

Review Article

## A REVIEW ON PHARMACOLOGICAL USES OF ESSENTIAL OIL

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### Abstract

The Egyptians are thought to use the aromatic herbs for cosmetic and other medicinal purposes. Several pots and other vessels are found which reflect that Egyptians have specialized the extraction procedures. Ayurveda which was written thousands of years ago, contains mentioning of essential oils in formulations. The ayurvedic system of medicine is based on extracts of plants by different procedures in different amounts. During the dark ages, monks kept herbal system of medicine alive and practiced to cure population. The anti bacterial and anti pesticide properties were discovered during this time

**KEYWORDS:** essential oils, aromatherapy, anticancer activity

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### INTRODUCTION

Aromatherapy involves inhalation of essential oils with good fragrance to prevent or cure disease, infection or indisposition. It has been proved that inhalation has a direct communication with central nervous system activity and control. Chinese has been using storax pill essential oil in their folk medicine for treatment of epilepsy

Some fragrant compounds produces tranquilizing effect on the subject upon inhalation. The sleeping time is also effected in some cases when accompanied with other drugs showing their synergistic effects. The major component of cardwood essential oil has shown its hypnotic effect and prolongation of pentobarbital induced sleeping time. Lavender has several pharmacological activities and is used in curing menopausal disorders by inhalation

### ANTIMICROBIAL ACTIVITY

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Many essential oils exhibit antibacterial and antiviral activities and proved as potent therapeutic agent. These are used against both pathogenic and non-pathogenic organisms. Following strains have been identified as sensitive against essential oils

