

Review about Semi-Synthetic Face Serum

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Abstract: *UV radiation and photodamage can cause unwanted skin aging and wrinkles on the face. There are currently no practical methods for delaying the pro-aging process of the skin. A highly concentrated cosmetic product is a face serum containing aloe vera, glycerine, and honeybee venom. Aloe Vera serum has the capacity to penetrate deeper layers of the skin and absorb quickly, providing both immediate cosmetic benefits and psychological boosts. Aloe Vera gel is frequently used as a wound healer, anti-inflammatory, anti-bacterial, and anti-fungal agent, as well as a treatment for various skin conditions, sunburns, small wounds, and insect bites. Bee venom is a protective poison that bees make; it has been shown to improve collagen synthesis and blood flow. The globule size, consistency, pH, and physiochemical characteristics of the face serum were assessed. The stability study's findings demonstrated that the globule, homogeneity, and visual appearance were unchanged. [1,2,3]*

Keywords: Salicylic Acid, Vitamin C, Sandalwood, Aloe vera, Aegle Marmelos Fruit, Coconut oil, Rose water

I. INTRODUCTION

The examination of human skin is a crucial field for research and development in the fields of dermatology, toxicology, pharmacology, and cosmetology. This is because it allows for the evaluation of exogenous agents' effects, interactions, absorption mechanisms, and/or toxicity towards various cutaneous structures. Humanity has recognized the value of aesthetics since the prehistoric era, and the desire to appear well and attractive has grown across society. The Greek term "cosmetic" means "to adorn," as in adding something ornamental to a person or something. Cosmetology is the study and application of beauty therapy. It is the study of cosmetics and its application as well as the art or science of enhancing and beautifying the skin, nails, and hair.

For a skin care formulation to achieve its intended goal, the potent ingredient must be able to penetrate the skin. The solution is a face serum, which penetrates the skin to provide the valuable active ingredient without the need for dangerous chemicals to get immediate results. In the field of cosmetics, serum is a concentrated product that is frequently utilized. The moniker originates in professional makeup artistry. Like any other cream, the cosmetic serum has the same concentration of water or oil. A concentrated solution with ten times more organic matter than cream is called a serum. Consequently, takes care of the aesthetic issue swiftly and efficiently.

Face serum is an oil-and water-based emulsion that is extremely concentrated. Because serums, also known as concentrates, have roughly 10 times the amount of biologically active ingredients than creams do, they can cure skin issues more effectively. Within a month or less, adding a few drops of face serum to your regular skin care routine will show results. This is due to the fact that face serums are composed of minuscule molecules, which facilitate rapid and deep skin penetration. Numerous beneficial active ingredients and nutrients, including ceramides, amino acids, and antioxidants, are abundant in serum.

Additionally, AP-8, a neuropeptide linked to muscle contraction, and beta-glucan, a cell turnover and regeneration extract, which are thought to promote immunological surveillance in a healthy manner sodium green tea, hyaluronate, a humectant that is new to extracellular matrix and vitamin C&E formulations, among which are polyphenols and other antioxidants. What's missing from the formulation is what sets a serum apart from a cream or lotion. They additionally have less thickening and lubricating ingredients, such as nut Since most serums are water-based, oils are completely excluded. or oils from seeds. [4,5,6]

HISTORY OF FACIAL SERUMS:

As defined in the dictionary a serum is the clear, yellowish fluid obtained upon separating whole blood into its solid and liquid components after it has been allowed to clot, so it is not surprising that the precursors of modern-day serums were based on horse blood, egg albumin, and bovine placenta.

