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Formulation and Evaluation of Butterfly Pea Extract Multipurpose Cream

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ABSTRACT
This study focuses on the formulation of a Multipurpose butterfly pea extract cream, where the first cream base is prepared, and the active ingredients are incorporated. The preparation involves creating a stable base cream by emulsifying the oil and water phases, ensuring proper consistency and homogeneity and then Butterfly pea extract, known for its antioxidant, anti-inflammatory, rich in bioactive compounds such as anthocyanins, flavonoids, and polyphenols, which are known for their skin-enhancing properties and skin-healing properties, is incorporated into cream by a trituration method which involves mixing the extract thoroughly into the cream base.Formulations of the cream were prepared with varying concentrations, to determine the optimal formulation for skin benefits.Among the different formulations, F2 exhibited the best results in terms of texture, stability, and skin benefits. It showed favorable physicochemical properties, including optimal viscosity, spreadability, and pH. Additionally, F2 demonstrated mild to no irritation in skin irritation tests, confirming its suitability for sensitive skin.Overall, the F2 formulation, enriched with butterfly pea extract, it a promising candidate for use in multipurpose skincare products. It provides an effective solution for skin health, protection, and hydration.

I. INTRODUCTION

Creams are emulsified formulations widely used in the cosmetic and pharmaceutical industries for their ability to deliver active ingredients to the skin while providing moisturizing, soothing, and protective benefits. Composed of a mixture of water and oil, creams are designed to be applied topically to the skin for various purposes, ranging from skincare and anti-aging to therapeutic treatments for skin conditions such as dryness, irritation, and acne.

The primary function of creams is to hydrate the skin by forming a barrier that prevents moisture loss. They are an essential part of daily skincare routines, helping to maintain skin elasticity, reduce the appearance of fine lines and wrinkles, and improve skin texture. Depending on the formulation, creams can also provide targeted treatment for specific skin concerns, such as inflammation, sun damage, or acne, through the inclusion of active ingredients like antioxidants, anti-inflammatory agents, and moisturizers.

The consistency of creams allows for easy application and effective absorption, making them suitable for use on both the face and body. Emulsifiers play a crucial role in the formulation of creams by stabilizing the mixture of oil and water, ensuring that the product remains smooth and homogenous. Additionally, the choice of base oils and active ingredients determines the cream's overall efficacy, texture, and sensory experience.

Due to their versatility, creams can be formulated for various skin types and concerns, from sensitive to oily skin. As a result, they remain one of the most popular and widely used forms of topical skincare products in the market.

Anatomy of skin:

Skin is the biggest organ within the body and covers the body's whole outside surface. It is a noteworthy and vital organ. It could be a beefy surface with hair, nerves, organs and nails. It comprises hair follicles which grapple hair strands into the skin. It acts as a boundary between exterior and interior environment. It is made up of three layers, the epidermis, dermis, and the hypodermis, all three of which change altogether in their life structures and work. The skin's structure is made up of an complicated organism which serves as the

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body's starting boundary against pathogens, UV light, and chemicals, and mechanical damage. The skin has distinctive thickness and surfaces. It moreover directs temperature and the sum of water discharged into the environment. It permits sensation such as touch, warmth, and cold. It too watches the bones, muscles and other crucial organs of our body.

Fig:1 Anatomy of Skin

Epidermis:

The epidermis is the most superficial layer of the skin and is composed of stratified keratinized squamous epithelium, the thickness of which varies in different parts of the body. It is thickest on the palms and soles of the feet. There are no blood vessels or nerve endings in the epidermis, but its deeper layers are bathed by Interstitial fluid from the dermis, which provides oxygen and nutrients and drains as lymph.

