CODEN [USA]: IAJPBB ISSN : 2349-7750

INDO AMERICAN JOURNAL OF
PHARMACEUTICAL SCIENCES
SJIF Impact Factor: 7.187
https://doi.org/10.5281/zenodo.6850524

Available online at: http://www.iajps.com *Research Article*

FORMULATION AND DEVELOPMENT OF PERFUME FROM ESSENTIAL OIL GERANIOL (*PELARGONIUM GRAVEOLENS*) AND GINGER (*ZINGIBER OFFICINALE*)

Dr. Md. Rageeb Md. Usman[1]*, Mr. Sajan Mangilal Pawara[2]

[1]Department of Pharmacognosy, Smt. Sharadchandrika Suresh Patil College of Pharmacy, Chopda-425107, Maharashtra, India.

Article Received: May 2022 **Accepted:** June 2022 **Published:** July 2022

Abstract:

There is urgent need for perfume production and from local raw materials in order to supplement the existing ones. I recommend more research to be carried out on extraction of essential oil and its formulation from vast variety of oil bearing plants in our ecosystem. Further work should be carried out to analyse the Geraniol and Ginger essential oil as this could not be done due to time constraint. Characterization of Geraniol and Ginger essential oil components should be made in order to determine which is responsible for the characteristics of Pungent and Aromatic odor. Furthermore, large scale extraction of oil from Geraniol and Ginger through enzymatic process should be explored, feasibility studies on the economic viability of the process should be conducted.

Keywords: *Essential oil, Perfumery, Fractional distillation, Vacuum distillation.*

Corresponding author:

Dr. Md. Rageeb Md.Usman,

Department of Pharmacognosy,

Smt. Sharadchandrika Suresh Patil College of Pharmacy,

Chopda-425107, Maharashtra, India.

QR code

Please cite this article in press Md. Rageeb Md.Usman et al, ***Formulation And Development Of Perfume From Essential Oil Geraniol (Pelargonium Graveolens) And Ginger (Zingiber Officinale).,*** *Indo Am. J. P. Sci, 2022; 09(7).*

INTRODUCTION:

People‘s use of scents, aroma and fragrances has been used for many centuries. Since the beginning of recorded history, humans have attempted to mask or enhance their own odor by using perfume, which emulates nature's pleasant smells. Many natural and man-made materials have been used to make perfume to apply to the skin and clothing, to put in cleaners and cosmetics, or to scent the air. Because of differences in body chemistry, temperature, and body odors, no perfume will smell exactly the same on any two people. Perfume comes from the Latin "per" meaning "through" and "fume," or "smoke." Many ancient perfumes were made by extracting natural oils from plants through pressing and steaming. The oil was then burned to scent the air. Today, most perfume is used to scent bar soaps. Some products are even perfumed with industrial odorants to mask unpleasant smells or to appear "unscented."

AIM:

“Formulation and Development of Perfume from Essential oil Geraniol *(Pelargonium Graveolens)* and Ginger *(Zingiber officinale)”*

OBJECTIVE:

- The main objective of this research is to extract essential oil Geraniol (Pelargonium Graveolens) and Ginger (Zingiber officinale) using Fractional distillation, Vacuum distillation, Hydrodistillation, and formulating the perfume.

METHODOLOGY:

A proper method has to be carried out while formulating the Perfume from essential oil Geraniol (Pelargonium Graveolens) and Ginger (Zingiber officinale) Selection of actives are as,

1) **Collection and Authentication**
2) **Selection of base**
3) **Formulation**
4) **Preparation**
5) **Evaluation**

METHODS:

Selection of active:

Fresh Geraniol (Rosa damaceae) or Ginger sample was collected from the garden. The sample was allowed to dry for about three days in the laboratory. The leaves and rhizomes were later cut into slices to reveal the tighter inner stem until when ready for use. The analysis of Essential oils are generally derived from one or more plant parts, such as flowers (e.g. rose, jasmine, carnation, clove, mimosa, rosemary, lavander), leaves (e.g. mint, Ocimum spp., lemongrass, jamrosa), leaves and stems (e.g. geranium, patchouli, petitgrain, verbena, cinnamon), bark (e.g. cinnamon, cassia, canella), wood (e.g. cedar, sandal, pine), roots (e.g. angelica, sassafras, vetiver, saussurea, valerian),

Collection and Authentication:

Fresh Geraniol (Rosa damaceae) or Ginger sample was collected from the garden and authenticated in botanical department by botanist.

