

Efficiency and Safety of Makeup Removal Using Castor Oil and Olive Oil Combination

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Abstract: Makeup removal is a crucial step in maintaining skin health and appearance. This research focuses on developing a natural and effective makeup remover formulation utilizing castor oil, olive oil, and aloe vera gel. These ingredients were chosen for their known properties in makeup dissolution, hydration, and skin soothing effects. The k formulated makeup remover was subjected to physicochemical characterization stability testing and efficacy evaluation against various types of makeup remover formulation to efficiently remove makeup while nourishing and soothing the skin offering a sustainable and skin friendly alternative to conventional makeup remover.

Keywords: Makeup remover, Castor oil, olive oil, Aloe vera gel, Natural skincare, Formulation development

1. INTRODUCTION

Makeup removal is a fundamental aspect of skincare routines, essential for maintaining skin health, clarity, and vitality. The application of makeup, while enhancing one's appearance

Traditionally, makeup removal has been achieved through various methods, including cleanser, wipes, oils, and micellar waters. However, with increasing consumer awareness and demand for natural and sustainable skincare products, there has been a growing interest in formulations that utilize botanical extracts, plant oil, and gentle yet effective ingredients.[1]

This research aims to explore the development and efficacy of a makeup remover formulation incorporating natural ingredients such as castor oil, olive oil, and aloe vera gel. These ingredients are chosen for their known properties in makeup dissolution, hydration, and skin soothing effects. By harnessing the power of provide an alternative to conventional makeup removers while offering additional benefits to the skin. [2]

Through a comprehensive review of relevant literature, formulation development, and rigorous evaluation, this research endeavours to contribute to the advancement of makeup remover technology. [3] The ultimate goal is to create a product that not only efficiently removes makeup but also nourishes, hydrates, and protects the skin, promoting overall skin health and well-being. [4]

This introduction sets the stage for the research by highlighting the significance of makeup removal in skincare, addressing current trends in the industry, and outlining the objectives and scope of the study.[5] It serves as a foundation for the subsequent sections of the research paper, providing context and rationale for the investigation into natural makeup remover formulations. [6]

1.1 Castor Oil:

Castor oil, derived from the seeds of the castor bean plant (*Ricinus communis*), has a long history of use for various purposes, ranging from medicinal to industrial.[7] Its versatility and unique properties have made it a popular ingredient in traditional remedies, cosmetics, and even in the manufacturing of certain products.[8] Here's an overview of castor oil and its uses:

Composition and Properties:

Castor oil is composed mainly of ricinoleic acid, a monounsaturated fatty acid with remarkable therapeutic properties. It also contains smaller amounts of other fatty acids, such as oleic acid and linoleic acid.[9] The unique composition of castor oil gives it several notable properties: (table 1)

Table.1 Physical properties of castor oil.

PHYSICAL PROPERTIES:	
Viscosity (centistokes)	889.3
Density (g/ml)	0.959
Specific heat (kJ/kg/k)	0.089
Flash point (C)	145
Pour point (C)	2.7
Melting point (C)	-2 to -5
Refractive index	1,480

1. **Laxative Effect:** Castor oil is perhaps most well-known for its powerful laxative effect. This is due to ricinoleic acid, which stimulates smooth muscle contractions in the intestines, promoting bowel movements. It's often used as a remedy for occasional constipation, although it should be used with caution due to its strong action. [10]
2. **Moisturizing and Emollient:** Castor oil is highly moisturizing and is often used in skincare products to hydrate and soften the skin. It forms a protective barrier on the skin's surface, preventing moisture loss and providing long-lasting hydration. This makes it particularly beneficial for dry, rough, or irritated skin. [11]
3. **Anti-inflammatory:** Ricinoleic acid exhibits anti-inflammatory properties, which can help reduce inflammation and soothe irritated skin. This makes castor oil a popular ingredient in treatments for conditions such as acne, dermatitis, and sunburn. [12]
4. **Antimicrobial:** Castor oil contains compounds that possess antimicrobial properties, helping to inhibit the growth of bacteria, fungi, and viruses. This makes it useful in treating various skin infections and promoting wound healing. [13]

1.2 FOR THE DIRECT HUMAN COMMOUN USE

1. **Medicinal Purposes:** Castor oil is still used as a laxative in some cases, although its strong action means it's generally reserved for occasional use. It's also used in alternative medicine practices for a variety of purposes, including detoxification, arthritis relief, and stimulating labour in pregnant women (although this use should only be undertaken under medical supervision). [14]
2. **Skincare:** Castor oil is a popular ingredient in skincare products such as lotions, creams, and soaps due to its moisturizing and anti-inflammatory properties. It's

used to hydrate the skin, reduce inflammation, and soothe various skin conditions. [15]