Dermis:

The dermis is stiff and elastic. It is formed from connective tissue and the matrix contains collagen fibers interwoven with elastic fibers. Rupture of elastic fibers occurs when the skin is stretched, resulting in permanent stretch marks or stretch marks that can appear in pregnancy and obesity. Collagen fibers bind water and give the skin its tensile strength, but as this ability declines with age, wrinkles appear. Its deepest layers are areolar tissue and varying amounts of adipose tissue.[2]

Butterfly Pea Flower: A Natural Wonder with Multiple Benefits

Fig:2 Butterfly Pea Flower

The butterfly pea flower (Clitoria ternatea) is a striking blue flower native to Southeast Asia, widely recognized for its medicinal, culinary, and cosmetic applications. Rich in anthocyanins, it serves as a potent antioxidant, helping combat oxidative stress and promoting overall health. Traditionally used in Ayurveda and Chinese medicine, it is believed to enhance cognitive function, reduce stress, and support eye health. Additionally, its extract is known for promoting hair growth and improving skin hydration.

In the culinary world, the butterfly pea flower is famous for its color-changing properties. When steeped in water, it produces a deep blue tea that turns purple with the addition of acidic ingredients like lemon juice. This natural dye is often used in rice dishes, desserts, and beverages across Southeast Asian cuisine. Beyond its edible uses, the flower has gained popularity in the skincare and haircare industries due to its anti-aging and hair-strengthening properties, making it a key ingredient in many herbal beauty products.

Apart from its health and beauty benefits, butterfly pea also plays a crucial role in agriculture and environmental conservation. As a nitrogen-fixing plant, it improves soil fertility, making it valuable for sustainable farming practices. Additionally, its high-protein content makes it a beneficial feed for livestock. With its wide range of uses and impressive health benefits, butterfly pea flower continues to be a subject of interest in both traditional medicine and modern research.[3]

TYPES OF SKIN CREAMS

1.Oil in water (O/W)
2.Water in oil (W/O)
3.Cosmetic creams
4.Medicated creams

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OIL IN WATER (O/W):

Oil-in-Water (O/W) creams which are composed of small droplets of oil dispersed in a continuous phase, and an emulsion in which the oil is dispersed as droplets throughout the aqueous phase is termed an oil-in-water (O/W) emulsion.

WATER IN OIL(W/O):

Water-in-Oil (W/O) creams which are composed of small droplets of water dispersed in a continuous oily phase. When water is the dispersed phase and an oil the dispersion medium, the emulsion is of the water in nil (W/O) type.

COSMETICS CREAMS:

These creams are highly used in a variety of skin conditions(dermatoses).

EX: vanishing creams, Foundation creams, cold creams, moisturizing creams, all purpose creams, night creams, skin protective and creams

1. Cleansing cream
2. Foundation and vanishing creams.
3. Night and Massage creams
4. Hand and body creams
5. All-purpose creams and general creams

Cleansing creams and Cold creams

Cleansing creams:

They are used for the purpose of removing makeup, surface grime (layer of dirt on skin) and secretions of skin from the face and throat respectively.

Cleansing creams are of two types.

They are:

(i) Beeswax-borax type / Emulsified type

(ii) Liquefying type

Cleansing creams are modern day face cleaning products that are used by people to clean the face of make-up and the dust before going to bed.

Cold creams:

These types of creams are water-in-oil types of emulsion. They produce a cooling sensation by the evaporation of water after application of cream to the skin. Hence, they are known as cream. They should possess emollient action. The layer left on the skin after application should be non-occlusive.

Vanishing cream and foundation cream:

Vanishing cream:

These creams are also referred to as 'Day Creams' as they are applied during day times. They are oil in water emulsion. When applied on the surface of skin, they sp as thin oil less film which is not visible to the naked eye. Hence, they are called vanishing creams. They are used to hold powder on the skin as well as to improve adhesion.

Foundation cream:

They provide an emollient base or foundation to the skin. are applied before applying face powder or other preparations of make-up.

Night and massage creams:

Night Creams:

The preparations which are applied during night time and removed in the morning are called night creams.

Massage creams:

The preparations which are gently applied and rubbed on the skin through massage technique are called massage creams. Skin becomes dry due to the following reason:

- When stratum corneum is exposed to low humidity, excessive loss of water takes place which attributes to dryness of skin.
- When the lower layer of epidermis does not hydrate properly.
- When the skin is in contact with soap or solutions of detergent for a long time.

