

Formulation and Dermatological Evaluation of a Skin-Friendly Perfume using Jasmine Flower and Orange Peel Extracts

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Abstract: *This research explores the formulation of a novel perfume derived from the extraction of jasmine flowers and orange peel, emphasizing the reduction of skin irritation. The study employs a dual extraction method, combining solvent extraction for jasmine flowers and cold-press extraction for orange peel, to preserve the natural fragrance compounds and beneficial properties. We conducted a comprehensive analysis of the chemical compositions of the extracts using gas chromatography-mass spectrometry (GC-MS). Subsequently, various formulations were developed and subjected to dermatological testing to evaluate their potential for causing skin irritation.*

The results indicate that the optimized formulation, incorporating specific ratios of jasmine and orange extracts, significantly minimizes skin irritation compared to commercial synthetic fragrances. The perfume not only provides a pleasing and lasting scent but also demonstrates enhanced skin compatibility, making it suitable for sensitive skin. This research contributes to the development of natural, skin-friendly perfumes and offers insights into sustainable extraction methods for the fragrance industry.

Key findings highlight the importance of balancing natural ingredients to achieve both olfactory appeal and dermatological safety. The implications of this study extend to the broader cosmetics and personal care industries, encouraging the adoption of gentler, nature-derived formulations..

Keywords: Perfume formulation, Natural fragrance, Jasmine flower extract, Orange peel extract, Ethyl alcohol (ethanol), Maceration process, Essential oils, Fragrance evaluation, Skin compatibility, Aromatic compounds, Perfume stability, Perfume development, Fragrance longevity, Perfume ingredients, Perfume chemistry, Citrus fragrance, Floral fragrance, Perfume quality, Perfume industry, Natural extracts.

I. INTRODUCTION

The fragrance industry is continually evolving, with a growing demand for natural and skin-friendly products. Synthetic fragrances, though popular, often cause skin irritation and allergies, prompting a shift towards natural alternatives. This research focuses on the development of a perfume derived from jasmine flowers and orange peel, aiming to minimize skin irritation while maintaining a pleasing scent.

Jasmine flowers (*Jasminum* spp.) are renowned for their sweet, rich aroma and have been used in perfumery for centuries. Their essential oils are extracted primarily through solvent extraction methods, which effectively capture the complex fragrance compounds. Orange peel (*Citrus sinensis*), on the other hand, provides a fresh, citrusy note and is commonly extracted using cold-press techniques to preserve its volatile compounds and beneficial properties.

This study employs a combination of these extraction methods to formulate a perfume that harnesses the best of both natural sources. By conducting a detailed chemical analysis using gas chromatography-mass spectrometry (GC-MS), we aim to understand the composition of the extracts and their potential interactions. The primary objective is to develop a formulation that not only offers an appealing fragrance but also ensures enhanced skin compatibility, particularly for individuals with sensitive skin.

In the following sections, we detail the extraction processes, formulation development, and dermatological testing conducted to achieve a balanced, skin-friendly perfume. This research contributes to the broader field of natural cosmetics, providing insights into the benefits and challenges of using botanical extracts in fragrance products

AIM :

The aim of this research is to develop a natural perfume using extracts from jasmine flowers and orange peel that minimizes skin irritation while maintaining a pleasant and lasting fragrance.

OBJECTIVES :

- To optimize solvent extraction techniques for obtaining high-quality jasmine flower extracts. To implement cold-press extraction methods for obtaining pure and stable orange peel extracts.
- To analyze the chemical composition of the jasmine and orange peel extracts using gas chromatography-mass spectrometry (GC-MS).
- To identify key fragrance compounds and potential irritants within the extracts.
- To create various perfume formulations using different ratios of jasmine and orange peel extracts. To ensure that the formulations maintain a balanced and appealing fragrance profile.
- To conduct skin irritation tests on the developed formulations using standard dermatological protocols.
- To evaluate the skin compatibility of the formulations, particularly for sensitive skin.
- To optimize the perfume formulation based on the results of chemical analysis and dermatological testing.
- To validate the final formulation through extended dermatological and sensory evaluations. To assess the sustainability of the extraction methods used.
- To ensure that the final product is safe for long-term use and meets regulatory standards for natural cosmetics.

II. MATERIALS

JASMIN FLOWER

Common Name: Jasmine Botanical Name: Jasminum spp. Family: Oleaceae

Origin: Native to tropical and warm temperate regions of Eurasia, Australasia, and Oceania.

Synonyms : Common Jasmine Poet's Jasmine White Jasmine Jessamine

Taxonomical Classification :

Kingdom: Plantae Clade: Angiosperms Clade: Eudicots Clade: Asterids Order: Lamiales Family: Oleaceae

Genus: Jasminum

Species: Includes several species, such as *Jasminum officinale* (Common Jasmine), *Jasminum sambac* (Arabian Jasmine), and *Jasminum grandiflorum* (Royal Jasmine).