Selection of base:

The main objective of the present study was to prepare a Perfume from essential oil Geraniol (Pelargonium Graveolens) and Ginger (Zingiber officinale) base are used

Formulation of Perfume:

For the preparation of perfume some constituents are used including drug, which are:

• Vehicle

Vehicle should follow the ideal characters given in the Pharmacopeias

• Aqueous material

The aqueous phases used are water, alcohol, etc.

a) Alcohol- Fixative/ Perfumery

Is the most commonly used in perfuming, alcohol-based perfume will give you a strongr and more powerful scent

b) Distilled Water: - Solvent

It is universal solvent acts as hydrating agent.

c) N- hexane- Solvent

It is use as solvent; hexane has been used for decades for extraction of perfume.

d) Sweet almond oil- fixative

It is use in fixation of perfume.

Formulation of Naturals Oils:

Table No 01 Formulation of Naturals Oils

Ingredients	Parts Used	Category	Qty%
Geraniol(Rosa damaceae) 	Petals	Perfumery Antioxidants Anti-inflammatory	3
Ginger 	Rhizomes	Perfumery Antioxidants Anti-bacterial	3

Formulation of Base:

Table No 02 Formulation of Base

Ingredients	Category	Qty%
N- hexane	Solvent	1
Sweet almond oil	Fixative	2
Alcohol	Fixative	5
Distilled water	Vehicle	Q.S
Sodium Benzoate	Preservative	0.15

Experimental work:
Extraction of Essential oil
Extraction of Geraniol Use in Fractional Distillation and Vacuume Distilation
Fractional Distillation:
Fractional distillation is a technique used to separate close boiling materials and to produce high purity distillates. In simple distillation, all the material that is vaporized is collected in the receiver. This gives some purification. In fractional distillation, not all of the vaporized material is collected. Some vaporized material is allowed to flow back down the fractional distillation column (reflux) so that it can be distilled again and again. This repeated distillation due to refluxing further separates the close boiling materials and produces higher purities then by simple distillation. Purification is further aided by the fractional distillation column. Inside the distillation column, packing or a spinning band is used to maximize the contact between the ascending vapor and the descending reflux. More vapor liquid contact equates to a better fractionation. A vapor-liquid diagram of an ideal binary mixture is helpful in visualizing the fractional distillation process. The bottom curve is the liquid mixture and the top curve is the vapor mixture. In this example, a starting liquid mixture at is used. The first vaporization follows the blue line to the left with a corresponding increase in purity. This vapor is then condensed and returned to the boiler (follow the white line down to the liquid

curve at.This is a single step in the fractionating process. The blue and white lines combined even look like a step. Each step moves the purity to a higher level. The better the fractional distillation column and the higher the amount of reflux gives more "steps" and therefore a higher purity.