Hand and body creams:

Due to exposure of skin to water, soaps and detergents many times a day, removal of lipids and other secrets from the skin occurs. Cold and dry winds are a response for chapping of the skin. Chapping occurs due to loss of moisture from the skin, which is also associated with cracking.

Water is sufficient enough to treat the dryness of the skin, but evaporation of water takes place rapidly, which again, makes the skin dry and no emollient effect is produced.

In case, if hands are immersed in water for a longer time then abnormal hydration takes place. This hydration will lead to swelling of cells in the stratum corneum, which ultimately results in rupturing of cells.

Hence, hand and body creams are formulated with suitable emollient, which not only makes water available but also regulates the water take-up by the cells of the stratum corneum.

All-purpose creams:

These creams are used by sports persons and also by people who do outdoor activities. Hence, they are called sport creams or all purpose cream. They are oily in nature but non-greasy.

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They provide protective film to the skin.They make the rough surfaces of the skin smooth.

MEDICATED CREAMS:
A cream is semisolid emulsion containing suspended or dissolved medication.
EX: antibiotic creams, antifungal creams, zinc oxide creams.[4]

FUNCTIONS OF INGREDIENTS
1: BUTTERFLY PEA EXTRACT

Fig:3 Butterfly Pea Extract

General description: Clitoria ternatea, commonly known as **Butterfly Pea,** is a tropical plant. It is well- known for its striking blue flowers. The plant is utilized for various therapeutic purpose due to its rich array of bioactive compounds.

Synonyms: Butterfly Pea, Asian Pigeonwings, Blue Bellvine, and Darwin Pea.

Biological source: The flower of Clitoria ternatea is the primary biological source. Some of the plant parts like leaves and roots are also used in Ayurvedic medicine.

Family: Fabaceae or Legume (Leguminosae)

Chemical constituents: The chemi constituents of Butterfly Pea are responsible for its pharmacological activities. Anthocyanins-delphinidin-3-sophoroside a potent antioxidant.

Geographical source: Native to Southeast Asia, Africa,Pacific Islands, Australia,Sri Lanka.

Uses and **Properties:**
- Cognitive Health: Enhancing memory and brain function.
- Skin Health: Used in the form of lotions,creams, and oils to treat skin conditions such as skin irritation, inflammation.
- Antioxidant activity, which reduces the risk of chronic diseases like heart diseases and cancer.
- Anti-inflammatory effects
- Neuroprotective Effects: Stimulates **acetylcholine** receptors and enhances cognitive functions.[4]

2: ALOE VERA GEL

Fig:4 Aloevera gel

General Description: Aloe vera is a herb with succulent leaves that are arranged in a rosette. The leaves are grey to green and sometimes have white spots on their surfaces. They have sharp, pinkish spins along their edges and are the source of the colourless gel found in many commercial and medicinal products.

Synonyms: Aloe barbadensis, Aloe barbadensis miller, Aloe spica, Musabbar (Hindi), Korphad (Marathi).

Biological source: The biological source of aloe is **dried latex of leaves of various species of Aloes,** namely: Aloe barbadensis Miller, Aloe ferox Miller,Aloe perryi Bakery, Aloe spicata Bakery.

Family: Asphodelaceae (Liliaceae)

Geographical source: Aloes is the indigenous to eastern and southern Africa. Cultivated in Caribbean islands, Europe and many parts of India, including the North West Himalaya region.

Chemical Constituents: Aloe vera contains over 200 chemical constituents. The two-main active constituents of the aloe vera plant extract are **chromone** and **anthraquinone** and its **glycoside** derivatives.

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Uses and **Properties:** It has antioxidant and antibacterial properties.

- It accelerates wound healing.
- It helps to treat canker sores.
- It reduces constipation.
- It lowers blood sugar levels.
- Improves skin and prevents wrinkles.[5]

3: **TURMERIC EXTRACT**

Fig:5 Turmeric Extract

General description: Curcumin is a major component of turmeric, and the activities of turmeric are commonly attributed to curcuminoids **(**curcumin and closely related substances**).** It comes from the rhizome (root) of the ginger family, which has anti- inflammatory and antioxidant effects. Beyond culinary uses, turmeric is used in traditional medicine, cosmetics, and as a natural dye.