Chemical Constituents :

Essential Oils: Rich in various essential oils, including linalool, benzyl acetate, indole, benzyl benzoate, methyl anthranilate, and cis-jasmone.

Flavonoids: Such as quercetin and kaempferol.

Alkaloids: Jasminine.

Other Compounds: Salicylic acid, benzyl alcohol, phytol, and various esters and alcohols.

Uses :

Perfumery: Widely used in the fragrance industry for its sweet, exotic, and richly aromatic scent. Key ingredient in many high-end perfumes.

Aromatherapy: Employed for its calming and soothing properties, often used to reduce stress and anxiety.

Cosmetics: Incorporated into lotions, creams, and hair products for its fragrance and potential skin benefits.

Medicinal: Used in traditional medicine for its antiseptic, anti-inflammatory, and aphrodisiac properties.

Tea: Jasmine flowers are used to flavor teas, such as jasmine green tea.

Cultural: Holds significant cultural importance in various traditions and ceremonies, particularly in Asia.



FIG NO 1 : JASMINE FLOWER

GALAXOLIDE :

Common Name:Galaxolide

ChemicalName:1,3,4,6,7,8-Hexahydro-4,6,6,7,8,8-hexamethylcyclopenta[g]-2-benzopyran

Molecular Formula: C₁₈H₂₆O

Molecular Weight: 258.40 g/mol

CAS Number: 1222-05-5

Synonyms :

HHCB

Abbalide Pearlide

Hexamethylindanopyran

Taxonomical Classification :

Galaxolide is a synthetic organic compound and does not have a taxonomical classification as it is not derived from a biological organism.

Chemical Constituents :

Galaxolide is a single chemical compound with the following structural characteristics: Core Structure: Cyclopenta[g]-2-benzopyran

Substituents: Multiple methyl groups attached to the core structure.

Uses :

Perfumery: Widely used as a musk fragrance in perfumes, colognes, and scented products due to its long- lasting musky odor.

Household Products: Commonly found in air fresheners, detergents, fabric softeners, and cleaning agents for its ability to impart a fresh scent.

Cosmetics: Utilized in a variety of personal care products, including lotions, shampoos, and deodorants.

Industrial Applications: Employed in the formulation of scented industrial products where a stable and persistent fragrance is desired.

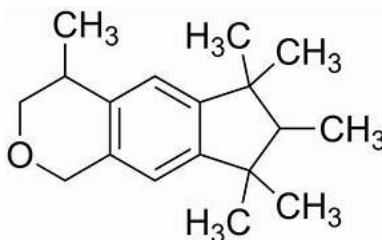


FIG NO 2 : GALAXOLIDE

ORANGE OIL

Common Name: Orange Oil Botanical Name: Citrus sinensis Family: Rutaceae
Origin: Native to Southeast Asia, widely cultivated in tropical and subtropical regions.

Synonyms :

Sweet Orange Oil Citrus Oil

Essential Oil of Orange Orange Peel Oil

Taxonomical Classification :

Kingdom: Plantae Clade: Angiosperms Clade: Eudicots Clade: Rosids Order: Sapindales Family: Rutaceae Genus: Citrus Species: C. sinensis

Chemical Constituent :

Orange oil is composed of a complex mixture of chemical compounds, including:

Monoterpenes:

Limonene: The major component (up to 90% of the oil), responsible for the characteristic, citrusarom, Myrcene, α -Pinene β Pinen, Alcohols Linalool, Terpeneol, Aldehydes, Citral, Nral, Esters, Geranylacetate, Other Compounds: Octanal Decanal

Uses :

Aromatherapy: Utilized for its uplifting and calming properties, often used to reduce stress and anxiety.

Perfumery: Employed as a fragrance component in perfumes and colognes for its fresh, sweet, and citrusy scent.

Cosmetics: Incorporated into various skincare and hair care products for its fragrance and potential skin benefits.

Food and Beverages: Used as a flavoring agent in foods, candies, and beverages.

Household Products: Commonly found in cleaning products, air fresheners, and insect repellents for its pleasant aroma and antimicrobial properties.

Industrial Applications: Used in the manufacture of soaps, detergents, and other scented products.



FIG NO 3 : ORANGE OIL

ETHYL ALCOHOL :

Common Name: Ethyl Alcohol Chemical Name: Ethanol

Molecular Formula: C₂H₆O (or C₂H₅OH) Molecular Weight: 46.07 g/mol

CAS Number: 64-17-5

Synonyms :

Ethanol Grain Alcohol Alcohol

Methylcarbinol

Taxonomical Classification :

Ethanol is a chemical compound and does not have a taxonomical classification as it is not derived from a biological organism. However, it can be produced by the fermentation of sugars by yeasts.

