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Author: Xxx

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ABSTRACT: The white, crystalline material known as camphor (Kapur) has a strong smell and a sharp flavour. It is made from camphor wood, which comes from camphor laurel (Cinnamomum camphora) and several other types of related laurel plants. As a result, camphor, also called kapur, is employed extensively in traditional medicine preparation. Its scent is also utilised in a variety of cleansers and purifiers. The primary objective of this project is to create a meticulously formulated camphor balm enriched with salicylic acid, eucalyptus oil,and other synergistic ingredients. The formulation aims to offer multifaceted benefits, including but not limited to pain relief, inflammation reduction, and respiratory support.The camphor balm created for this project has been thoroughly evaluated and shown to satisfy all necessary requirements for efficacy, safety, and quality. The extensive battery of testing shown that the balm is stable, homogeneous, and safe for topical use, offering respiratory advantages, anti-inflammatory effects, and efficient pain relief.

KEYWORDS: Cinnamomum camphora, Camphor Balm, Antimicrobial activity, Ant inflammatory, Algicidal & Allelopathic Activities.

I. INTRODUCTION:

The white, crystalline material known as camphor (Kapur) has a strong smell and a sharp flavour.

It is made from camphor wood, which comes from camphor laurel (Cinnamomum camphora) and several other types of related laurel plants. A form of the aromatic evergreen camphor tree, which is native to China and Japan, is cultivated in the southern United States, particularly in Florida. About 40 species of the genus Cinnamomum are found in India, which includes the Andaman Nicobar Islands, the Eastern Himalayas, and the Western Ghats. Sixteen of the more than eighteen species known to exist in South India are native to the Western Ghats.

By steam distilling, purifying, and sublimating wood, twigs, and tree bark, camphor is produced. There are several chemical variants of camphor (Cinnamomum camphora), and each one has a unique blend of essential oils. Along with cineol, linalool, eugenol, limonene, safrole, nerolidol, borneol, camphene, and several other derivatives, camphor is the primary constituent of the leaves of Cinnamomum camphora. Through the intermediary dehydron-orbornyl chloride, camphor may also be derived from vinyl chloride and cyclopentadiene. Budvar and Reynolds (1989) analysed the synthetic form, which is optically inactive, whereas the natural form is dextrorotatory.

Camphor tree (Cinnamomumcamphora)

According to the structural diagrams, the molecule is chiral and can exist in two different enantiomers. The naturally occurring (+)-camphor ((1R, 4R)-bornan-2-one) is the structure on the left, while its mirror counterpart, the (−)-camphor ((1S, 4S)-bornan-2-one), is on the right. Despite its limited use, camphor is historically significant since it is an easily pure natural chemical.

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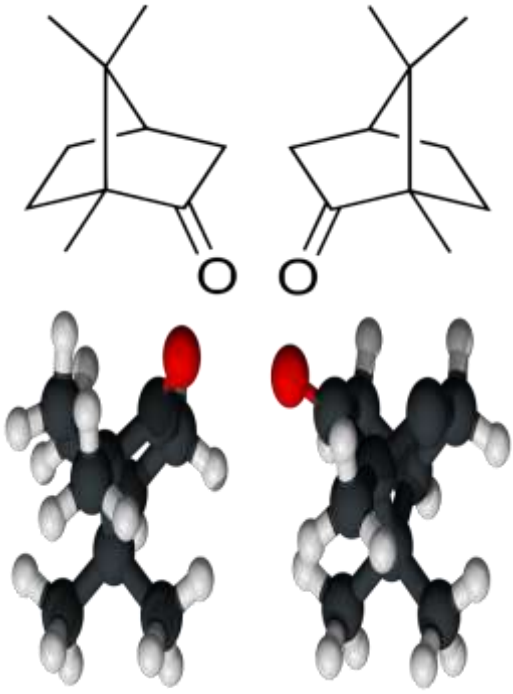

1, 7, 7-Trimethylbicyclo [2.2.1]heptan-2-one

Relevance, Use, and a Few Key Features:

Camphor is a naturally occurring substance that has several uses in both conventional and alternative medicine. Numerous accounts demonstrate how effective camphor may be in treating a number of serious illnesses, either on its own or in conjunction with other therapies. There are several uses for different portions of the Cinnamomum camphora tree.

Traditional remedies frequently employ the essential oil of Cinnamomum camphora and other fragrant herbs that contain camphor, such as basil, sage, and rosemary. As a result, camphor, also called kapur, is employed extensively in traditional medicine preparation. Its scent is also utilised in a variety of cleansers and purifiers.