*Listeria monocytogenes*

*Linnocua*

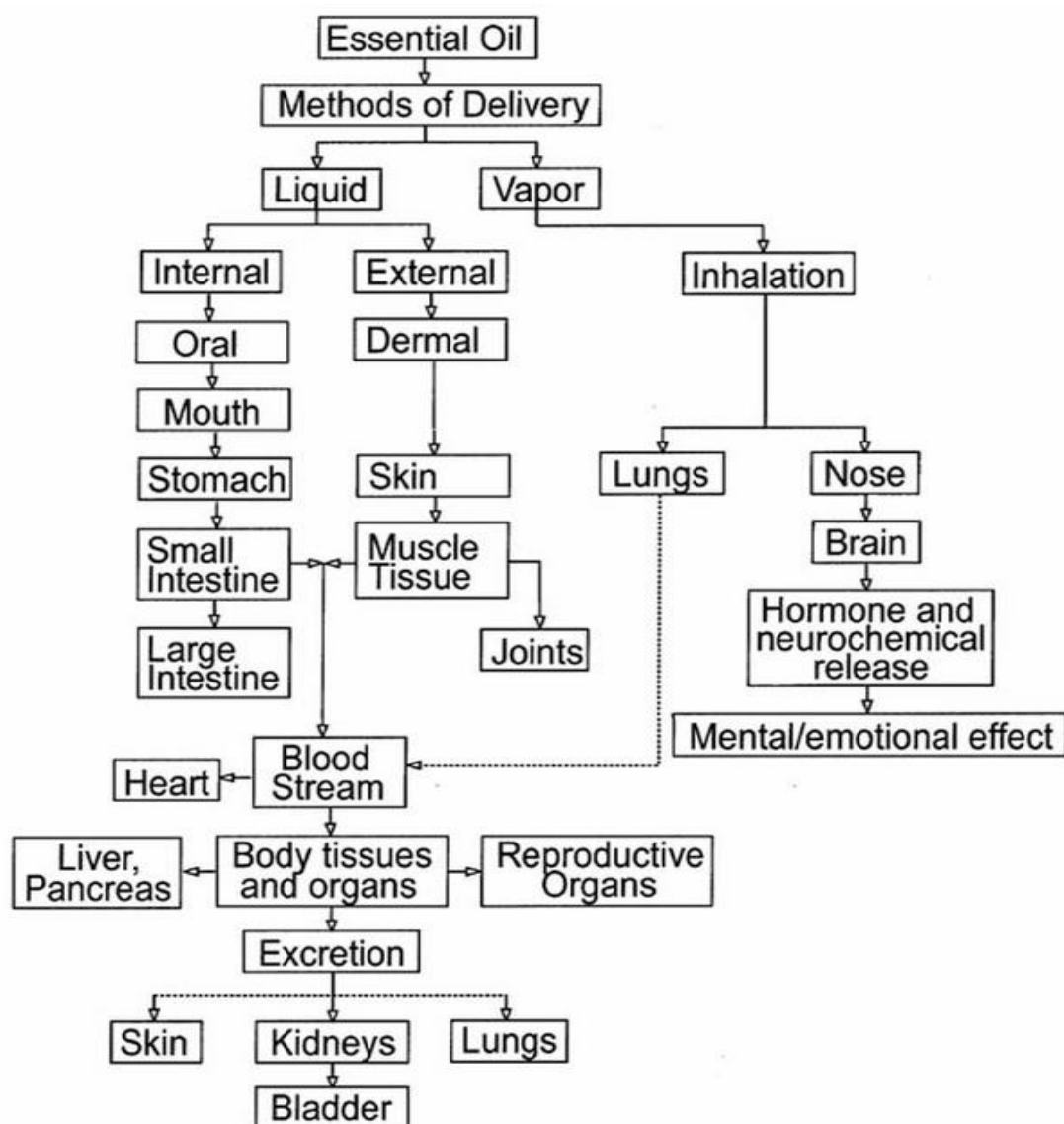


Figure 1: Essential Oils

*Salmonella typhimurium*

*Shigelladysentria*

*Bacillusscerus*

*Staphylococcus aureus*

Along with antibacterial potential, the essential oils have also shown their interesting potential towards viruses and providing a very useful alternate line of treatment for viral diseases.

Cinnamaldehyde also inhibits fungal wall by inhibiting certain enzymes. When used as a combination with probiotics, essential oils can reduce the microbial load in intestines.

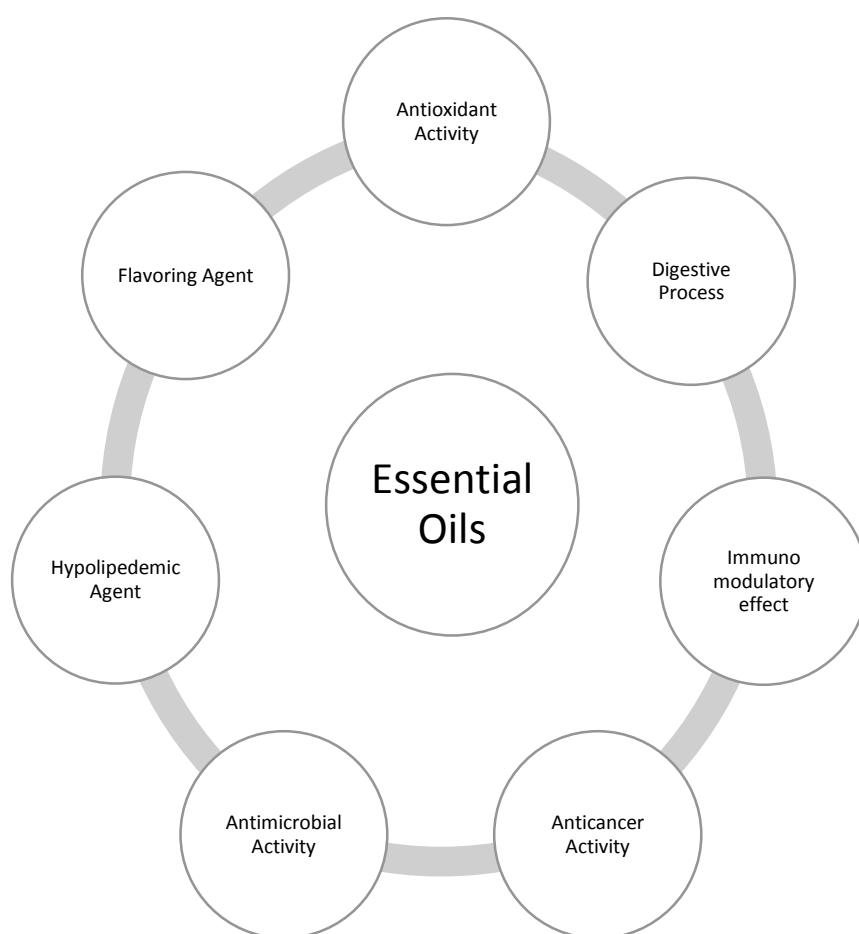
Essential oils have hydrophobic character, so they easily penetrate the membrane of bacterial and reach the inner part of cell, which contributes their potency.