Packaging these products in sterile ampoules preserved with oxyquinoline (and later, the invention of parabens) made them available commercially. This is a practice that stayed with us since the early days of short product shelf life, which meant small batches had to be made and used up quickly before the product spoiled. Exercise, cleanliness, and skincare were all held in high regard during the 1800s. Zinc oxide was used to lighten skin, but often caused allergic reactions. [7,8,9]

BACKGROUND OF FACIAL SERUMS:

It is not surprising that the ancestors of modern serums were based on horse blood, egg albumin, and bovine placenta, as defined by the dictionary: a serum is the clear, yellowish fluid obtained upon separating whole blood into its solid and liquid components after it has been allowed to clot. Commercial availability of these products was achieved by packaging them in sterile ampoules maintained with oxyquinoline (and later, parabens). This is a technique that dates back to the early days of short product shelf lives, when products needed to be prepared in tiny amounts and consumed rapidly to prevent spoilage. In the 1800s, people placed a great value on hygiene, exercise, and skincare. Zinc oxide was used to lighten skin but often caused allergic reactions. [7,8,9]

OBJECTIVES:

The main objective of this study is to determine the optimum and stable face serum. The specific objectives of this study are:

To optimize the thickeners and emulsifiers of face serum formulation with regard to the viscosity and pH value. To determine the most stable face serum formulation in term of its physicochemical stability study and microbiological study. To characterise the face serum formulation in term of its flow behaviour and sensory profile. [10,11]

TYPES OF SERUM:

1. Oil Serum:

The serum made of oil Out of all the face serums, the oil serum is the easiest to prepare. Usually, it begins with a base consisting only of high-quality, quickly absorbing carrier oils, sometimes known as "dry" oils. The premium oils included in the serum not only have moisturizing and barrier-repairing properties, but also contain polyphenols, essential fatty acids, and other compounds that the skin may be able to break down. [12,13]



Fig.1. The Oil Serum

2. The Gel Serum:

Gel serums give the skin a "tightening" feeling that makes your customer's skin appear temporarily lifted or tightened in specific facial areas. Because this formulation is water-based, the gel serum gives you the opportunity to incorporate some amazing water-based (hydrophilic) plant extracts. ^[14]



Fig.2. The Gel Serum

3. The Water Based Serum.

Gel and water-based serums are similar, albeit the former may or may not contain thickeners and gums. A water-based face serum would be used to apply high-performance hydrophilic plant extracts that are trapped against the skin beneath a cream or lotion. Underneath an anti-aging facial mist greater skin penetration of water-based chemicals, providing them high performance emulsion and then beneath an oil is the best method for encouraging deeper within the skin's layers. An occlusive barrier that prevents penetration will be formed by the oils. ^[15]

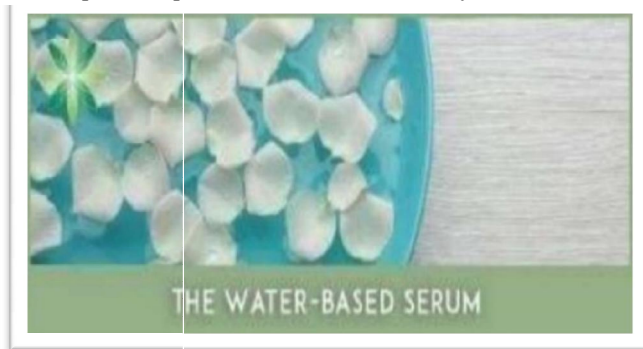


Fig.3. The Water Based Serum

4. The Emulsion Serum:

An emulsion-based face serum is a type of moisturizer that delivers high-performance ingredients to the skin and fortifies the skin's barrier function. An emulsion is made up of two "immiscible" phases-phases that don't want to mix, such as water and oil. Water and oil are bound together and kept in a stable form by the application of an emulsifier. Using an emulsion gives you the best possibility of introducing potent actives deeper into the skin's tissues. Given the skin's barrier function, it is highly difficult for any cosmetic component to penetrate the dermis, yet an oil and water mixture is best suited to accomplish this remarkable feat. The skin's barrier function will be strengthened by the emulsion's moisturising characteristics. ^[16,17]



Fig.4. The Emulsion Serum

5. Pressed Balm Serum:

A balm serum contains active ingredients that are oil-soluble (lipophilic) and may benefit the skin in addition to the traditional balm base of butters, waxes, and oils. The occlusive barrier that the butters and waxes create on the skin nourishes and moisturizes it, enabling the active ingredients in the pressed serum to work. Dozens of fascinating, one-of-a-kind butters and waxes can be blended with thousands of wonderful plant oils to create a balm serum. ^[18,19]