Fig. No.1- Fractional Distillation Apparatus

Procedure-

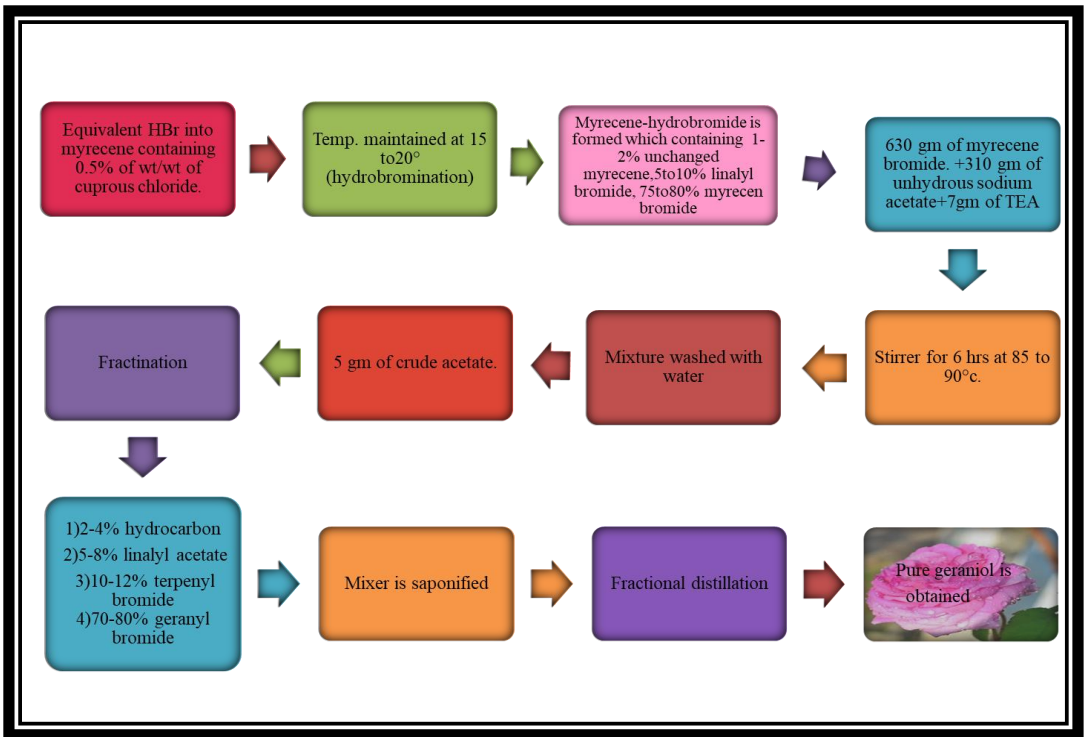

Fig. No.2- Extraction of Geraniol

Vacuum Distillation:

Vacuum extraction technology is a dynamic extraction by using vacuum devices to reduce the pressure in the system to below normal pressure and maintain the solvent boiling at a lower temperature. In this study, an effective vacuum distillation-extraction (VDE) technology was developed to obtain volatile oil from oregano (Origanum vulgare L.). The process conditions, such as the pressure, the liquid-solid ratio and the distillation time were optimised using a single-factor experiment and the response surface methodology with a Box-Behnken design. A multivariate quadratic polynomial model was successfully established. It is shown that the model agrees well with the experimental results and the identified optimal process parameters were a liquid-solid ratio of 14:1, an extraction time of 253.8 min with a vapor pressure of 558 mbar. The optimal process conditions lead to the highest yield of 1.02%, which is an 8% increase compared with the

conventional hydro-distillation (HD). The composition of the essential oils extracted by vacuum distillation-extraction under the optimal condition were analysed by Gas chromatography-mass spectrometry (GC–MS) and compared with those obtained from hydro-distillation. It was found that they differed in the contents of the dominant components contributing to the antimicrobial effects in oregano essential oil, such as thymol, carvacrol and terpineol, etc. Subsequent antibacterial experiments were also performed using S. aureus and E. coli. It is shown that the vacuum distillation-extraction technology results in better antibacterial effects than the hydro-distillation.

Procedure:

Fig. No.3- Extraction of Geraniol

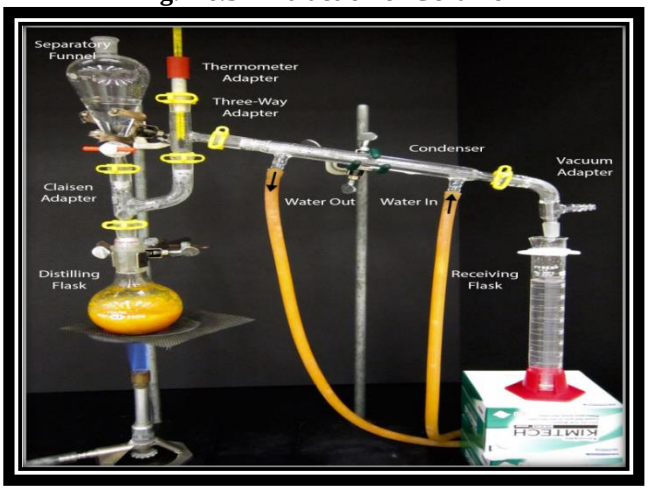

Fig. No.4- Vacuum Distillation Apparatus

Extraction of Ginger Use in Hydrodistillation and Solvent Extraction Method:

Hydrodistillation Method:

Hydrodistillation is a traditional method for the extraction of bioactive compounds from plants. In this method, plant materials are packed in a still compartment then water is added in sufficient amount and brought to a boil. Alternatively, direct steam may also be injected into the plant sample.

