

**DEVELOPMENT OF ORGANIC EYE SHADOW FROM
NATURAL COMPOUNDS USING BETA VULGARIS**

PROJECT WORK

Submitted in partial fulfillment of the requirements for the award
of Bachelor of Science in Biotechnology

by

RESHMA SREE S (41770025)



SCHOOL OF BIO AND CHEMICAL ENGINEERING

DEPARTMENT OF BIOTECHNOLOGY

SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

Accredited with Grade “A++” by NAAC | 12B Status by UGC | Approved By AICTE

JEPPIAAR NAGAR, RAJIV GANDHI SALAI,

CHENNAI - 600 119

APRIL – 2024



SATHYABAMA

INSTITUTE OF SCIENCE AND TECHNOLOGY

(DEEMED TO BE UNIVERSITY)

CATEGORY-I UNIVERSITY BY UGC

Accredited "A++" Grade by NAAC | 12B Status by UGC | Approved by AICTE

www.sathyabama.ac.in

DEPARTMENT OF BIOTECHNOLOGY

BONAFIDE CERTIFICATE

This is to certify that this Project Report is the bonafide work of **RESHMA SREE S (41770025)** who carried out the project entitled "**DEVELOPMENT OF ORGANIC EYE SHADOW FROM NATURAL COMPOUNDS USING BETA VULGARIS**" under my supervision from January 2024 to April 2024.

Internal Guide

Dr. R. THYAGARAJAN

External Guide

Dr. S. JAYASHREE

Head of the Department
Dr. V. RAMESH KUMAR

Submitted for Viva voce Examination held on: 27/4/24

Internal Examiner

(Dr. S. JAYASHREE)

External Examiner

Dr. Rakesh S

DECLARATION

I **RESHMA SREE S (41770025)** here by declare that the Project Report entitled **“DEVELOPMENT OF ORGANIC EYE SHADOW FROM NATURAL COMPOUNDS USING BETA VULGARIS”** done by me under the guidance of **Dr.R. THYAGARAJAN** (Internal), and **Dr. S JAYASRHEE** (External) at Sathyabama Institute Of Science Of Technology, Chennai, Tamilnadu, India is submitted in partial fulfillment of the requirements for the award of Bachelor of Science degree in Biotechnology.

DATE: 24/4/24

PLACE: CHENNAI

A handwritten signature in blue ink, appearing to read 'S Reshma Sree'.

SIGNATURE OF THE CANDIDATE

ACKNOWLEDGEMENT

I am pleased to acknowledge my sincere thanks to The Board of Management of **SATHYABAMA INSTITUTE OF SCIENCE AND TECHNOLOGY** for their encouragement in doing this project and for completing it successfully. I am grateful to them.

I convey my thanks to **Dr. REKHA CHAKARAVARTHI**, Dean, School of Science and Humanities, and **Dr. V. RAMESH KUMAR, M.phil, Ph.D.**, Head of the Department, Department of Biotechnology, for providing me with necessary support and details at the right time during the progressive reviews

I would like to express my sincere and deep sense of gratitude to my Project Guide **Dr. R. THYAGARAJAN**, Assistant Professor, Department of Biotechnology and **Dr. S. JAYASHREE** Assistant Professor, Department of Biotechnology for their valuable guidance, suggestions and constant encouragement paved the way for the successful completion of my project work.

I wish to express my thanks to **all Teaching and Non-teaching staff** members of the Department of Biotechnology who were helpful in many ways for the completion of the review work.

ABSTRACT

in the modern world every product has been chemicalized and we are in a phase where there are no products available without chemicals. It is hard to find products which are organic and without any side effects. The interest in sustainable products has increased along the years since the choice of products, packaging and production processes have a great impact on the environment. These products are classified by regulatory agencies in different categories, aggregating advantages to the product and increasing the demand by consumers. However, there is no harmonization in guidelines of these certifying agencies and each cosmetic industry formulates their product and packaging in a more rational way, which causes less damage to the environment. Many cosmetic products have in their formulation natural products that perform a specific biological function, but these products should be evaluated on efficacy and toxicological aspects. This article aims to approach sustainability, natural and organic cosmetics, considering the consumer and the efficacy, toxicological and regulatory aspects. Products are used in bare skin should be chemical free, in order to minimize side effects.