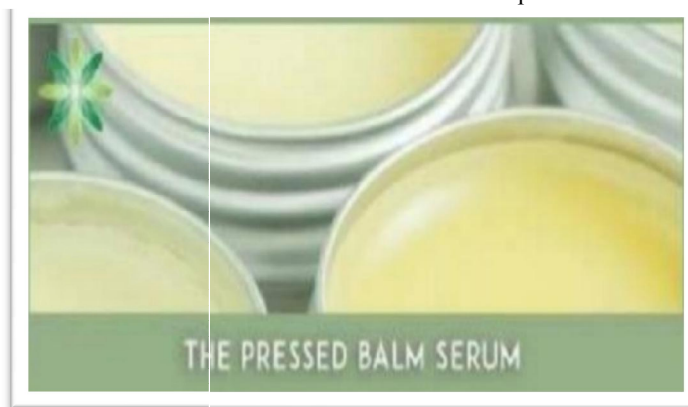


Fig.5. The Pressed Balm Serum

IDEAL QUALITY OF FACE SERUM:

- 1. Calms Inflamed Skin:** Aloe vera is well known for its ability to regenerate cells and fight viruses. Aloe vera has benefits that are similar to how sunburn relief feels when applied topically have a unique ability to increase and decrease skin hydration.
- 2. Proper Hydration:** The main cause of acne and pimples is bacterial proliferation, which is stopped by Bael fruit.
- 3. Combat Acne and lighten imperfections.**
- 4. Get Rid of Puffiness And Dark Circles:** Antioxidants and vitamin E in large quantities help with the discoloration of the eyelids, and the cooling effect minimizes puffiness. Under-eye circles appear less noticeable as a result. Eliminating dead skin cells promotes the production of collagen.
- 5. It has antioxidant properties that promote skin that looks healthy.** ^[20,21,]

Advantages:

- Improves skin texture.
- Minimizes the skin pores.

- Hydrates and nourishes the skin.
- Improves skin elasticity.

Disadvantages:

- The liquid or gel-like texture of a serum can be a poor match for people with chronic conditions like eczema or rosacea, which weaken the skin barrier.
- For these people, serums may penetrate too quickly, causing irritation.

FORMULATION OF FACIAL SERUM:

In formulating a face serum, the physical properties and stability are the main characteristics in determining its quality. A face serum formulation is basically an emulsion consists of two immiscible liquids. To prevent emulsion instabilities, thickener and emulsifier are introduced to the system.

Emulsifier will balance the system by minimizing the interfacial tension between the two immiscible liquids and at the same time stabilizes the dispersion phase from coalescence. Contributing to the system, thickener also plays an important role as theology modifier and provides flexibility to the flow characteristic of the emulsion.

A chemical property which is considered important in formulating is pH value. If the pH value of the skin is changed, the skin's natural microbiology and function will be interrupted. This in turn causes numerous skin problems including acne, skin flakiness, excessive sebum secretion and other serious conditions. The natural skin micro flora is intact on the skin with pH value running from 4 to 4.5, while pH value ranging from 8 to 9 eliminates the skin natural micro flora. Formulating a face serum with suitable pH range can help in improving the skin barrier function.

Formulating a face serum or any other formulation can be challenging. This is because the traditional One Factor at a Time (OFAT) method was highly time consuming and may result in unnecessary experiment that consume costs. OFAT was done by changing one factor at a time while keeping the other factor as constant. It requires large number of tests. On the contrary, optimization using Design Expert software could save time, costs and labour. D-optimal design is suitable to be used in formulating cosmetic formulations thus it is in the formulation studies widely.