Procedure: 100g of fresh Ginger sample were placed into a 500ml round bottom flask containing 250ml of distilled water. The flask was fitted with a rubber stopper connected to a condenser and heated. Water at 00C flowed counter currently through the

condenser to condense the ensuring steam. When the water reached 100oC it started boiling ripping off the essential oil from the Ginger. When the Ginger got heated up, the essential oil that was extracted from the leaf mixed with the water vapour. Both passed through the condenser and the vapour was condensed into liquid. With the use of ice block, cooling was made possible and volatilization of the essential oil was avoided. The condensate was directly collected using a 500ml beaker and then poured into a separating funnel. This formed two layers of oil and water. The tap of the separating funnel was opened to let out the water while the oil was immediately collected into a 100ml stoppered. The bottle was closed tightly to prevent vaporization of the essential oil. The oil was collected and the volume of oil obtained was weighed.

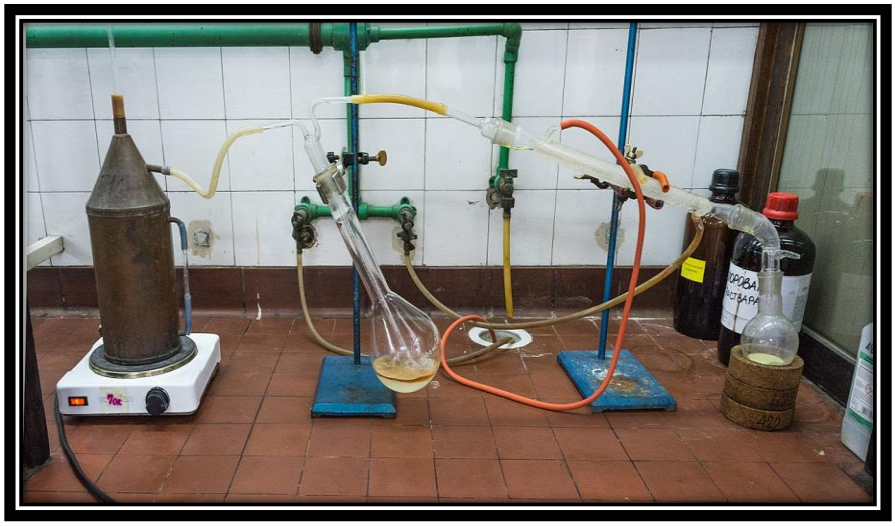

Fig. No.5- Hydrodistillation Apparatus

Procedure For Solvent Extraction Method:
Solvent extraction is one of the most commonly used laboratory purification methods, particularly in organic chemistry labs. Solvent extractions done in chemistry labs are usually small-scale, batch-mode operations using a separatory funnel. Solvent extraction is also widely used in industrial operations

Procedure:
100g of the dry sample of Ginger were weighed from the sliced Ginger sample and placed in a 500ml clean flat bottom flask. 600ml of N-hexane solvent were poured into the 500ml flask and stopped. The flask and content were allowed to stand for 24hrs; this was done to extract all the oil content in the Ginger and for complete extraction. After which the extract was decanted into another 500ml beaker. 200ml of Ethanol were added to extract the essential oil since essential oil is soluble in Ethanol. The mixture was then transferred to 500ml separating funnel and separated by a process called liquid/liquid separation process. The content of the separating funnel was and allowed to come to equilibrium, which separated into two layers (depending on their different density). The lower Ethanol extract and the upper Hexane layer were collected into two separate 250ml beaker and were placed in a water bath at 78•C. This was done to remove the Ethanol leaving only the natural essential oil. The yield of oil was determined by weighing the extract on an electronic weighing balance. The difference between the final weight of the beaker with extract and the initial weight of the empty beaker gave the weight of essential oil.

