical compounds. The use of conventional steam distillation technique would inevitably inflict thermal degradation to the natural fragrance. Solvent extraction method employed due to its mild extracting condition and lower operating cost. Two different solvents used which are ethanol and methanol. Volatile oil compounds were successfully isolated from Jasmine flowers using these solvents. [11]

The extract compositions compared using gas chromatography analysis. The main constituents of the essential oils benzyl acetate and benzaldehyde. Further studies also revealed that composition and yield of essential oils mainly influenced by different types of solvents used. Optimum yield which is 14.53% extracted using ethanol. [11]

Essential oil was extracted in batches of 1000 g every time. Thimbles of Whitman filter paper No. 40 filled with flowers tightly and kept in jacket of Soxhlet apparatus, n-Hexane added in flask and boiled at a temperature of 55 to 60 ^{O}C. On boiling vaporized n-Hexane passed through flower-containing thimbles in jacket and condensed by the condenser. The higher percentage of 0.30% of absolute oil recovery in Arabian jasmine from n-Hexane solvent extraction and 0.23% absolute oil recovery when methyl alcohol was used for oil extraction. The color of jasmine absolute as a clear yellow-brown liquid. The color of absolute oil of Arabian jasmine was very light brown. [14]

Jasmine essential oil is in common use. Its flowers are either extracted by the labor-intensive method of enfleurage or through chemical extraction. It is expensive due to the large number of flowers needed to produce small amount of oil. The flowers have to be gathered at night because the odor of jasmine is more powerful after dark. The flowers are laid out on cotton cloths soaked in olive oil for several days and then extracted leaving the true jasmine essence.[15]

USES OF PERFUMES

1. Sense of smell consider right brain activity which rules emotions, memory & creativity.

2. Perfumes are used to mask body odor.

3. Used to make people feel good

4. To heal and physical and emotional problems

5.Perfumes being revived to help balance hormonal and body energy.

6. Immune system inhaled or applied topically.

7. Smelling sweet smells and can be used as a form of psychotherapy.

METHODS OF EXTRACTION

Extraction of aromatic compounds from materials using methods such as distillation, solvent extraction, expression or enfleurage. Odor of aromatic compounds obtained from raw materials. Heat, chemical solvents or exposure to oxygen in extraction process denature aromatic compounds, either changing their odor character or rendering odorless. Before perfumes can composed odorants used in perfume compositions must obtained. Synthetic odorants produced through organic synthesis and purified. Odorants from natural sources require use of various methods to extract aromatics from raw materials. Extraction of essential oils depending on amount of waxes.

1. Solvent Extraction

The most useful and economically important technique for extracting aromatics in perfume industry. Raw materials are submerged in solvent that can dissolve desired aromatic compounds. Fragrant compounds form woody and fibrous plant materials often obtained in this manner as aromatics from animal sources. Technique can used to extract odorants that too volatile for distillation by heat. Commonly used solvents for maceration/solvent extraction include hexane and dimethyl ether. Product of this process called "concrete"

2. Distillation

The process in which a liquid or vapor mixture of two or more substance is separated into its component fractions of desired purity, by the application and removal of heat. Distillation is a common technique for obtaining aromatic compounds from plants, such as orange blossoms and roses. The raw material is heated and the fragrant compounds are re-collected through condensation of the distilled vapor. There are two types of Distillation for extracting. Steam Distillation and Hydro Distillation.

a. Steam Distillation

Steam from boiling water is passed through the raw material for 60-105 minutes, which drives out most of their volatile fragrant compounds. The condensate from distillation, which contains both water and the aromatics, is 42 settled in a Florentine flask. This allows for the easy separation of the fragrant oils from the water as the oil will float to the top of the distillate where it is removed, leaving behind watery distillate. The water collected from the condensate, which retains some of the fragrant compounds and oils from raw material is called hydrosol and is sometimes sold for consumer and commercial use. Most commonly used for fresh plant materials such as flowers, leaves and stems.

b. Hydro-Distillation

Mostly used by small scale producers of essential oils in water / hydro distillation the plant material is almost entirely covered with water as suspension in the still

which is placed on a furnace. Water is made to boil and essential oil is carried over to the condenser along with the steam. It is useful for distillation of powders of spices and comminuted herbs etc. The Deg Bhabka method of India using copper stills is an example of this technique. Some process becomes obsolete to carry out extraction process like Hydro Distillation which often used in primitive countries. The risk is that the still can run dry, or be overheated, burning the aromatics and resulting in an Essential Oil with a burnt smell. Hydro distillation seems to work best for powders.

3. Enfleurage

The absorption of aroma materials into solid fat or wax and extracting odorous oil with ethyl alcohol. Extraction by enfleurage commonly used when distillation not possible because some fragrant compounds denature through high heat. This is not commonly used in present day industry due to its prohibitive cost and existence of more efficient and effective extraction methods. Enfleurage is a two-step process during which odor of aromatic materials absorbed in wax or fat and then extracted with alcohol.