Keywords: Beetroot, *Beta vulgaris* Eye Shadow, Organic

TABLE OF CONTENTS

S NO	TITLE	PAGE NO
	ABSTRACT	i
	LIST OF ABBREVIATION	ii
	LIST OF FIGURES	iii
	LIST OF TABLES	iv
1	INTRODUCTION	1
	1.1 Organic Eye Shadow With <i>Beta Vulgaris</i> Natural Beauty Revolution	1
	1.2 Importance Of Organic Eye Shadow	3
	1.3 Types Of Organic Eye Shadow	3
	1.4 Advantages Of Organic Eye Shadow	4
	1.5 Needs	5
	1.6 Especially For Childrens	6
	1.7 History Of Eye Shadow	7
	1.8 Chemical Orientend Eye Shadow	8
	1.9 Merits Of Organic Eye Shadow	9
	1.10 De Merits Of Organic Eye Shadow	10
2	LITEREATURE SURVEY	12
3	AIM AND ABJECTIVES	17
4	MATERIALS AND METHODS	18
	4.1 <i>Beta Vulgaris</i>	18
	4.1.1 Benefits Of <i>Beta Vulgaris</i>	19
	4.1.2 Benefits Of Mica Powder	22
	4.2 Methodology	23
	4.3 Preparation Of Final Product	23

5	RESULTS AND DISCUSSION	24
	5.1 Physiochemical Property Analysis	24
	5.1.1 Skin Irritability Test	24
	5.1.2 Ph Test	24
	5.1.3 Transfer Resistance Test	25
	5.1.4 Antioxidant	25
	5.1.5 Anti Bacterial Test	26
	5.1.6 Gcms Test	27
	5.2 Results	28
	5.2.1 Extraction 1 Result	28
	5.2.2 Extraction 2 Result	28
	5.2.3 Ph Test	30
	5.2.4 Skin Irritability Test	31
	5.2.5 Transfer Resistance Test	32
	5.2.6 Anti Bacterial Test	36
	5.2.7 Gcms Test	37
	5.2.8 Antioxidant Test	37
6	SUMMARY AND CONCLUSION	39
	REFERENCE	

LIST OF FIGURES

FIGURE NO	FIGURE NAME	PAGE NO
5.2.1	Extraction Result 1	29
5.2.2	Extraction Result 2	29
5.2.3	Ph Test	30
5.2.4	Skin Irritability Test	31
5.2.5	Transfer Resistance Test	32
5.2.6	Antibacterial Test	32
5.2.7	Gcms Test	34
5.2.8	Anti Oxidant Test	37

LIST OF TABLES

TABLE No.	TABLE NAME	PAGE NO.
4.1	Final Product Quantity	23
5.1	Skin Irritability Test	31
5.2	Antibacterial test	34
5.3	Gcms Peak Report	36

CHAPTER 1

INTRODUCTION

1.1 Organic Eye Shadow with *Beta Vulgaris* A Natural Beauty Revolution

In the world of cosmetics , the allure of organic products has steadily grown, fueled by a desire for safer , more sustainable alternatives . Organic eye shadow ,in particular , has emerged as a frontrunner in this beauty revolution, offering a blend of natural ingredients that not only enhance your beauty but also nourish and protect your delicate skin. One key ingredient that has captured the spotlight is *Beta Vulgaris* , more commonly known as beetroot, celebrated for its vibrant pigmentand numerous skin benefits. At the heart of organic eye shadow lies a commitment to purity and sustainability. Unlike conventional cosmetics that may contain harsh chemicals and synthetic dyes , organic eye shadows are formulated with natural ingredients sourced from organic farms. This not only ensures a safer product for your skin but also supports eco-friendly practices that protect our planet. *Beta Vulgaris*, derived from beetroot, is a standout ingredient in organic eye shadows . Renowned for its rich, earthy hue, *Beta Vulgaris* provides a natural alternative to synthetic dyes , infusing eye shadows with a beautiful ,long-lasting color payoff .Beyond its pigment ,Beta Vulgaris is packed with antioxidants and vitamins, offering anti-inflammatory properties that can so the and protect the delicate skin around your eyes . This makes it an ideal choice for those with sensitive skin or allergies to conventional makeup ingredients. The benefits of Beta Vulgaris extend beyond its cosmetic appeal .