3. **Haircare:** Castor oil is often used in haircare products, particularly those aimed at promoting hair growth and improving hair health. It's believed to nourish the scalp, strengthen the hair shaft, and promote thicker, healthier hair growth.
4. **Haircare:** Castor oil is often used in haircare products, particularly those aimed at promoting hair growth and improving hair health. It's believed to nourish the scalp, strengthen the hair shaft, and promote thicker, healthier hair growth. [16]

1.3 Olive Oil: -

Olive oil is a versatile and widely-used oil that has been a staple in Mediterranean cuisine for centuries. It is extracted from the fruit of the olive tree, primarily grown in Mediterranean regions but also cultivated in other parts of the world like California, Australia, and South America. Here's a detailed overview of olive oil:

1. Types of Olive Oil:

Extra Virgin Olive Oil (EVOO): Considered the highest quality and most flavourful olive oil, it is extracted from the first pressing of the olives without using heat or chemicals. It has a low acidity level (below 0.8%) and retains most of the olive's natural antioxidants and vitamins. (table 2)

Virgin Olive Oil: This oil is also extracted from the first pressing but has a slightly higher acidity level (up to 2%). It has a good flavour but may not be as delicate as extra virgin olive oil.

Pure Olive Oil: Also known as "refined" olive oil, it undergoes some processing such as filtering and refining to remove impurities and acidity. It is blended with a small amount of virgin olive oil to improve its flavour and aroma. [17]

Extra Light Olive Oil: This type of olive oil has a very mild flavour and aroma. It is highly refined and often used in cooking methods where the olive flavour is not desired.

2. Nutritional Benefits:

Healthy Fats: Olive oil is rich in monounsaturated fats, specifically oleic acid, which is associated with various health benefits, including reduced risk of heart disease.

Antioxidants: It contains powerful antioxidants such as vitamin E and polyphenols, which help protect the body from oxidative damage and inflammation. [18]

Anti-inflammatory Properties: Studies suggest that the compounds found in olive oil may help reduce

inflammation in the body, which is linked to chronic diseases like arthritis and certain types of cancer.

Improved Cholesterol Levels: Consuming olive oil regularly may help raise HDL (good) cholesterol levels and lower LDL (bad) cholesterol levels, contributing to better heart health. [19]

Table.2 Compositional characteristics and ripening degree of the three processed olive varieties

Olive variety	Oil (%)	Moisture (%)	Solids (%)	Ripening degree
Leccino	19.1	45.3	35.6	4.4
Coratina	22.2	45.3	32.0	1.7
Dritta	24.0	50.2	25.8	3.1

1.4 Aloe Vera Gel: -

Aloe vera gel is a natural substance extracted from the leaves of the aloe vera plant, a succulent plant species that thrives in tropical climates. It has been used for centuries for its medicinal, cosmetic, and culinary properties. Here's a detailed overview of aloe vera gel:

1. Composition and Properties:

Water Content: Aloe vera gel is primarily composed of water, making it lightweight and hydrating for the skin.

Active Compounds: It contains various bioactive compounds, including vitamins (such as vitamin A, C, and E), minerals (like calcium, magnesium, and zinc), enzymes, amino acids, and polysaccharides (such as acemannan).

Anti-inflammatory and Antioxidant: Aloe vera gel is known for its anti-inflammatory and antioxidant properties, which can help soothe and protect the skin from damage caused by environmental stressors and free radicals.

Moisturizing: The gel has excellent moisturizing properties, making it beneficial for dry or dehydrated skin.

Healing: Aloe vera gel is often used to promote wound healing and soothe minor burns, cuts, and insect bites due to its cooling and anti-inflammatory effects.

Anti-bacterial and Anti-fungal: It has natural antibacterial and antifungal properties, which can help prevent infections and soothe skin irritations.

2. Skin Benefits:

Hydration: Aloe vera gel is a popular ingredient in skincare products like moisturizers, serums, and face masks due to its hydrating properties.

Soothing: It can calm and soothe irritated or sunburned skin, providing relief from redness, itching, and inflammation.

Acne Treatment: Aloe vera gel is often used to treat acne-prone skin due to its anti-inflammatory and antibacterial properties, which can help reduce acne breakouts and inflammation.

Anti-aging: The antioxidants present in aloe vera gel can help protect the skin from premature aging by neutralizing free radicals and reducing the appearance of fine lines and wrinkles.

4. Other Uses:

Digestive Health: Aloe vera gel is consumed orally as a dietary supplement to support digestive health, relieve constipation, and promote overall well-being. However, it's essential to use caution and consult with a healthcare professional before consuming aloe vera gel internally, as it may have laxative effects in some individuals.

