

# Extraction of Essential oil and identification of clove Oil by Clevenger Apparatus and chromatographic analysis

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## Abstract

Eugenol is the main volatile compound extracted oil from clove bud, (*Eugenia caryophyllus*), and used in traditional medicine, as a bactericide, fungicide, anesthetic, and others. Its extraction was performed using hydro distillation(CLEVANGER) which is the most common extraction technique. Its components and thermal behaviour were evaluated using thin layer chromatography (TLC) and differential scanning calorimetry (DSC), which provide a better characterization of these natural compounds. This extracted product was compared to the standard eugenol results. The TLC results suggested ~90% eugenol was found in the total extracted oil, and some of its boiling characteristics were 270.1 °C for peak temperature and 244.1 J g<sup>-1</sup> for the enthalpy variation.

## Keywords

*Eugenia caryophyllus*., Eugenol, Thermal analysis, Differential scanning calorimetric.

## INTRODUCTION

Cloves (*Eugenia caryophyllus*) are the aromatic dried flower buds of a tree in the family Myrtaceae. Cloves are native to the Maluku islands in Indonesia and used as a spice in cuisines all over the world. Cloves are harvested primarily in Indonesia, India, Madagascar, Zanzibar, Pakistan, and Sri Lanka. They have a numbing effect on mouth tissues.

The medicinal properties of clove have been known over the centuries. It is beneficial as a home remedy in curing various health ailments. Cloves have long been considered a home remedy in India for toothaches, joint pains, indigestion, asthma, cough, skin disorders, headache, etc. These health benefits of clove can be attributed to its antimicrobial, antiseptic, antispasmodic, carminative, expectorant, germicidal, rubefacient, stomachic and stimulant properties..

The clove tree is an evergreen that grows to a height ranging from 8–12 m, having large leaves and sanguine flowers in numerous groups of terminal clusters. The flower buds are at first of a pale colour and gradually become green, after which they develop into a bright red, when they are ready for collecting. Cloves are harvested when 1.5–2 cm long, and consist of a long calyx, terminating in four spreading sepals, and four unopened petals which form a small ball in the center.

Clove is a tropical plant and requires warm humid climate. Clove thrives in all situations ranging from sea level up to an altitude of 1000 meters. Deep loamy soil with high humus content found in the forest region is best suited for its cultivation. It grows satisfactorily on late rite soil, loamy and rich black soil having good drainage.

Raised nursery beds are prepared on fertile soil with high Percentage of organic matter. The beds normally measure one meter width and two to three meter length. Seeds should be placed flat at a depth of about 2.5 cm with a spacing of 12 to 15 cm. Germination commences in about 10 to 15 days and completes by about 45 days. The slender and delicate seedlings grow very slowly

The volatile oil extracted from clove buds and have medicinal value as well as adding flavor to food. Cooks have cloves on their spice rack. cloves have been used as a medicine for more than 2,000 years. Cloves have been used by dentists to treat tooth and gum disease. Cloves have antiseptic, disinfectant and germicidal properties. Clove oil is effective as a broad spectrum antibiotic.

Clove oil can relieve toothaches and earaches. Clove oil spray has been used to help relieve bronchial inflammation and cough bad breath, not only because of its aromatic scent, but because it kills germs that cause bad breath. Cloves aid in digestion and can relieve gastric and intestinal gas. The stimulative effect of the clove aids the metabolic processes of the body. Cloves Repel Insects: Cloves can keep moths off your clothes due to a particular smell and taste. Clove oil works as an effective insect repellent when diluted with water in 1:10 ratio. Spray this solution to keep the insects at bay.

The essential oil is extracted by steam distillation and has numerous uses, including as a preservative on microscope slides, a topical anesthetic, a flavoring in gargles and mouthwash's, and as a mild germicidal in toothpastes, perfumes, and aftershaves. Sucking on cloves is said to reduce temporarily the craving for alcohol and to help kick the tobacco habit.

clove oil containing up to 85% eugenol and acetyl eugenol. Eugenol comprises 72-90% of the essential oil extracted from cloves, and is the compound most responsible for the cloves' aroma.

The present manuscript mainly deals with the extraction and isolation of buds of clove with water. It was then isolated by thin layer chromatography. Its preliminary analysis like presence of volatile oil, eugenol.

## **Experimental**

### **Extraction of clove using Clevenger**

Apparatus consist of one round bottom flask of 1000ml which is connected with another two way round flask which holds raw material. The top flask is connected with condenser through the connector. The separating funnel is used for the separation of essential oil and water.

Buds (100 gm) of *Syzygium aromaticum* were collected from F.R.I Dehradun, then washed the buds with water. Clove buds are cut into pieces less than 2 X 2 cm within half a day. After collection and 150-200 g boiled with 500 ml of distilled water in a Clevenger apparatus until oil distillation ceased after 5-6 hrs. The volume of essential oils was determined from a calibrated trap. The essential oils in the distillate were dried over anhydrous  $\text{Na}_2\text{SO}_4$  and kept in the freezer.

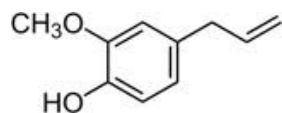
### **Identification by thin layer chromatography(TLC)**

Thin layer chromatography (TLC) is a chromatographic technique used to separate the components of a mixture using a thin stationary phase supported by an inert backing. TLC is an analytical tool widely used because of its simplicity, relative low cost, high sensitivity, and speed of separation. Developing a TLC plate requires a developing chamber or vessel. The chamber should contain enough solvent to just cover the bottom and should have a lid or other covering to minimize evaporation. Cut the plate to the correct size and using a pencil gently draw a straight line across the plate approximately 1 cm from the bottom. It is important to use a pencil

rather than a pen because inks commonly travel up the plate with the solvent. Using TLC pipettes, apply spots of analytic to the line. This can be done by using the short-wave UV. A purple spot should be seen.

### Preliminary analysis of volatile oil:-

After extraction volatile clove oils obtained about 2ml from 100 gm of clove bud and its containing up to 85% eugenol and acetyl eugenol, methyl salicylate, pinene, and vanillin. It contains gum, tannins, flavonoids and sterols. Triterpenoids like oleanolic acid, stigma sterol and camp sterol; and several sesquiterpenes



EUGENOL

### Monographic analysis of clove:-

Parameters	Obtained value	Pharmacopoeial limit
Foreign organic matter	1.75 ± 0.60	NMT 2%
Total ash	7.33 ± 0.33	NMT 9
Acid-insoluble ash	0.983 ± 0.0118	NMT 1%
Alcohol-soluble extractive	10.64 ± 0.40	NLT 8%
Water-soluble extractive	14.55 ± 0.162	NLT 9%

### Percentage yield of extracts:-

Plant	Weight % yield of raw material(gm)	Weight of the extract	% Yield (ml)
<i>Eugenia caryophyllus</i>	100 gm	2ml	2ml

## Result and discussion

*Eugenia caryophyllus* buds yielded volatile oil is about 2ml from 100gm of clove buds. It also give positive result for alkaloid ,tannins , flavanoids and sterols. Its components and thermal behaviour were evaluated using thin layer chromatography (TLC) and differential scanning Calorimetry (DSC), which provide a better characterization of these natural compounds. This extracted product was compared to the standard eugenol results. The TLC results suggested ~90% eugenol was found in the total extracted oil, and some of its boiling characteristics were 270.1 °C for peak temperature and 244.1 J g<sup>-1</sup> for the enthalpy variation.

## Conclusion

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