## ANTICANCER ACTIVITY

Some of the isolated components of essential oils also exhibited anti cancer activity when testes on a number of human cell linings. These include bening tumors, breat cancer, leukemia. A sesquiterpene derived element found in many essential oils has been found significantly effective on glioma. D-limolene has been proved as a potential anticancer drug that stimulates apoptosis inhibiting the future proliferation of cancer cells.

When human cells were treated with eucalyptus oils, they showed morphological changes which was caused due to fragmentation of their genetic material indicating apoptosis.

One another essential oil derived from *Tetraclinis articulate* which belongs to conifers has shown a remarkable apoptosis when treated on human cancer cell lines. Cinnamaldehyde also inhibits fungal wall by inhibiting certain enzymes. When used as a combination with probiotics, essential oils can reduce the microbial load in intestines.



**Figure 2: Activity of Essential Oils**

Scientists are working hard to get the essential oils in laboratory but are not very much successful with most of the oils. It is to mention here that even when the same chemical components which are used by nature to make the same oil do not produce the same result in laboratory. Oils with nearby properties can be obtained but identical oils are not yet possible to made.

The copy obtained in the laboratory normally do not possess the same therapeutic effect as obtained from oils from nature. The current scientific advancements are not able to unlock the secrets of essential oils and the reason behind their therapeutic efficacy.

For example, it is possible to make lavender oil in laboratory by making use of correct chemical components which include lavandulol, borneol and other aldehydes, but oil obtained from such process is not able to treat burns as effectively as natural oil can do.

To understand the composition of essential oils, it is first to consider the structure of isoprene unit.

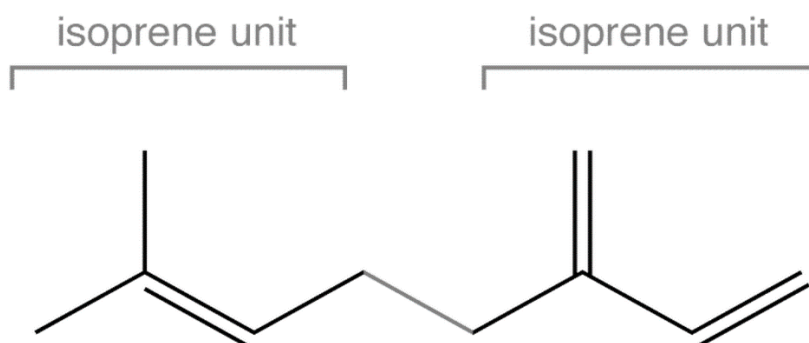


Figure 3. Structure of Isoprene unit

Every single oil has more than thousands of components but the above figure explains how a single component can be joined again and again to get a long chain as below

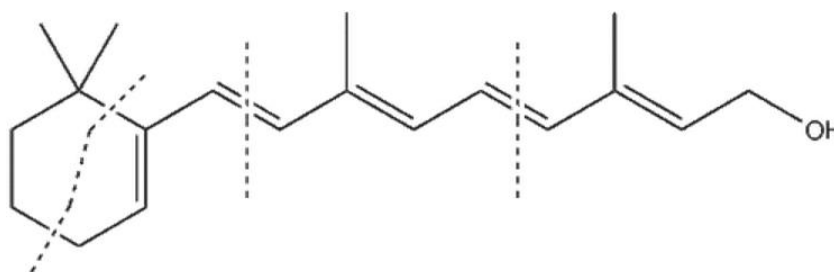


Figure 4 Head to tail bonding of isoprene units.

When the essential oils are analyzed with chromatographic and other instrumentation techniques, the several organic components are found.

#### TERPENE HYDROCARBONS

The terpenes primarily consisted of monoterpene hydrocarbons and sesquiterpenes.