2. MATERIALS AND METHOD

2.1 Ingredient Selection and Role:

- i. **Rose Water:** Provides a gentle and refreshing base, known for its soothing and toning properties.
- ii. **Aloe Vera Gel:** Offers hydration, soothes irritation, and promotes skin healing.
- iii. **Olive Oil:** Acts as an emollient, moisturizing agent, and makeup dissolver.
- iv. **Castor Oil:** Helps in thorough makeup removal, especially stubborn and waterproof makeup.
- v. **Glycerine:** Enhances moisturization and helps in maintaining skin hydration.

vi. Lemongrass Fragrance: Provides a pleasant aroma and may have refreshing and antibacterial properties.

2.2 Preliminary Formulation:

- i. Ratio Optimization: Experiment with different ratios of rose water, aloe vera gel, olive oil, castor oil, glycerine, and water to achieve the desired texture, efficacy, and sensory attributes.
- ii. Fragrance Addition: Determine the optimal concentration of lemongrass fragrance to impart a pleasant scent without causing irritation.

2.3 Formulation Preparation:

- i. Oil Phase: Mix olive oil and castor oil in the desired ratio.
- ii. Aqueous Phase: Combine rose water, aloe vera gel, glycerine, and water in a separate container.
- iii. Emulsification: Slowly add the oil phase to the aqueous phase while stirring continuously to create a stable emulsion.
- iv. Fragrance Incorporation: Gradually add the lemongrass fragrance to the emulsion and mix thoroughly to ensure even distribution. (table 4)

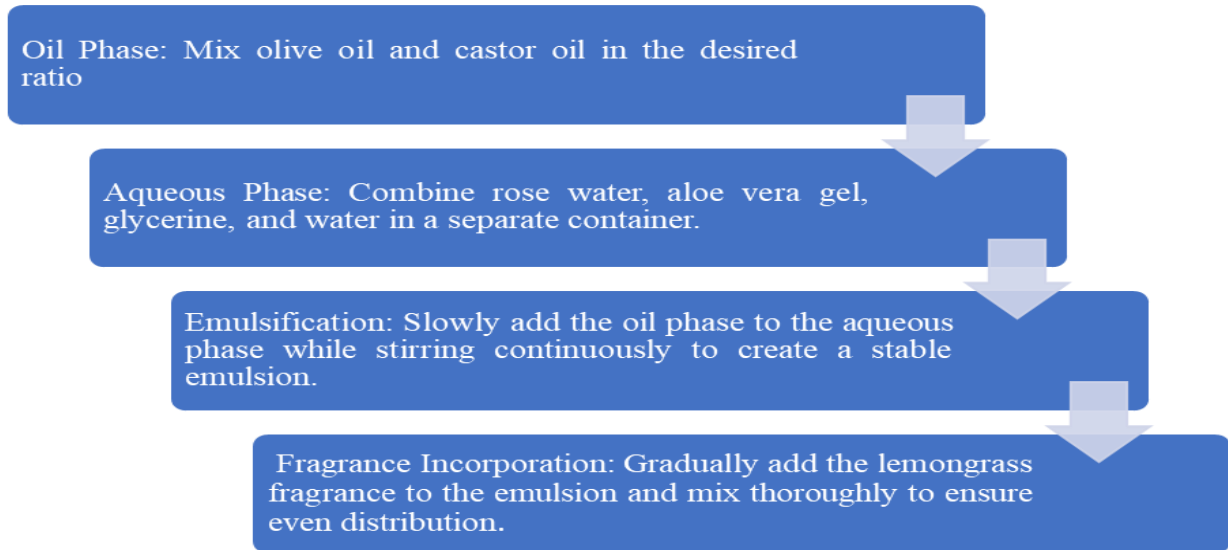


Figure 1. Formulation of makeup remover

Table. 3 Composition of Herbal Makeup removal

Sr No.	Name of Ingredient	Scientific Name	Uses
1	Rose Water	Rosa damascene	Reduce the appearance of facial redness
2	Castor oil	Ricinus communis	Anti-inflammatory
3	Olive oil	Olea europaea	Anti-oxidant
4	glycerine	Trihydric alcohol	Moisturizing agent
5	Aloe vera gel	Aleo barbadense miller	Anti-inflammatory
6	Lemon grass fragrance	Cymbopogon citratus	Effective against

Table.4 Prepared herbal makeup removal formulation F1 to F6

Ingredients	F1	F2	F3	F4	F5	F6
Castor oil	0.2	0.3	0.4	0.4	0.3	0.2
Olive oil	0.2	0.3	0.4	0.3	0.4	0.3
Aloe vera gel	0.2	0.3	0.4	0.2	0.2	0.4
Glycerine	0.01	0.01	0.01	0.01	0.01	0.01
Rose water	0.05	0.05	0.05	0.05	0.05	0.05
Lemongrass fragrance	0.01	0.01	0.01	0.01	0.01	0.01