Synonyms: Curcuma, Curcuma aromatica, Curcuma domestica, Curcuma longa, Curcuma longae rhizoma, Curcumin, Curcumine, Curcuminoid.

Biological source: Turmeric is the dried rhizome of Curcuma longa Linn. belonging to the family Zingiberaceae.

Family: Zingiberales

Geographical source: The plant is a native to Southern Asia. It is grown on a large scale in India, China, Indonesia and widely cultivated in tropical regions.

Chemical constituents: Turmeric contains several bioactive compounds, primarily known as curcuminoids. The main chemical constituents: Curcuminoids & Essential oils.

Uses and **Properties:**

- Anti-inflammatory.
- Antioxidant.
- Antimicrobial.
- Digestive Aid.
- Pain Relief.[6]

4: BEESWAX

General description: Beeswax is a natural wax produced by honey bees of the genus Apis. Worker bees secrete it from eight wax- producing glands on their abdomens. The bees use this wax to build honeycomb cells for storing honey and protecting their larvae and pupae. Beeswax is composed mainly of esters of fatty acids and long- chain alcohols.

Synonyms: Cera-alba, linseed-oil, honeycomb wax, natural wax,white wax, yellow wax.

Biological source: The primary biological source of beeswax is the honeycomb, specifically species like Apis mellifera and Apis dorsata and other members of the family.

Family: Apidae.

Geographical source: India, Asia, Europe, West Africa, Brazil, Italy.

Chemical constituents: Beeswax is a complex mixture of various chemical compounds. Unhydrolyzed Beeswax consists of approximately 71% esters,15% hydrocarbon, 8% free fatty acids, 6% other compounds.

Uses and **Properties:**

- Cosmetics; used in making skincare products due to its protective, emollient properties
- Food Processing; used as a coating for cheese and as a food additive (E901) to prevent moisture loss.
- Medical Applications; used in dental fillings and for treating skin conditions like eczema and psoriasis.[7]

5: LIQUID PARAFFIN

General description: Liquid paraffin, also known as mineral oil or paraffinum liquidum, is a highly refined, clear, colourless, and odourless oil derived from petroleum. It is composed mainly of saturated hydrocarbons (alkanes).

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Uses:
- Cosmetics: Used as a moisturiser and emollient in lotions, creams,ointments to soften and smooth the skin.
- Medicine: Acts as a laxative to relieve constipation and is used in various pharmaceutical formulations.
- Food industry: Used as a coating for fruits and vegetables to maintain freshness and appearance.

6: BORAX

General description: Borax, also known as sodium borate, is a naturally occurring mineral and a salt of boric acid. It appears as a white powder consisting of soft, colourless crystals that dissolve easily in water. Borax has a wide range of applications due to its unique chemical properties.

Uses:
- Borax is used in pest control.
- Cleaning agent
- Water softening
- Preservatives
- Emulsifier

7: METHYL PARABEN

General description: Methyl paraben is a preservative used in various products including cosmetics, food, and pharmaceuticals. It helps prevent the growth of mood and harmful bacteria, thereby extending the shelf life of the products. It is the methyl ester of p-hydroxybenzoic acid. Which is absorbed through the skin and gastrointestinal tract.

Uses:
- Antimicrobial preservative, antifungal agent, neuroprotective agent.
- Allergenic testing agent
- Hair care products
- Moisturisers

8: GLYCEROL

General description: Glycerol, also known as glycerin, is a colourless, odourless, and viscous liquid with a sweet tasting and non-toxic Tirol compound. It occurs in nature as a triester in oils and fats with carboxylic acids. It is a trihydroxy alcohol. Typical plant sources include soybeans or palm.

Uses:
- Widely used in the pharmaceutical, cosmetics, and food industries due to its moisturizing properties, and it serves as a humectant, solvent, and sweetener.
- Also used in various chemical and biochemical applications, including in the production of antifreeze and in medical formulations like cough syrups and skin creams.

9: ROSE WATER

Fig:6 Rose water

General description: The rose (genus Rosa) is known for its medicinal and therapeutic uses, although it is more commonly recognised for its ornamental beauty.