#### MONOTERPENE HYDROCARBONS

The monoterpene hydrocarbons are found in almost all essential oils and consists of a structure of ten C atoms and at least one double bond. Two isoprene units constitute the 10 carbon atom structure

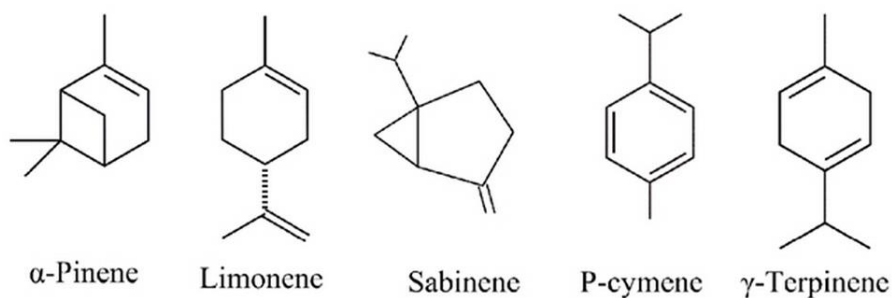


Figure 5: Monoterpenes

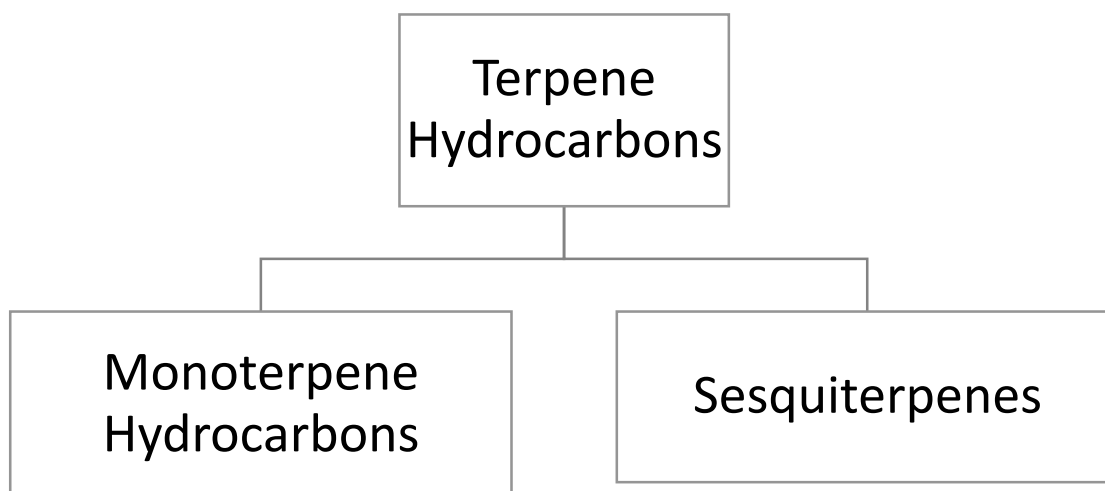


Figure 6: Primary components of essential oils

Due to their reaction with air and heat sources, it is observed that citrus oils do not last long, the monoterpenes have a quick reaction with air at higher temperatures and are easily oxidized.

It can be stated that these components have antiseptic, anti-inflammatory and antiviral activities along with antibacterial properties as well. It is a broad generalization, since this group of chemicals has a large variation. The decongestant activity of such compounds is attributed to stimulating effect.