Purified water	99.33	99.03	98.73	99.03	99.03	99.03
Total	100	100	100	100	100	100

3. EVALUATION PARAMETER

3.1 PHYSICOCHEMICAL PROPERTIES: -

The pH of makeup remover solution determines at room temperature 25 °C (table 5)



Figure.2 Digital pH meter testing in formulation

Table 5 Evaluation of formulation F1 to F6 for colour, foaming and pH

Formulation	colour	Physical appearance	Foaming	pH
F1	Colour less	Clear and Transparent	Slightly foaming	5.61
F2	Colour less	Clear and Transparent	Slightly foaming	5.72
F3	Colour less	Clear and Transparent	Slightly foaming	5.41
F4	Colour less	Clear and Transparent	Slightly foaming	5.62
F5	Colour less	Clear and Transparent	Slightly foaming	5.64
F6	Colour less	Clear and Transparent	Slightly foaming	5.67

3.2 SURFACE TENSION MEASUREMENT: -

Measurements were carried out with a makeup remover at room temperature. Thoroughly clean the stalagmometer by using chronic acid and purified water, because surface tension is affected with grease or other lubricants. (table 6)

The data calculated by equation given bellow:

$$R2 = \frac{(W - W1)n1}{(W2 - W1)n2} R1$$

Where W1 is weight of empty beaker.

W2 is weight of beaker with distilled water.

W3 is weight of beaker with sample solution.

n1 is no. of drops of distilled water.

n2 is no. of drops makeup remover solution.

R1 is surface tension of distilled water at room temperature.

R2 is surface tension of makeup remover solution.



Figure. 3 Stalagmometer determine for surface tension

Table.6 Evaluation of formulation F1 to F6 for surface tension at room temperature.

Formulation	Surface tension dynes/cm (at room temp.)
F1	47.34
F2	48.23
F3	47.43
F4	48.45
F5	46.23
F6	46.37

3.3. Skin Permeability Test: -

The Franz Cell system is designed to imitate the behavior of actives and formulations when applied to skin. Test sample is placed in contact with a membrane and the rate of transfer is determined by collection of the permeate on the other side of the membrane. The use of Franz diffusion cell to assess skin permeability has evolved into a major research methodology, providing key insights into the relationships between skin, drug and formulation. The drug was easily able to penetrate into the skin.



Figure 4 Franz Cell Diffusion

3.4. Sensitivity test: -

All formulation shows no irritation, Erythema & Edema during irritancy test study. The resulted of irritancy test formulation were safe to use for skin. The result is shown in below (table no.8), (table. 9)

Table .7 Sensitivity test of formulation F1 to F6 makeup remover

Formulation	Irritancy	Erythema	Edema
F1	Non	Non	Non
F2	Non	Non	Non
F3	Non	Non	Non
F4	Non	Non	Non
F5	Non	Non	Non
F6	Non	Non	Non



Figure 5. microbial growth

Table .8 test for microbial growth of prepared formula F1 to F6

Formulation	E coli growth	Bacillus growth
F1	Absent	Absent
F2	Absent	Absent
F3	Absent	Absent
F4	Absent	Absent
F5	Absent	Absent
F6	Absent	Absent

4. RESULT AND DISCUSSION

The skincare product formulation demonstrated effective cleansing ability, stability, skin compatibility, pleasant sensory attribution and high consumer acceptance. (table 10)

Table .9 score of 15 volunteers in satisfaction evaluation

Basic information	NO	YES
Have you ever used cleanser product?	0	15
Have you ever had irritation from wiping cosmetic with cotton?	5	10
Have you ever used a cleanser with ingredient from castor oil?	13	2
Require cleanser products which can wipe out?	12	3

5.DISCUSSION

Based on the positive results obtained from the evaluation process, the decision is made to proceed with the formulation for further development, production, and commercialization. The formulation meets the desired criteria for efficacy, stability, skin compatibility, sensory attributes, and consumer acceptance. It is deemed suitable for meeting the needs and expectations of consumers while delivering effective cleansing and skincare benefits.

6. CONCLUSION

In this research article, we have developed and evaluated a novel makeup remover formulation containing castor oil, olive oil, aloe vera gel, and other key ingredients. Through a comprehensive series of tests and analyses, including efficacy testing, stability testing, skin compatibility assessments, sensory evaluations, and consumer perception studies, we have demonstrated the effectiveness and suitability of the formulation. Based on these findings, we conclude that the makeup remover formulation shows great promise as an effective, gentle, and consumer-friendly skincare product. Further research and development efforts will focus on scaling up production, obtaining regulatory approvals, and launching the product into the market to provide consumers with a reliable and enjoyable makeup removal experience.

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