Uses and **Properties:**
- Used in skincare for its mild astringent and a natural moisturiser.
- Used to treat eye irritation and inflammation.
- Antioxidant activity, anti-inflammatory, antibacterial and antifungal, antidepressant and calming effect, skin care, digestive health.[8]

II. LITERATURE REVIEW

1.Jayshree Modi, et.al (2024):

Studied the quest for efficacious and safe skincare products has led to an increased interest in herbal formulations owing to their potential therapeutic benefits and minimal adverse effects. This research endeavors to formulate and evaluate a multipurpose herbal cream utilizing renowned botanical extracts of Aloe Vera, Turmeric, and Neem, each recognized for their multifaceted medicinal properties. The rationale behind the selection of specific herbs and natural components is emphasized, drawing attention to their historical uses and documented therapeutic properties. A comprehensive account of formulating the cream

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with Aloe Vera, turmeric, and neem oil to achieve ideal texture and durability is provided.

2.Somnath, et.al (2023):

Studied that Herbal cosmetics are products that are used to improve one's look. The goal of the research was to develop a herbal cream for moisturizing, nourishing, whitening, and treating various skin diseases. Curcuma longa (Turmeric powder), Carica papaya (Papaya), Aloe barbadensis (Aloe-vera leaves), Azadirachta indica (Neem leaves), and Ocimum sanctum (Tulsi leaves) are some of the basic drugs used to make the cream. The selection of components is based on the agents' various therapeutic characteristics. Various evaluation parameters are used for the cream.

3.Archana Dhyani, et.al (2019):

Analysed that the Herbal cosmetics are the preparations used to improve the individual appearance. The aim of the present study was to prepare the herbal cream for the use of moistening, nourishing and cure of various diseases of the skin. Different crude drugs like Aloe barbadensis (Aloe Vera leaves), Azadirachta Indica (Neem-leaves), Curcuma longa (Turmeric-rhizomes) and Emblica Officinali (Amla) are used to formulate the cream. The selection of ingredients based on the different medicinal properties of the agents. The cream is subjected to various evaluation

4.Vikrant Dandekar, et.al (2020):

Studied that the commercial need for herbal formulations is increasing nowadays as natural remedies are more favored in the belief that they are safer with fewer side effects than synthetic ones. Therefore, it is rational to develop a multipurpose herbal cream that is free from toxic side effects, safe and effective with better patient compliance as compared to allopathic preparations. The present research work related to a multipurpose herbal cream was formulated and subjected to various evaluation parameters, and the findings obtained were evaluated for the limits

5.Laxmi Banjare, et.al (2014):

Analysed that the Herbal Medicine, sometimes referred to as Herbalism or Botanical Medicine, is the use of herbs for their therapeutic or medicinal value. The herb is a plant or plant part valued for its medicinal, aromatic qualities. Herb plants produce and contain a variety of chemical substances that act upon the body. Herbal Cosmetics are defined as beauty products, which possess desirable physiological activities, such as skin healing, smoothing, and appearance, enhancing and conditioning properties because of herbal ingredients.

6.Abhijeet Pandey, et.al (2010):

Studied that Herbal ointment containing Aloe vera,Neem and Turmeric was formulated and evaluated to study antibacterial and antifungal activity. The evaluation was done using cup plate method for zone of inhibition and twofold dilution method for MIC (Minimum Inhibitory Concentration).The study showed that Aloe ointment was exhibiting broad-spectrum antifungal activity and antibacterial activity against E.coli. The overall experiment showed that Aloe ointment and Turmeric ointment showed more antifungal activity than Neem ointment.

8.K.Bijauliya Rohit, et.al (2017):

Studied that ability to desire the right herbal cream formulation for you depends on accurate ingredient knowledge,body Prakriti assessment, personal needs, customer perception about product, benchmark product. Corrective formulation based natural beauty preparation, which has cosmetic value or safe | additive properties in replacing synthetic ingredients. There is need to do more R and D in the field of herbal cosmetics to prove effectiveness and establish herbal cosmetics in that the purpose of the work was to promote safety profile.