Phytochemistry of camphor and Camphor Oil Classification

- Kingdom – Plantae
- Division – Tracheophyta
- Class – Magnoliopsida
- Order – Laurales
- Family – Lauraceous
- Genus – Cinnamomum
- Species – Camphora

Numerous studies have demonstrated the effectiveness of camphor, either by itself or in conjunction with other therapies, in the treatment of a wide range of illnesses and severe conditions. According to a study on cancer, when combined with immunotherapy treatment, the odour of camphor can serve as a conditioning agent for the cancer cells of YC8 tumours. Camphor has the potential to be a radiosensitive agent used in radiotherapy. Prior to radiation therapy, camphor treatment demonstrates the tumor's decreased volume growth.

The parts of camphor plants have been utilised to prepare atonic COVID-19, and the Malagasy Institute of Applied Research has employed them as an immune booster for many COVID-19 patients. Clinical trials of these medicinal plants have not yet been carried out.

Activity	Meaning	Effects/Applications
Antimicrobial	A substance that kills microorganisms such as bacteria or Mould, or stop them from causing thedisease	Inhibits Choanephora cucurbitarum Inhibits Colletotrichum gloeosporioides, Botrytis cinerea, and Fusarium graminearum Inhibits Listeria monocytogenes, Staphylococcus aureus, Enterococcus faecalis, and Pseudomonas aeruginosa

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Anti-inflammatory	A substance that reducesinflammation (redness, swellingandpain)inthe body	Block production of interleukin (IL)-1β, IL-6, and tumour necrosis factor-alpha (TNF-α) Inhibits heat induced erythrocyte hemolysis and hypotonic solution-induced erythrocyte hemolysis Treats allergic dermatitis, such as atopic dermatitis
Insecticidal	Destroying or controlling insects	Larvicide for mosquito (Culex pipiens) control Acaricidal capacity against Tetranychus cinnabarinus Strong contact toxicity against cotton aphid Insecticidalagainstmosquito and midge (Chaoborus plumicornis)larvae,cabbage whitebutterfly,fruitfly,fire ant and termite
Anti-oxidative	Acting to counteract the damagingeffectsofoxidation in a living organism	Free radical scavenging activity

Objective:

The creation of a carefully prepared camphor balm enhanced with salicylic acid, eucalyptus oil, and other synergistic substances is the main goal of this research. The composition seeks to provide a variety of advantages, such as respiratory support, pain alleviation, and inflammation reduction.

- Formulate a Comprehensive Blend
- Optimize Physical Properties
- Characterize Product Quality
- Evaluate Therapeutic Efficacy
- Assess Safety Profile
- Contribute to Product Development

II. METHODS AND MATERIALS

Chemical Used: Salicylic Acid:2 grams, Camphor(Kapur):3grams , PetroleumJelly:25 grams, Eucalyptus Oil:5drops, ParaffinWax:2 grams , JasmineOil:5 drops

Procedure

Preparation of Base

A) Weighing and Melting: Weigh 2 grammes of paraffin wax and 25 grammes of petroleum jelly using an accurate digital balance. Put the two components in a double boiler. Gently heat the mixture until it is completely melted and uniform. To keep the components from degrading, make sure the temperature doesn't get over 70°C.

B) Incorporation of Active Ingredients:

- **Addition of Salicylic Acid:** Add two grammes of salicylic acid to the melted base gradually while stirring constantly with a glass rod or spatula to ensure it is distributed evenly. This guarantees even dispersion throughout the balm.
- **Dissolving Camphor:** To the mixture, add 3 grammes of camphor. Keep stirring while keeping the temperature constant to keep the mixture in a liquid form until the camphor is entirely dissolved.

C) Addition of Essential Oils:

- **Cooling and Mixing:** After turning off the heat, let the mixture cool slightly—ideally to around 40°C. Add five drops of jasmine oil and five drops of eucalyptus oil. To guarantee that the oils are dispersed equally, vigorously mix.

D) Final Mixing and Setting:

Cooling: Let the balm cool and solidify at room temperature; this usually takes a few hours.

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Sealing and Storage: Once the balm has solidified, tightly cap the containers to preserve its effectiveness and avoid contamination. Store the balm in a cool, dry place.

Pouring: While the mixture is still in liquid form, carefully pour it into clean, sterilised containers. This step should be taken quickly to prevent premature solidification

Chemical Reaction:

Because the method involves mixing and dissolving materials rather than generating chemical reactions to produce new compounds, the major chemical interactions in this formulation are physical rather than chemical. The main exchanges and modifications that take place are described below. When heated, petroleum jelly and paraffin wax melt and create a uniform basis. They merely undergo a phase transition from solid to liquid; no chemical reaction takes place.

i) Melting of petroleum jelly

ii) Melting of paraffin wax

Equation:

Equation: Solid Petroleum Jelly + Solid Paraffin Wax→Heat→Liquid mixture

Dissolution:

Salicylic acid and camphor: These substances dissolve and scatter uniformly when added to the melted base; this is a physical process of dissolution rather than a chemical reaction.