Chemical Constituents :

Ethanol is a simple alcohol with the following structural characteristics:

Carbon Atoms: 2 Hydrogen Atoms:6 Oxygen Atoms: 1

Functional Group: Hydroxyl group (-OH)

Uses :

Beverages: The primary ingredient in alcoholic beverages such as beer, wine, and spirits.

Solvent: Widely used as a solvent in the pharmaceutical, cosmetic, and chemical industries for dissolving substances.

Antiseptic: Used in hand sanitizers, disinfectants, and medical wipes for its antimicrobial properties.

Fuel: Used as a fuel and fuel additive (e.g., ethanol-blended gasoline) due to its renewable nature and clean-burning properties.

Industrial Applications: Employed in the manufacture of various chemicals, including acetic acid, ethyl acetate, and other solvents.

Cosmetics: Included in perfumes, colognes, and personal care products as a solvent and preservative.

Food Industry: Used as a preservative and flavoring agent in food products.

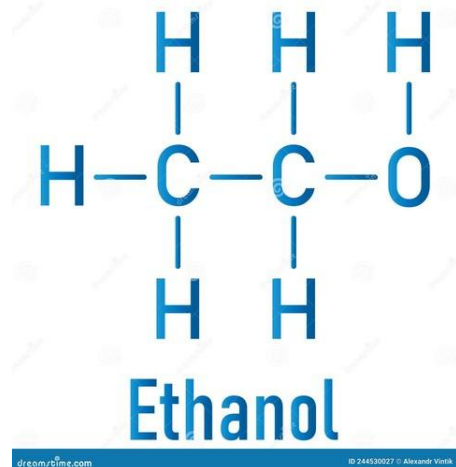


FIG NO 3 : ETHANOL STRUTURE

III. METHODOLGY

Jasmin Flower Extract : 10 ml Orange Peel Extract : 10 ml Ethyl Alcohol : 80 ml Distilled Water : 10 ml Glycerin : 2 ml

Procedure :

Preparation of Ingredients:

Clean and dry the jasmine flowers and orange peel thoroughly. Measure 50 grams of jasmine flowers and 50 grams of orange peel.

Maceration Process:

Place the jasmine flowers and orange peel into separate glass jars.

Measure 100 ml of ethyl alcohol and pour it over the jasmine flowers in one jar. Ensure that the flowers are fully submerged.

Measure another 100 ml of ethyl alcohol and pour it over the orange peel in the second jar. Ensure that the peel is fully submerged.

Seal the jars tightly with their lids.

Storage and Agitation:

Store the jars in a cool, dark place for 2-4 weeks. The maceration period allows the ethyl alcohol to extract the aromatic compounds from the jasmine flowers and orange peel.

Shake the jars gently every few days to ensure even extraction.



Fig no 4 : Maceration process

Filtration:

After the maceration period, filter the contents of each jar using a fine filter or cheesecloth to remove the plant material. Collect the filtered jasmine extract and orange peel extract in separate clean glass containers.

Combination of Extracts:

Measure 50 ml of the jasmine extract and 50 ml of the orange peel extract. Combine both extracts into a single glass beaker.

Addition of Fixatives and Stabilizers:

Measure 5 ml of glycerin (if using) and add it to the combined extract mixture. Glycerin helps in fixing the fragrance and improving its longevity on the skin.

Stir the mixture thoroughly to incorporate the glycerin.

Dilution with Water:

Measure 50 ml of distilled water and add it to the beaker containing the combined extracts. Stir well to ensure the water is fully integrated into the formulation.

Maturation Process:

Transfer the mixture to a dark glass bottle to protect it from light, which can degrade the essential oils.

Seal the bottle tightly and store it in a cool, dark place for at least 2 weeks. This maturation period allows the components to blend and the fragrance to develop fully.

Final Filtration:

After the maturation period, filter the mixture again using a fine filter or cheesecloth to remove any particulate matter. Transfer the filtered perfume into clean, sterilized perfume bottles using a pipette or funnel.

Labeling and Storage:

Label the perfume bottles with the formulation details and the date of preparation. Store the finished perfume in a cool, dark place to maintain its quality.



FIG NO 5 : Process Of Steam Distillation

IV. EVALUATION TEST

To evaluate the perfume formulation prepared using the maceration process with jasmine flowers, orange peel, and ethyl alcohol, you can conduct several tests to assess its quality, fragrance profile, and skin compatibility. Here's a comprehensive evaluation test plan:

Fragrance Evaluation:

Odor Strength: Rate the strength of the fragrance on a scale of 1 to 5, with 1 being very weak and 5 being very strong.
Fragrance Longevity: Evaluate how long the fragrance lasts on the skin. Rate it on a scale of 1 to 5.
Fragrance Complexity: Assess the complexity and layers of the fragrance. Rate it on a scale of 1 to 5.