#### SESQUITERPENES

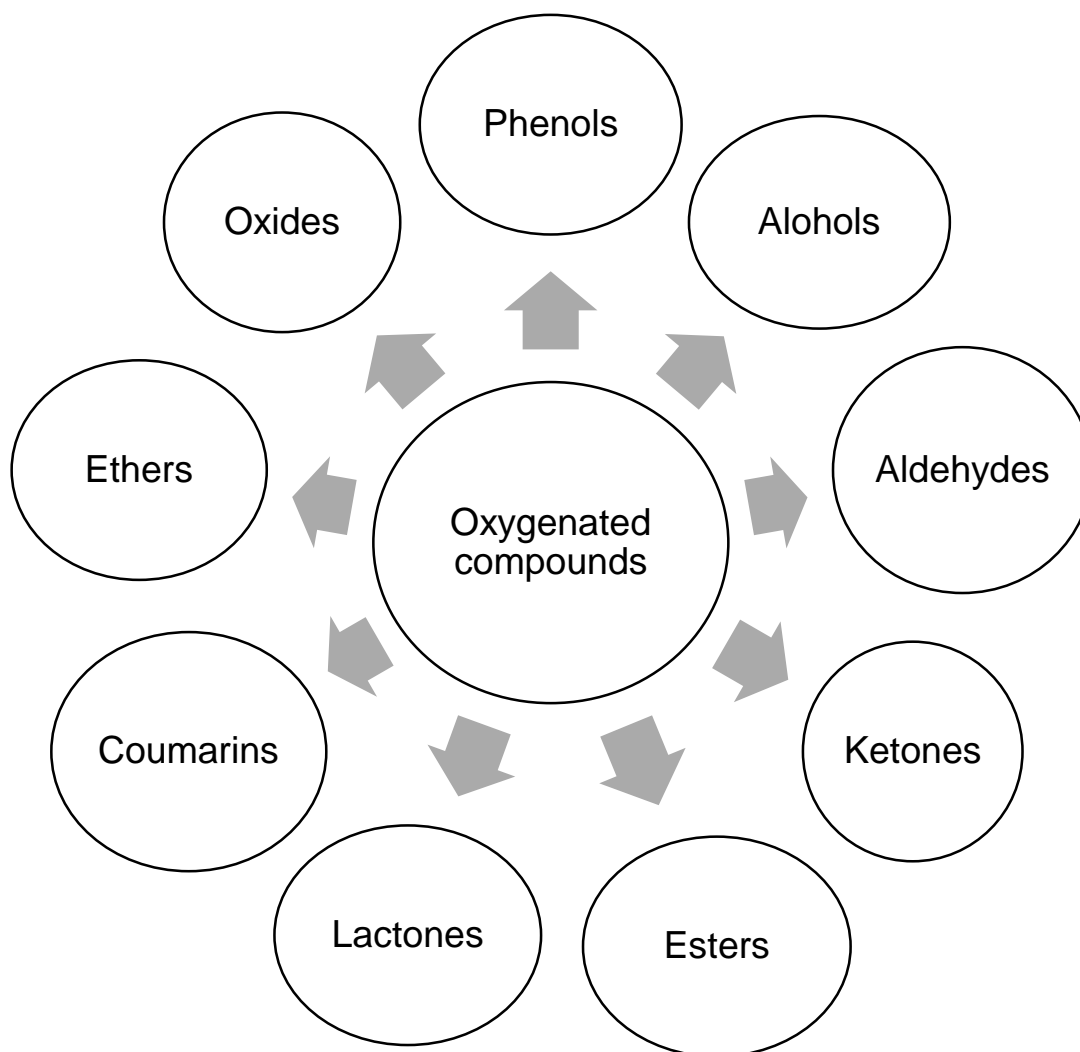
These sesquiterpenes consist of fifteen carbon atoms and can have complex therapeutic actions. Some of these have anti-inflammatory activity and anti-allergy activity. In 1910 the Nobel Prize for chemistry went to Professor Otto Wallach for his contribution in understanding the chemistry of terpenes which influenced the essential oil industry.

#### OXYGENATED COMPOUNDS

The oxygenated compounds are classified as below.

## PHENOLS

The phenols are among the constituents of essential oils have a carbon side chain and some compounds such as thymol, eugenol and carvacrol represents the group. They show great antiseptic, anti bacterial and disinfectant qualities. The stimulating properties of these are also well known.



**Figure 7: Oxygenated compounds**

Due to toxicity caused by phenols, the essential oils containing phenols are recommended for usage in short duration. The liver is burdened with prolonged usage of phenol containing essential oils. Although, on one side cinnamon and clove oil are used for application on skin, still these are capable of causing irritation in some of the cases.

## ALCOHOLS

Alcohols can be classified into monoterpene alcohols and sesquiterpene alcohols. These are known to show very good antiseptic, antiviral and antifungal activity. The side effects of irritation to skin have uplifting and energizing effect. Sesquiterpene alcohols are not very common but have great therapeutic properties including liver, glandular stimulation, anti allergic and anti inflammatory properties.

## ALDEHYDES

The essential oils containing aldehydes are known to possess anti fungal, anti inflammatory, disinfectant along with sedative hypnotic properties. The aldehydes find their usage in aromatherapy a lot with citrus like fragrance example lemon grass oil. The instability of aldehydes is due to its easy oxidation in presence of heat and oxygen.