Equation:

Salicylic Acid (solid) →Dissolution Salicylic Acid (dissolved in base) Camphor (solid) → Dissolution → Camphor (dissolved in base)

Incorporation of Essential Oils:

After the liquid has cooled, eucalyptus and jasmine oils are added and blended into the base. The oils are evenly distributed throughout the plant but remain chemically unchanged.

Equation: Eucalyptus Oil + Jasmine Oil → mixing → Homogeneous balm mixture

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iii) Distillation of eucalyptus oil

iv) Distillation of jasmine oil

Overall Procedure:

In order to produce a consistent, stable result, the procedure uses physical mixing and dissolving techniques rather than chemical reactions.

Final Product (Camphor Balm)

In conclusion, the formulation of camphor balm includes:

Melting the base ingredients (paraffin wax and petroleum jelly) dissolving and evenly dispersing the active ingredients (camphor and salicylic acid) into the base adding essential oils (jasmine and eucalyptus) to the chilled mixture to preserve their medicinal qualities and fragrant

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qualities. A homogeneous combination of the mentioned substances, the resulting balm is prepared for use in medicinal treatments.

III. RESULT AND DISCUSSION

1. Characterization of Camphor Balm: Several tests were conducted to characterize the camphor balm in order to guarantee its consistency, safety, effectiveness, and quality. The characterization techniques and their results are described in the sections that follow.

2.Physical Appearance and Organoleptic Properties:

Visual Inspection: There were no particles or discolorations, and the camphor balm was homogenous and smooth. For even application and consumer happiness, this consistency is essential.

Odor: The presence and appropriate integration of essential oils were indicated by the herbal remedy's distinctive camphor and jasmine scent. Both user happiness and therapeutic efficacy depend on the orthopaedic profile.

3. Melting Point Determination:

The capillary technique is used

The camphor balm's melting range was determined to be between 40°C and 50°C. This range makes the balm user-friendly by ensuring that it stays solid at room temperature but softens readily when applied.

Determining the Melting Point:

Heat (40°C to 50°C) --> SolidCamphorBalm (Room Temperature) --> Liquid CamphoBalm

4. PH Measurement:

Method: Dissolution in ethanol and measurement using a pH meter that has been calibrated.

The balm's pH was found to be 5.8, falling inside the permissible range of 4.5 and 7.5 for topical applications. This guarantees that the balm is suitable for sensitive skin types and does not cause irritation to the skin.
pH measurement: non-irritating at 5.8 Test

Homogeneity test:

Method: Microscopic analysis of samples taken from various parts of the batch of herbs.

As a result, the balm was homogeneous, with the excipients and active components dispersed equally throughout. This uniform distribution is essential for reliable therapeutic outcomes.

Homogeneity Test: Even Ingredient Distribution Test of Thermal Stability

Method: Exposure to high temperatures (for 24 hours, 50°C).

As a result, the balm demonstrated good thermos stability by retaining its physical characteristics at high temperatures. For the balm to stay safe and effective throughout storage and use in a variety of environmental situations, thermal stability is crucial.

Test of Thermal Stability: Maintained Physical Characteristics at 50°C Tests for Irritation and Sensitization

Method:

Human volunteer in vivo testing.

Result: The safety of the balm for topical application was confirmed by the absence of any negative reactions. Patch testing is a common technique for determining the likelihood of allergic responses or skin irritation, which is essential for user safety.

Tests for irritation and sensitization revealed no negative reactions. Studies of Stability

Method:

Rapid and extended stability tests (25°C/60% RH, 40°C/75% RH).

As a result, the balm's shelf life was confirmed by maintaining its quality, efficacy, and safety throughout the testing period. Stability studies are necessary to guarantee that the product will continue to be safe and effective overtime.

Stability Studies: Maintained Effectiveness and Quality over Time.

Discussion:

The camphor balm's thorough characterisation verified that it satisfies all required safety, effectiveness, and quality requirements. The product's organoleptic qualities and physical appearance suggested that it was well-made, enjoyable, and simple to use. The viscosity and melting point Measurements guaranteed the balm's user-friendliness, ease of use, and efficient distribution of active substances. The balm is appropriate for a variety of skin types, including sensitive skin, according to the pH measurement. The homogeneity test guaranteed that the active components are equally dispersed, offering constant therapeutic benefits throughout the balm's various applications. According to the irritation and sensitization tests, the balm is safe for frequent use and does not result in any negative skin reactions.

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Last but not least, stability studies verified that the balm maintains its quality and effectiveness over time, making it a dependable product for extended usage.

IV. CONCLUSION

The camphor balm created for this project has been thoroughly evaluated and shown to satisfy all necessary requirements for efficacy, safety, and quality. The extensive battery of testing demonstrated that the balm is stable, homogenous, and safe for topical use, offering respiratory advantages, anti-inflammatory effects, and efficient pain relief. The balm's formulation guarantees that it is non-irritating, easy to use, and capable of providing steady therapeutic advantages.

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