As a natural ingredient, *Beta Vulgaris* is biodegradable, meaning it breaks down easily without harming the environment. This aligns with the ethos of organic beauty, which seeks to minimize the impact of cosmetic products on the planet. By choosing eye shadows with *Beta Vulgaris*, you're not only enhancing your beauty but also

contributing to a more sustainable future. In addition to *Beta Vulgaris* , organic eye shadows are often enriched with other natural ingredients that further enhance their performance and benefits. These may include nourishing oils like jojoba orcoconut oil, which help to moisturize and protect the delicate skin around your eyes. Plant-based waxes such as candelilla or carnauba wax provide a smooth, creamy texture that glides effortlessly onto your skin, ensuring easy application and blendability. Organic eye shadows with *BetaVulgaris* are also free from harmful chemicals such as parabens, phthalates, and synthetic fragrances. This reduces the risk of skin irritation and allergic reactions, making them suitable for even the most sensitive skin types. Additionally, many organic eyeshadows are cruelty-free and vegan, ensuring that no animals are harmed in the production process From all the above data organic eye shadow with *Beta Vulgaris* represents a natural beauty revolution , offering a safe , sustainable, and effective alternative to conventional cosmetics. With its vibrant pigment , skin-nourishing properties, and eco-friendly credentials, *Beta Vulgaris* is a star ingredient that embodies the essence of organic beauty. By choosing organic eye shadows with *Beta Vulgaris*, you're not only enhancing your beauty but also supporting a more sustainable and compassionate approach to cosmetics.

1.2 Importance of Organic Eye Shadow

Importance of organic eye shadow lies in its potential to provide a safer, more environmentally friendly and ethically conscious alternative to conventional eye shadows . Safer Ingredients : Organic eye shadows are made from natural and organic ingredients, which are generally considered safer than synthetic ones .They often exclude harmful chemicals like parabens , phthalates, and sulfates. Less Irritation: Natural ingredients are less likely to cause irritation or allergic reactions, making organic eye shadow a better choice for those with sensitive skin or eyes. Environmental Friendly Organic eye shadows are produced using environmentally sustainable practices , which can reduce the environmental impact compared to conventional cosmetics .Cruelty-Free : Many organic eye shadows are cruelty-free, meaning they are not tested on animals. Quality Despite being made from natural ingredients organic eye shadows can offer high-quality pigmentation and long-lasting wear. Health Consciousness: Consumers are becoming more conscious of what they put on their skin, leading to a preference for products with fewer synthetic chemicals.

1.3 Types of Organic Eyeshadow

Organic eye shadows are made with natural ingredients and are free from synthetic chemicals. Here are some common types you might come across: These are the most common type of organic eye shadows. They come in pressed or loose powder form and are applied with a brush. Cream eye shadows have a creamy texture and are usually applied with fingers or a brush. They can provide a more intense color pay off compared to powder eye shadows. These eye shadows come in a stick or pencil form and are easy to apply directly to the eyelids. They are convenient for quick application and blending. Mineral eyeshadows are made from natural minerals and are often free from preservatives, fragrances, and other synthetic ingredients. They come in powder form and are known for their bendability and long-lasting wear. Liquid eye shadows have a liquid formula that can be applied with a brush or wand. They can provide a high-shine finish and are often used for

creating bold, metallic looks. These are collections of eye shadows in a single palette, usually featuring a range of colors and finishes. Palettes can be a convenient way to create various eye looks using a single product. When choosing an organic eye shadow, look for products that are certified organic by reputable organizations like USDA Organic or Exocet . These certifications ensure that the product meets certain standards for organic ingredients and production methods.

1.4 Advantages Of Organic Eye Shadow

Organic eye shadows offer several advantages over conventional eye shadows that contain synthetic ingredients. Here are some of the key benefits:

Natural Ingredients: Organic eye shadows are made from natural ingredients, such as plant extracts, minerals, and oils. These ingredients are often gentler on the skin and less likely to cause irritation or allergic reactions.

Free from Harmful Chemicals Organic eye shadows are free from synthetic chemicals, such as parabens, phthalates, and synthetic fragrances , which have been linked to various health concerns .Using organic eye shadows reduces your exposure to these potentially harmful substances .

Environmentally Friendly Organic eye shadows are produced using environmentally friendly practices that minimize the use of synthetic pesticides, fertilizers , and other chemicals . This is a more ethical choice for those who prefer to avoid products that involve animal testing.

High-Quality Ingredient Organic eye shadows often contain high-quality ingredients that provide better performance, such as smoother application, longer wear, and richer color payoff. Some organic eye shadows are formulated with ingredients that offer additional skin benefits, such as moisturizing, soothing, or anti-aging properties.

Customizable: With the increasing popularity of natural and organic cosmetics, there is a wide range of organic eye shadows available in various colors, finishes, and formulations to suit different preferences and needs . While organic eye shadows offer many advantages, it's essential to note that not all organic products are created equal. Look for certifications from reputable organizations, such as USDA Organic or Exocet, to ensure that the product meets certain standards for organic ingredients and production methods.