In formulating a face serum, the mixing of water phase and oil phase is crucial to create a stable system over an extended period or longer product shelf life. Naturally, the oil and water systems are thermodynamically unstable. Incorporation of emulsifiers into the system minimize the interfacial difference between the water and oil phases thus mix the system. [22,23]

METHODS OF PREPARATION OF FACE SERUM:

The emulsion (o / w) was prepared according to the formula given below. The oily component consisting of Olive oil, sandalwood oil, tween 20 and coconut oil is mixed for 10 minutes to obtain a uniform solution. At the same time the water phase was prepared by mixing aloe vera gel, glycerine, and a small amount of distilled water uniformly. The oil phase is added to the liquid phase by drop wise under mechanical vibration at 2500 rpm to obtain oil in water based on biphasic emulsion. [25,26]



Fig.6. Preparation Of Face Serum

ACTIVE INGREDIENT USED IN HERBAL FACE SERUM:

1. Salicylic Acid
2. Vitamin C
3. Sandalwood
4. Aloe Vera
5. Aegle Marmelos Fruit
6. Coconut Oil
7. Rose Water

1) Salicylic Acid

Synonyms: Salicylate, 2-hydroxybenzoic acid, Keralite, acetylsalicylic acid, methyl ester.

Salicylic acid is a Beta hydroxyl acid obtained from the bark and wintergreen leaves of the white willow and encompass bacteriostatic, fungicidal and keratolytic effects. Salicylic acid (SA) is a colourless, crystalline organic carboxylic acid.

The substance is used in many skin-care products for the treatment of acne, psoriasis, callouses, keratosis pilaris and warts and is produced and or imported to EU in 10 000 - 100 000 tpa.

Benefits Of Salicylic Acid:

Treats acne by reducing swelling and redness and unplugging blocked skin pores to allow pimples to shrink.

Salicylic acid and benzoyl peroxide both help clear acne and prevent breakouts.

It is an excellent exfoliant that helps to remove acne-causing bacteria, slough dead skin cells and fade dark spots or marks.

Salicylic acid is generally considered to be an ingredient that is suitable for daily use. ^[27]

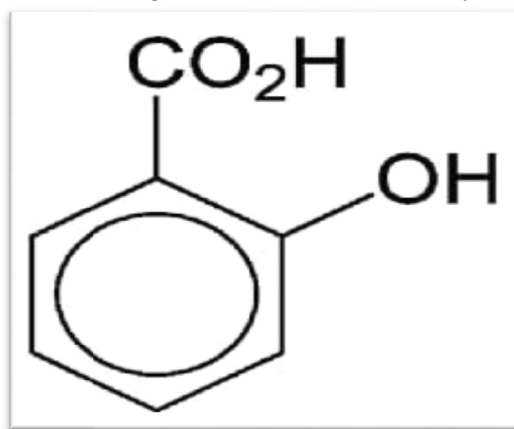


Fig.7. Salicylic Acid

2) Vitamin C

Vitamin C, also known as ascorbic acid, is a water-soluble vitamin. While most animals can synthesize vitamin C in their body, humans do not have the ability to make their own vitamin C; it must be obtained through their diet.

Low levels of vitamin C have been associated with several cardiovascular disorders, including heart disease, hypertension, stroke, and atherosclerosis, as well as impaired immune function and some cancers. A sufficient vitamin C intake may help reduce the risk of developing some of these conditions.

Vitamin C Serum Benefits:

reduces wrinkles.

protects collagen and increases production.

aids wound healing.

helps protect against sun damage.

reduces hyperpigmentation.

evens skin tone.

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brightens complexion.

acts like Armor against pollution and other free radicals. ^[28]

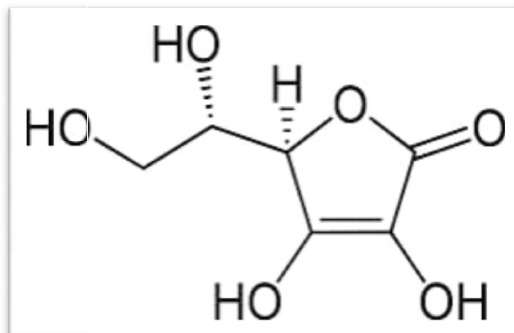


Fig.8. Vitamin C

3) Sandalwood Oil



Fig.9. Sandalwood oil

Kingdom: Plantae

Order: Santalales

Family: Sandalwood Family

Genus: Santalum L.-Sandalwood

Species: Santalum album L.-Sandalwood

With its anti-inflammatory and skin-clearing properties, sandalwood essential oil can help clear acne and pimples and soothe skin. ^[29]