## KETONES

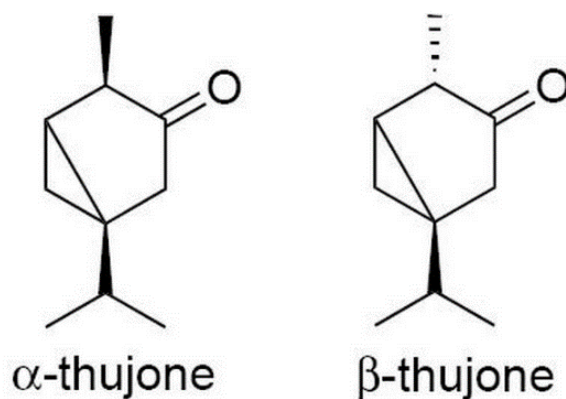


Figure 8: Forms of Thujone

Some of the ketones like thujone are toxic yet, they also have some good therapeutic benefits, especially in the field of easing the mucus secretion and regeneration of tissues. These are contraindicated during pregnancy time. Some oils like eucalyptus and rosemary have low amount of ketones, but when used with proper composition in aromatherapy produces very good results. The other properties of ketone containing essential oils include skin regeneration, wound healing and used in lessening of scar marks and other stretch marks

## ESTERS

When acids react with alcohols, esters are made. They are also made during biochemical reactions and form a component of essential oils. Basically esters are sweet smelling compounds and wherever they are present are characteristic distinguish. These also contain anti spasmodic action. Anti microbial activity is also reported by some ester containing essential oils. The most well known ester compound is lavender oil which is the largest used ester in commerce for fragrance purposes. Unlike aldehydes and ketones, esters possess very low toxic profiles so can be used liberally without any caution.

## LACTONES/COUMARINS

When carbon ring is integrated into an ester group lactones are formed. Coumarins are closely related with lactones and are often used interchangeably. Lactones possess neurotoxic effects and have capacity to sensitize skin and produce irritation. The presence of lactones and coumarins in essential oils is not very large.

## ETHERS

Ethers of phenols are also found in essential oils. Example anethol in aniseed. Ether compounds are highly sensitive to temperature and heat. They degrade very fast and are volatile in nature.

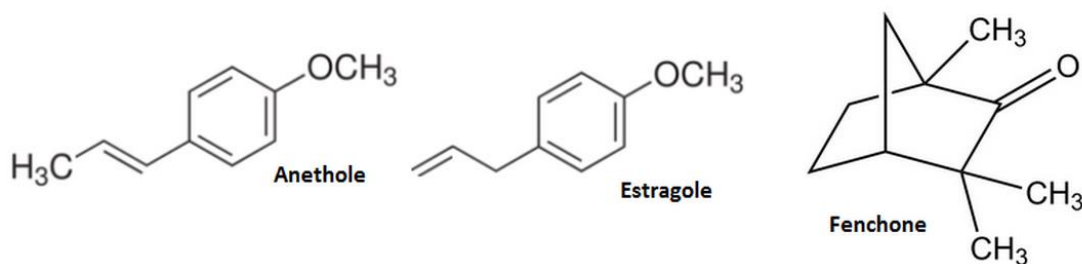


Figure 9: Essential oils found in Fennel

#### Oxides

Expectorant properties are represented by essential oils containing oxides. Eg. 1,8-cineole or eucalyptol is most commonly used expectorant.

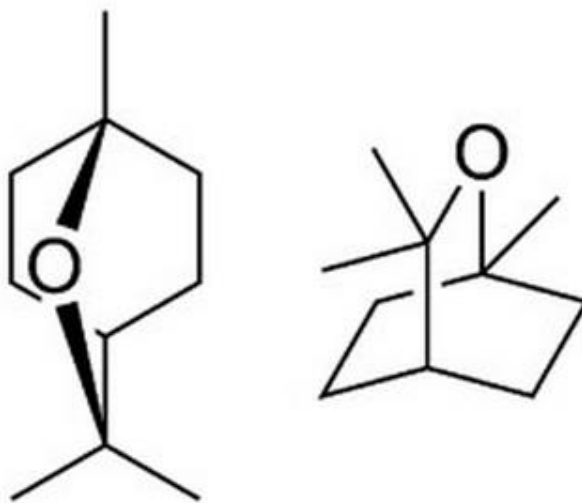


Figure 10: Eucalyptol (1,8-Cineol) has two forms

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