9.Shashank Srivastava, et.al (2024):

Studied The goal behind designing this multipurpose herbal skincare cream is to prepare an herbal cream which is suitable for various skin care needs. Multipurpose creams are designed to fulfill various purposes, including hydrating, calming, preventing aging, and offering antioxidant advantages. Customers searching for a single product to streamline their skincare routine may find this adaptability appealing. In this multipurpose cream, the blend of essential oils and plant extracts can be used to address particular skin issues such as uneven skin tone, dryness, irritation, or acne. The cream's formulation includes essential oils, natural extracts, and other herbal ingredients that work together to benefit the skin in multiple ways. It contains pineapple extract which has antioxidant property and several other benefits like skin brightening, moisturizer and anti acne benefits. Also Aloe Vera provides the skin and

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pores with intense moisture, leaving the skin smooth, clear, and nourished. Natural ingredients with antibacterial and anti-inflammatory properties, such as turmeric, neem, and tulsi, help to reduce inflammation and prevent breakouts of pimples. In addition, these antioxidants promote the synthesis of collagen, which improves skin suppleness and delays the appearance of fine lines and wrinkles. It has multiple benefits it helps in various skin disorders and also improves the look and enhances the skin appearance.

10.TP Kumara, et.al (2020):

Analysed that the Cosmetics formulations used to enhance the human appearance are popular since ages and herbal, natural based cosmetics are gaining more attention recently. This increased attention is because of their non-toxic, safe perception. In this present research we had formulated herbal cream possessing the properties of moisturizing, nourishing, lightening and treating various skin ailments. Different Schiff base active ingredients, N-(4-methoxybenzylidene aniline), Montanov-68, Glycerin monostearate, Coconut oil, Glycerin, citric acid and perfume…

III. METHODS

The type of cream being created determines the preparation technique. The general techniques are as follows:

1. The Fusion Method:

Ingredients that dissolve in oil, such as oils and waxes, are melted at a regulated temperature. Ingredients that dissolve in water are heated independently to the same temperature.With constant stirring, the aqueous phase is progressively added to the oil phase until a homogeneous emulsion forms.Stirring, the mixture is allowed to cool to room temperature. Uses: Good for heavy O/W creams and W/O creams.[5]

2. The Emulsification Process:

Separately prepare the water and oil phases. Raise the temperature of both phases to the same level. Using high-speed mixing or homogenization, gradually incorporate the oil phase into the water phase (or vice versa).Stir until the cream stabilizes and cools. Uses: Frequently applied to O/W creams.[5]

3. Trituration Method:

The Trituration Technique Using a mortar and pestle, a little amount of oil is triturated with an emulsifying ingredient. Adding water gradually creates a homogenous, silky cream. Applications: Fit for small-scale manufacturing processes, such as making medicinal creams.[5]

Fig:7 Trituration of Cream

EXCIPIENTS AND HERBAL INGREDIENTS WITH THEIR ROLE

Sr.no	Ingredients	Role
1.	Butterfly Pea Extract	Antioxidants, anti-inflammatory
2.	Aloe Vera Gel	Anti ageing, anti-inflammatory, moisturiser, reduce acne, and pimples.
3.	Turmeric extract	Anti-inflammatory, antioxidant, skin brightening, antimicrobial, Moisturiser and wound healing
4.	Liquid paraffin	Lubricating agent
5.	Borax	Alkaline agent, which reacts with Emulsifying agent to form soap
6.	Methylparaben	Preservative
7.	Rose water	Fragrance

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8.	Beeswax	Emulsifying agent, stabiliser, and gives thickness to the cream
9.	Glycerol	Humectant, skin barrier support, improve texture, and has healing properties

EXTRACTION PROCESS

Anthocyanin extraction from butterfly pea flowers:

Hot water extraction:

A small number of fresh or dried flowers are combined with water in a 1:15 or 1:20 substrate solvent ratio, and then they are heated for 30 to 40 minutes.The mixture was filtered and dried for 36 to 48 hours at 40°C. Anthocyanin extracts are the name given to these vacuum-dried extracts. Place the extract in the refrigerator.