6) Aloe Vera



Fig.10. Aloe vera

Kingdom: Plantae
Order: Asparagales
Family: Asphodelaceae
Subfamily: Asphodeloideae
Genus: Aloe
Species: Aloe vera
Botanical name: Aloe barbadense miller
English: India aloe

Aloe Vera has been used to treat wounds and infections. Aloe Vera is now recognised as a crucial ingredient in makeup thanks to advancements in beauty. It has nearly 20 amino acids, enough amounts of nutrients like calcium, magnesium, and sodium, enzymes, vitamins, and Its polysaccharides, nitrogen, and other ingredients make it a wonder plant for attractiveness. Here is a short explanation of some of the most significant uses of aloe Vera for cosmetic purposes. ^[30]

5) Aegle Marmelose Fruit

Kingdom: Plantae.
Order: Sapindales.
Family: Rutaceae.
Subfamily: Aurantioideae.
Genus: Aegle Marmelos.
Botanical name: Aegle Marmelos.

Aegle Marmelos Benefits for Skin Radiance and Skin Health

Treats Skin Rash

The Bael plant is a great treatment for skin abnormalities because it has anti-bacterial, anti-fungal, and anti-inflammatory qualities. Bael oil and Bael leaf extracts eliminate dangerous fungi that can result in minor to serious skin infections. The treatment of skin rashes and itchy skin bumps might also be advantageous. ^[31,32]



Fig.11. Aegle Marmelos Fruit

6) Coconut Oil

It contains nourishing fatty acids and linoleic acids which help retain the moisture in the skin and help protect and hydrate your skin. ^[33]



Fig.12. Coconut oil
DOI: 10.48175/568

7) Rose Water

Rose water is said to be a natural skin toner due to this amazing pH- balancing properties

Rose water is said to be a natural skin toner due to this amazing pH- balancing properties.

The primary phytoconstituents of rose water include flavonoids, triterpenoids, tannins, and polyphenolic chemicals. These constituents are primarily accountable for the anti-inflammatory and antioxidant effects of the water.

[34]

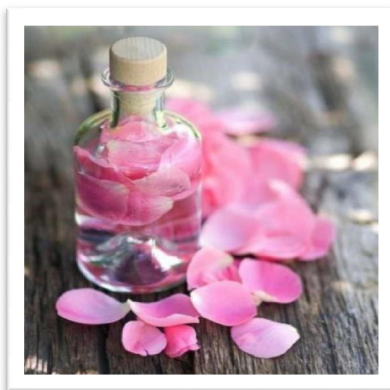


Fig.13. Rose Water

EVALUATION PARAMETERS OF FACE SERUM:

Physical Evaluation:

The Colour and appearance of the formulation was observed visually. The formulation procedure uniform distribution of extracts. This test was confirmed by visual appearance and by touch.

pH Value:

A pH meter was calibrated using a standard buffer solution. Nearly 1 ml of the face serum was properly weighed and dissolve in 50 ml of distilled water and finally its pH was calculated.

The skin has an acidic range, and the pH of the skin serum should be in the range of 4.1-6.7.

Determination of Spreadability:

2 gm of serum sample was placed on a surface. A slide was attached to a pan to which 20 gm weight was added. The time (seconds) required to separate the upper slide from surface was taken as a measure of Spreadability.

Microbial Examination of the Product:

In this method, the mixed culture is diluted directly in tubes of liquid agar medium. The medium is maintained in a liquid state at a temperature of 45°C to allow thorough distribution of the inoculum.

The inoculated agar medium is transferred into petri plates, allowed to solidify and incubated. In the series dilution technique, the original inoculum may be diluted by using sterile water or saline solution so that the concentration of the microbes gradually become less. Mix 1 ml dilute in 20 ml of liquid nutrient agar medium at 45°C. Shake the liquid agar nutrient agar medium & pour in a sterile petri plate, solidify and incubate it.