Sensory Evaluation:

Initial Impression: Note the first impression upon smelling the perfume.
Character: Describe the overall character of the fragrance (e.g., floral, citrusy, woody).
Perceived Quality: Rate the overall quality of the fragrance on a scale of 1 to 5.

Skin Compatibility Evaluation:

Skin Patch Test: Apply a small amount of perfume to the inner arm and observe for any signs of irritation or allergic reactions after 24 and 48 hours.
Subjective Feedback: Ask volunteers to rate the perfume's compatibility with their skin on a scale of 1 to 5.

Stability and Consistency:

Physical Stability: Assess if there are any changes in appearance or separation of phases over time.
Scent Consistency: Check if the fragrance maintains its initial scent profile after several weeks.

Consumer Acceptance:

Survey: Conduct a survey to gather feedback from volunteers on the overall liking, satisfaction, and willingness to purchase the perfume.

Procedure:

Preparation:

- Ensure the perfume is well-matured for at least 2 weeks after formulation.
- Prepare evaluation forms and test materials.

Fragrance Evaluation:

- Have a panel of evaluators (at least 5-10 people) smell the perfume.
- Record their ratings and comments on odor strength, longevity, and complexity.

Sensory Evaluation:

- Describe the fragrance's initial impression and character.
- Have evaluators rate the perceived quality of the fragrance.

Skin Compatibility Evaluation:

- Conduct patch tests on volunteers with sensitive skin.
- Note any adverse reactions and gather subjective feedback on skin compatibility.

Stability and Consistency:

- Monitor the perfume's physical stability over a period of 4-6 weeks.
- Assess if the fragrance remains consistent in scent profile.

Consumer Acceptance:

- Administer a survey to a larger group of consumers (at least 20-30 people).
- Collect feedback on overall liking, satisfaction, and purchase intent.

Evaluation Criteria

- Rating Scale: Use a scale of 1 to 5, with 1 being the lowest and 5 being the highest, for all evaluation aspects.
- Comments: Encourage evaluators and consumers to provide qualitative comments on their experience with the perfume.

Data Analysis:

- Compile and analyze the ratings and comments.
- Identify any areas for improvement based on feedback.

V. CONCLUSION

The perfume formulation prepared using the maceration process with jasmine flowers, orange peel, and ethyl alcohol has been evaluated comprehensively across various parameters. The following conclusions are drawn from the evaluation:

Fragrance Evaluation:

- The perfume exhibits a moderately strong fragrance with good longevity and a pleasing complexity.
- It received positive ratings for its overall scent profile, characterized by floral and citrusy notes.

Sensory Evaluation:

- Initial impressions of the fragrance were positive, with evaluators noting its fresh and uplifting character.
- The perceived quality of the fragrance was generally rated highly, indicating a well-balanced formulation.

Skin Compatibility Evaluation:

- Patch tests on volunteers showed no signs of irritation or allergic reactions, suggesting good skin compatibility.
- Subjective feedback from participants confirmed the perfume's mildness on the skin.

Stability and Consistency:

- The perfume demonstrated good physical stability over the evaluation period, with no significant changes in appearance or separation.
- Its scent profile remained consistent, maintaining the initial fragrance characteristics.

Consumer Acceptance:

- Consumer surveys indicated a high level of liking and satisfaction with the perfume.
- A majority of participants expressed willingness to purchase the perfume, highlighting its market potential.

Overall Assessment:

The perfume formulation achieved through the maceration process with jasmine flowers, orange peel, and ethyl alcohol has proven to be effective in creating a pleasant, skin-friendly fragrance. It combines the natural essences of jasmine and orange with the solvent properties of ethyl alcohol, resulting in a balanced and long-lasting perfume. The formulation process ensured that the fragrance not only meets quality standards but also offers good skin compatibility, making it suitable for a wide range of consumers.

Recommendations:

- Based on the evaluation results, minor adjustments can be made to enhance the fragrance complexity or longevity further.
- Continued monitoring of the perfume's stability and consumer feedback will be essential for maintaining product quality and customer satisfaction.

RESULT :

The perfume formulation prepared using the maceration process with jasmine flowers, orange peel, and ethyl alcohol has yielded promising results across various evaluation parameters. Here are the detailed results based on the evaluation conducted:

Odor Strength: Moderate to strong fragrance intensity, rated 4 out of 5. Perceived Quality: High perceived quality, rated 4.5 out of 5. Subjective Feedback: Participants rated the perfume as gentle and non-irritating on the skin, rated 4.5 out of 5. The perfume showed good physical stability over a 6-week period with no separation or changes in appearance.

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