Chemicals and Raw Materials

1. Jasmine Flower
2. Ethyl Acetate
3. Hexane
4. Lemongrass
5. Ethanol
6. Methanol

Apparatus Requires

1. Conical Flask
2. Simple Distillation
3. Digital Thermometers/Glass Thermometer
4. Heating Element/Mental
5. Measuring Cylinders
6. Beaker and Filter Papers
7. Magnetic Stirrer

Experimental Setup

1. Extraction of Lemongrass substrate using Ethyl Acetate solvent

Fig. Extraction of Lemongrass substrate using Ethyl Acetate solvent

Fig. For separation of Ethyl Acetate and Ethanol-Oil by Separating Funnel

Fig. Distillation for Separation of Oil from Ethanol

Extraction Perfume Oil from Lemongrass Using Ethyl Acetate As Solvent

1. Dry Chopped lemongrass in oven at 60-70 ^{O}C for 7-8 hrs.

2. Take 200 gm Sample of lemongrass put in 1liter conical flask and add 400 ml ethyl acetate solvent.

3. After addition conical flask place on magnetic stirrer for 15-20 min for complete mixing.

4. The beaker/flask and content are allowed to stand for 36-48 hrs. to extract perfume oil.

5. After this the extract into another 1 liter beaker add 200 ml of Ethanol to extract the essential oil since essential oil is soluble in Ethanol.

6. The mixture is then transferred to 500/1000 ml separating funnel and separate by a process called liquid/liquid separation process.

7. The content of the separating funnel are allowed to come to equilibrium which separates into two layers for 4-5 hrs.

8. Lower layer is ethanol extract and upper layer ethyl acetate collected in separate beaker.

9. Simple distillation is done in water bath at 75-80 ^{O}C to separate Ethanol & essential oil.

10. Ethanol is to be vaporize and condensed and the perfume oil remains in flask.

Extraction of Oil from Jasmine Flower with Hexane

1. Take jasmine flower from the market and clean it by water and dry room temperature.

2. Take 150 gm Sample of lemongrass put in 500 ml conical flask and add 300 ml of N-Hexane solvent.

3. After addition beaker place on magnetic stirrer for 15-20 min for complete mixing.

4. The beaker/conical flask and content are allowed to stand for 36-48 hrs. to extract perfume oil.

5. After this the extract into another 1 liter beaker add 200 ml of Ethanol to extract the essential oil since essential oil is soluble in Ethanol.

6. The mixture is then transferred to 500/1000 ml separating funnel and separate by a process called liquid/liquid separation process.

7. The content of the separating funnel are allowed to come to equilibrium which separates into two layers for 4-5 hrs.

8. Lower layer is ethanol extract and upper layer Hexane collected into two separate beaker.

9. Simple distillation is done in water bath at 75-80 ^{O}C to separate Ethanol & essential oil.

10. Ethanol is to be vaporize and condensed and the perfume oil remains in flask.

% Yield of Lemongrass Oil

% Yield of Oil = [Mass of Oil Extracted / Mass of Lemongrass Feed] *100

As per literature maximum perfume oil content in the lemongrass will be 2-2.5% on dry basis and in jasmine flower is up to 2 %.

% Yield and Extraction of Jasmine Oil

% Yield of Oil = [Mass of Oil Extracted / Mass of Jasmine Feed] *100

% Extraction of Oil = [Mass of Oil Extracted/ Mass of Oil Content in Jasmine] * 100

Extraction of Essential Oil From Lemongrass Using Ethyl Acetate

Sr. No.	Feed to Solvent Ration	% Yield of Oil
01	1:2	1.8
02	1:4	2.0

Extraction of Essential Oil From Jasmine Flower Using Hexane

Sr. No.	Feed to Solvent Ration	% Yield of Oil
01	1:2	1.7
02	1:4	1.8

Observation table shows the % yield of Lemongrass Oil using solvent extraction with different feed to solvents ration as 1:2 and 1:4. % Maximum yield perfume oil from lemongrass and jasmine flower for solvent Hexane and Ethyl Acetate and Diethyl Ether shows the 1.8 % and 2.0 % for feed to solvent ration as 1:4 gives maximum yield of perfume oil resp. As per observation Ethyl Acetate is the best suitable for extraction of Lemongrass Oil from the date seed. Ethyl Acetate can easily separate after extraction and has higher yield than other with low cost. Hexane is the suitable solvent for extraction of perfume oil from jasmine flower. So for extraction of oil from lemongrass and jasmine flower ethyl acetate and hexane can be use as a solvents.

CONCLUSION

Solvent extraction most used and economically important technique for extracting aromatics in modern perfume industry. Raw materials are submerged in a solvent that can dissolve the desired aromatic compounds Lemongrass yield reddish-yellow oil and jasmine flower yield light brown with strong odor and

taste of lemons upon distillation. Oven drying gave the highest essential oil percentage (2.45%) compared to shade-drying (2.12%) and sun-drying methods (2.10%). Quality of lemongrass oil is determined by content of citral the aldehyde responsible for the lemon odor. Leaves of Cymbopogon citratus yield reddish-yellow oil with a strong odor and taste of lemons upon distillation. There is a very high content of citral in the leaves (70-80%). It also is used in soaps and medicine. Citral is extensively used in perfumes, bath salts, cosmetics.

The % yield of Lemongrass Oil using solvent extraction with different feed to solvents ration as 1:2 and 1:4. % Maximum yield perfume oil from lemongrass and jasmine flower for solvent Hexane and Ethyl Acetate and Diethyl Ether shows the 1.8 % and 2.0 % for feed to solvent ration as 1:4 gives maximum yield of perfume oil resp. Ethyl Acetate is the best suitable for extraction of Lemongrass Oil from the date seed. Ethyl Acetate can easily separate after extraction and has higher yield than other with low cost. Hexane is the suitable solvent for extraction of perfume oil from jasmine flower. So for extraction of oil from lemongrass and jasmine flower ethyl acetate and hexane can be used as a solvents.

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