Stability Studies:

Formulation and development of a pharmaceutical product is not complete without proper stability analysis carried out on it to determine physical and chemical stability and thus safety of the product.

The stability studies are carried out as per ICH guidelines. Short term accelerated stability study was carried out for the period of few months for the prepared formulation.

Cyclical Temperature:

Test this test is not carried out at any fixed temperature and humidity. In this test, temperature was changed cyclically every day. At room temperature and frizzling temperature to stimulates the changes in temperature.

Washability Wash ability:

Test was carried out by applying a small amount of formulation on the hand and then washing it with tap water formulation was easily washable.

Phase Separation:

Prepared formulation was kept in a closed container at room temperature of 25-100 degree C away from light. Then phase separation was checked after 24hr. Any change in the phase separation was observed. [35,36,37,38,39]

APPLICATION OF A FACIAL SERUM:

Face serum is a lightweight water-based skincare essential that targets different skin concerns. There are various kinds of serums that are made with break through or game-changing ingredients like niacinamide, hyaluronic acid, vitamin C, AHAs and BHAs. If you truly want to reap the benefits of a face serum, you must know how to choose one that matches your skin type and skin concern. With such a plethora of serums available on the market, and with so many options to pick from and each claiming that they solve a skincare concern.

To apply face serum effectively, follow these steps:

1.Cleanse Your Face: Start with a clean face by washing it with a gentle cleanser and patting it dry.

2.Apply Toner (Optional): If you use toner, apply it before the serum. This helps to prepare your skin for better absorption.

3.Dispense The Serum: Place a few drops (usually 2-3) of the serum onto your fingertips or directly on your face.

4.Gently Spread and Pat: Using your fingertips, spread the serum evenly across your face. Avoid rubbing. Gently pat it into your skin to help absorption. Focus on problem areas: If the serum is targeted for specific concerns (like fine lines or dark spots), pay extra attention to those areas.

5.Wait A Minute or Two: Let the serum absorb fully before applying moisturizer or other skincare products.

6.Follow With Moisturizer: Serums often need a moisturizer on top to lock in the active ingredients and hydration.

7.Use Sunscreen (Morning Routine): If applying the serum during your morning routine, ensure you follow up with sunscreen as some active ingredients may make your skin more sensitive to sunlight. [40,41]

II. CONCLUSION

Semi Synthetic face serums are popular for their natural ingredients and potential benefits for skin health. However, individual experiences may vary, and it's essential to choose products based on your skin type and specific needs. Always patch-test new products and consult with a dermatologist if you have concerns about potential allergens or sensitivities.

The fresh aloe Vera gel from the inner central part (parenchyma) of the leaf often has a very good action in acne, pimples, eczema and other skin problems, burns due to heat, sun exposure and in treatment of radiation dermatitis. Aloe Vera contains number of vitamins and minerals that have a strong moisturizing capacity and anti-aging effects to maintain healthy- and fresh-looking skin. The gel stimulates cell growth and as such enhances the restoring of damaged skin. So, this serum can be used treat skin related problems.

Salicylic Acid This BHA helps to exfoliate dead skin cells, clear pores, and reduce acne.

Vitamin C a potent antioxidant, it brightens the skin, improves collagen production, and fights hyperpigmentation. **sandalwood** Known for its soothing properties, sandalwood helps reduce inflammation and imparts a calming effect to the skin. **aloe Vera** Moisturizing and cooling, aloe vera is ideal for hydration and healing irritated skin. **eagle Marmelos (Bael Fruit)** Contains antioxidants and has anti-inflammatory properties, which may help soothe and protect the skin. **Coconut Oil** A natural moisturizer, coconut oil nourishes and hydrates, though it may not be ideal for oily skin due to its comedogenic nature. **rose Water** Calming and hydrating, rose water balances the skin's pH and offers anti-inflammatory benefits. a semi-synthetic face serum combines natural ingredients with lab-created compounds to provide targeted skincare benefits. These serums often focus on hydration, anti-aging, brightening, or soothing the skin. The semi-synthetic components enhance the product's stability, absorption, and effectiveness, offering a blend of nature and science for improved skin health.

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