Fig: 8 Extraction of Butterfly Pea Flowers

Confirmatory test for Anthocyanin

1.Sulfuric acid test:

To 2 ml of extract,1 ml of concentrated H2So4 is added in a test tube. Orange colouring would be a sign of anthocyanin content.

2.Sodium hydroxide test:

2 drops of 1 N NaOH were added to 2 ml of extract. The presence of anthocyanin would be indicated by blue to bluish-green coloration.

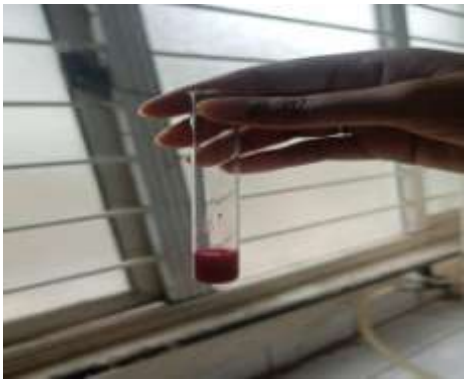

Fig:9 Sulfuric acid Test

Extraction of Aloe vera gel:

Fig: 10 Extraction of Aloe Vera gel

Fresh aloe vera leaves were gathered and cleaned with distilled water. The leaves were then properly dried in a hot air oven, and the outer portion of the leaf was cut lengthwise with a sterile knife. The colourless parenchymatous tissue, or aloe vera gel, was then extracted using the sterile knife, and the filtrate, or filter product, which is a clear aloe vera gel, was then used in the preparation.

Extraction of Turmeric:

Take 2 gm of turmeric powder in a beaker. Add 10 ml of water to it and boil the mixture for 10 min. Filter it. [10]

FORMULATION OF CREAM:

Preparation of Cream Base

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In a borosilicate glass beaker, heat the liquid paraffin and beeswax to 75°C and keep it there. (Phase of oil). Borax and methylparaben should be dissolved in distilled water in a different beaker and heated to 75°C to produce a clear solution.

Preparation of Multipurpose Cream

Gradually incorporate this watery phase into the oily phase. Then, add a measured quantity of aloe vera gel, turmeric extract, and butterfly pea extract, and stir vigorously until a smooth cream develops. Then, for aroma, add a few drops of rose oil. Ensure that all the components are properly mixed. Stir continuously for 10 min until it forms a smooth cream.

Fig:11 Butterfly Pea Cream

FORMULATION TABLE

Sr.no	Ingredients	Formulation 1	Formulation 2	Formulation 3
1.	Butterfly Pea Extract	1.5ml	2 ml	1.5ml
2.	Aloe Vera gel	1.5ml	1ml	1ml
3.	Turmeric extract	0.5ml	0.5ml	1.5ml
4.	Beeswax	pm	3.5g	3.2g
5.	Liquid paraffin	10ml	15ml	12ml
6.	Borax	0.3g	0.2g	0.4g
7.	Methylparaben	0.05g	0.02g	0.04g
8.	Glycerol	1.5ml	1ml	2ml
9.	Rose water	5-6 drops	5 drops	3 drops
10.	Distilled water	upto Q.S	upto Q.S	upto Q.S

Evaluation of Cream

In this test, the cream was observed for color, odor, texture, state

A. Color: The color of the cream was examined visually

B. Odor: The odor of the cream was examined by smelling

C. State: The appearance of the cream was evaluated through visual inspection.

D.Consistency: The consistency of the formulation was assessed by manually rubbing the cream on the hand.

pH Measurement:

A 0.5 g sample of the cream was mixed with 50 ml of distilled water, and its pH was determined using a digital pH meter.