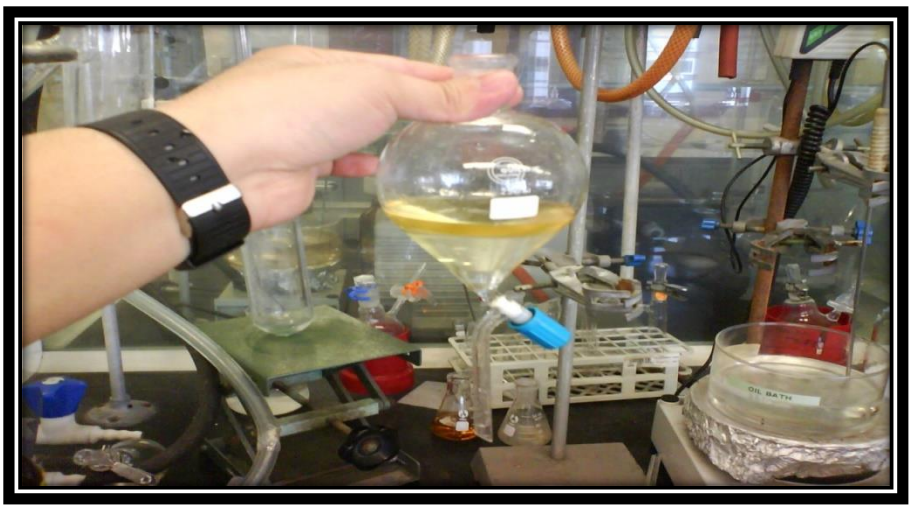

Fig. No.6- Solvent Extraction Apparatus

Preparation of Perfume:
Procedure
Geraniol Perfume
10ml of Geraniol essential oil extract were measured and placed in a 120ml beaker containing 5ml of Methanol. 5ml of the Fixatives were added to the mixture (to improve the longevity of the perfume). The solution were shaken and poured into a 50ml bottle.

Ginger Perfume
10ml of Ginger essential oil extract were measured and placed in a 120ml beaker containing 5ml of Methanol. 5ml of the Fixatives were added to the mixture (to improve the longevity of the perfume). The solution were shaken and poured into a 50ml bottle.

RESULT:

Fractional Distillation Method
Result obtained by Fractional Distillation is shown in Table below

Table No.3 weight of oil with respect to time

Weight of oil (g)	Time (mins)
0.2	240
0.3	480
0.7	720
0.72	960
0.78	1200

The amount of pure geraniol obtained by extraction method was 2.7g of essential oil per 100g of dry rosa damaceae sample. This gave 2.07% yield of essential oil per 100g of dry rosa damaceae. The temperature used was 780C i.e. the boiling point of ethanol. The volume of essential oil was measured at every 4hr interval to determine the oil yield at varying time. As the time increases the Ethanol solvent reduces thereby leaving the essential oil in the mixture.

Vacuum Distillation Method:
Result obtained by Vacuum Distillation is shown in Table below

Table No.4 weight of oil with respect to time

Weight (g)	Time (mins)
0.31	240
0.41	480
0.55	720
0.58	960
0.70	1200

The essential oil produced by Vacuum Distillation Method is 2.55g weight of essential oil per 130g of dry Rosa Damaceae sample thereby producing 1.96% oil yield at 780C

Hydro Distillation Method:

Table No.5 weight of oil with respect to time

Weight (g)	Time (mins)
0.10	240
0.14	480
0.26	720
0.35	960
0.38	1200

The result of hydro distillation process was 1.23g per 130g of dried Rhizome Ginger sample giving 0.95% yield of oil.

Table No.6 Result of Essential oil Extraction

Method of extraction	% yield
Fractional Distillation Method	2.07
Vacuum Distillation Method	1.96
Hydro distillation	0.95

CONCLUSION:

Fractional distillation, Vacuum distillation and hydrodistillation methods are effective and efficient means of extracting essential oils. extraction is the most common and most economically technique for extracting oil in modern perfume industry because of its simplicity. Vacuum distillation Extraction by was commonly used when distillation was not possible because some fragrant compounds denature through high heat. This technique is not commonly used in modern industries because of its prohitive cost. The essential oil extracted by hydrodistillation has strong odor characteristics of the raw material from which they were produced. When compared with other methods of extraction. It is cheaper because the cost involved is that of energy used in heating water to generate steam. Water itself is the commonest material easily available from nature supply or other alternative sources.

There is high demand for essential oils for various purposes such as medicinal, perfumery, aromatherapy, cosmetic, soap making, insectides to mention but a few. Imported essential oils are very expensive to meet the demand of our local consumer industries, therefore it becomes necessary to source and synthesis these oils from local sources, in particular Geraniol and Ginger With essential oils made from rose petals and ginger rhizome, perfume can be produced locally using different methods of extraction, thereby creating employment.

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