Viscosity:

The viscosity of the formulation was measured using a Brookfield viscometer at 15 rpm with spindle No. 62

Spreadability:

Spreadability was measured based on the time (in seconds) required for two glass slides to separate when a cream sample was placed between them under a specific load. A shorter separation time indicated better spreadability. To conduct the test, two sets of glass slides of standard dimensions were used. A suitable glass slide was taken, and a small amount of the cream formulation was placed on it. Another slide was positioned on top of the formulation, and a set weight was applied to ensure uniform spreading into a thin layer. After removing the weight, any excess formulation adhering to the slides was scraped off. The upper slide was then allowed to slip off freely under the influence of a tied weight, and the time taken for it to separate was recorded. Spreadability was calculated using the formula:

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Spreadability = (m × l) / t
Where:
m = Standard weight applied to the upper slide (30g)
l = Length of the glass slide (5 cm)
t = Time taken for the upper slide to slip off (in seconds)

Phase Separation:

The cream was stored in a tightly sealed container at room temperature, protected from sunlight, and monitored for 24 hours to check for any phase separation.

Washability:

To assess washability, a small amount of cream was applied to the hand and rinsed with tap water. All three formulations were found to be easily washable.

Irritancy:

This test examined whether the cream contained any potentially harmful materials or chemicals that could irritate the skin or mucous membranes. A designated area on the dorsal side of the left hand was marked, and the formulation was applied. The application time was recorded, and the area was observed for a few minutes to check for any signs of irritation.

Greasiness:

This test determined the oiliness or greasiness of the cream. Results showed that all formulations were slightly greasy. [11]

IV. RESULTS AND DISCUSSION

Physical parameters

S.no	Parameters	F1A	F2A	F3A
1.	Colour	Green	Blue	Yellow
2.	Odor	Pleasant	Pleasant	Pleasant
3.	Consistency	Smooth	Smooth	Smooth
4.	State	Semi solid	Semi solid	Semi solid

In this test, the cream was observed for color, odor, texture, state .The samples F1C,F2C,F3C share identical characteristics. The formulation F1C is green, F2C formulation is blue whereas the F3C is yellow in colour .All of them, have a pleasant odor, and possess a smooth consistency. Additionally, their state is semi-solid.

Fig: 12 Multipurpose Cream

pH Test

S.no	Formulation	pH
1.	F1C	6.48
2.	F2C	6.55
3.	F3C	6.6

According to the results, the pH of all the three formulations that is F1C,F2C,F3C were found to be nearer to skin pH so it can be safely used on the skin.

Fig: 13 pH Meter

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Viscosity

S. no	Formulation	Spindle no.	RPM	K Factor	Dial reading	Viscosity (CPS)
1.	F1C	62	0.5	500	15	7500
2.	F2C	62	0.5	500	14	7000
3.	F3C	62	0.5	500	13	6500

According to the results all the three formulations showed adequate viscosity.

Fig: 14 Viscometer

Irritancy test

S.no	Formulation	Irritant effect	Erythema	Edema
1.	F1C	Nil	Nil	Nil
2.	F2C	Nil	Nil	Nil
3	F3C	Nil	Nil	Nil

The formulations F1C, F2C, and F3C showed no irritant effect, erythema, or edema, indicating that they are non-irritating and well-tolerated.

Washability

S.no	Formulation	Washability
1.	F1C	Easily washable
2.	F2C	Easily washable
3.	F3C	Easily washable

The formulations F1C, F2C, and F3C were found to be easily washable, indicating good removability and user convenience.

Phase separation

S.no	Formulation	Phase separation
1.	F1C	No phase separation
2.	F2C	No phase separation
3.	F3C	No phase separation

The formulations F1C, F2C, and F3C exhibited no phase separation, indicating good stability and uniformity.

Spreadability

S.no	Formulation	Time (sec)	Spreadability
1.	F1C	7	2.2
2.	F2C	5	3
3.	F3C	6	2.5

Fig: 15 Spreadability Test

The spreadability of the three formulations that is F1C,F2C,F3C was carried out and out of that

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for F2C the time taken by the 2 slides to separate is less so as said in the description of evaluation test lesser the time taken for separation of the two slides better the spreadability so according to this statement F2C showed better spreadability.

Greasiness

S.no	Formulation	Greasiness
1.	F1C	Slightly greasy
2.	F2C	Slightly greasy
3.	F3C	Slightly greasy

The result of the above data indicates that all three formulations (F1C, F2C, and F3C) exhibit slightly greasy characteristics. There is no variation in greasiness among the formulations.

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