1.5 Needs

Organic eye shadows are formulated without harsh chemicals, reducing the risk of skin irritation and allergic reactions. Using organic eye shadows can minimize exposure to potentially harmful ingredients found in conventional cosmetics, which may have long-term health effects. Organic eye shadows are often produced using sustainable farming practices that reduce environmental impact. Many organic eye shadows are cruelty-free, meaning they are not tested on animals, aligning with ethical values. Organic eye shadows are made with natural ingredients such as plant extracts, minerals, and oils, which can nourish and protect the delicate skin around the eyes. They are free from synthetic fragrances, reducing the risk of skin sensitivities.

Organic farming practices produce fewer pollutants and greenhouse gases, contributing to a cleaner environment. Many organic eye shadows come in biodegradable or recyclable packaging, reducing waste. Purchasing organic products supports local farmers who use sustainable farming methods. Organic eye shadows are less likely to be contaminated with pesticides or other harmful chemicals. They are less likely to cause irritation or inflammation, making them suitable for those with sensitive skin. Organic eye shadows are formulated without synthetic preservatives, which can be harsh on the skin.

Organic farming practices promote biodiversity by avoiding the use of synthetic pesticides and fertilizers. They are made without genetically modified organisms (GMOs), which are a concern for some people. Organic eye shadows are often produced in facilities that adhere to ethical labor practices. Choosing organic eye shadows supports sustainable agricultural practices that help protect the environment. They are free from synthetic dyes, which can cause skin irritation and allergic reactions. They do not contain petroleum-based ingredients, which can be harmful to the skin and the environment.

Using organic cosmetics can contribute to a sense of well-being by aligning with values of health, sustainability, and ethical consumerism. Choosing organic eye shadows reflects a conscious choice to prioritize health, environmental sustainability, and ethical considerations in cosmetic purchases.

1.6 Especially For Children & Teens

Organic eye shadows are free from harmful chemicals and toxins, making them safer for children's delicate skin. Children's skin is more sensitive, and organic eyeshadows are less likely to cause irritation or allergic reactions. Synthetic chemicals in non-organic eyeshadows can potentially harm children's health, especially with prolonged use. Organic eyeshadows are made with natural ingredients, which are gentler on the skin and less likely to cause harm. They are produced using sustainable and environmentally friendly practices, which is important for the future of our planet. Many organic eyeshadows are cruelty-free, meaning they are not tested on animals, aligning with ethical considerations for many families.

Organic eyeshadows are free from synthetic chemicals, which can have negative effects on both the skin and the environment. They are less likely to contain allergens that could trigger reactions in children. Choosing organic eyeshadows promotes ethical consumption practices and supports companies that prioritize sustainability and natural ingredients.

Using organic products can be a way to educate children about the importance of natural and sustainable living. Many non-organic eyeshadows contain harsh ingredients that can be harmful to the skin, especially for young children. Avoiding synthetic fragrances, organic eyeshadows are often free from synthetic fragrances, which can be irritating to sensitive skin. Buying organic products supports organic farming practices, which are better for the environment and human health.

Organic eyeshadows are often more biodegradable than non-organic counterparts, reducing environmental impact. Non-organic eyeshadows may contain petrochemicals, which are derived from petroleum and can be harmful to the skin and the environment. Using organic eyeshadows encourages children to make healthy choices when it comes to personal care products. Choosing organic eyeshadows reduces children's exposure to potentially harmful chemicals found in non-organic products.

Many organic eyeshadows are produced by small, independent businesses, supporting local economies. They are produced without the use of genetically modified organisms (GMOs), which some people prefer to avoid. Using organic eyeshadows sets a healthy example for children and teaches them to prioritize natural and sustainable products.

1.7 History Of Eyeshadow

Eyeshadow has a rich history that spans thousands of years. Here's a brief overview: Eye makeup, including eye shadow, was commonly used in Ancient Egypt. Egyptians used a substance called "kohl" made from minerals like copper, lead, ash, and burnt almonds. Kohl was applied not only for cosmetic purposes but also believed to have protective and medicinal properties.

Eye makeup was also popular in Ancient Greece and Rome, where women used powders and pigments to enhance their eyes. Wealthy women would often use ground gemstones like lapis lazuli for a vibrant blue shadow. In Europe during the Middle Ages, makeup was largely associated with prostitutes and actors, and the Church frowned upon its use. However, noblewomen still used subtle eye shadows made from crushed flowers or herbs.

The Renaissance saw a resurgence of interest in cosmetics, including eye shadow. Women used various natural substances like crushed berries, beetles, and minerals to create pigments for eye makeup. Eye makeup became more elaborate during these centuries, especially among the aristocracy. Women used powdered pigments mixed with oils or fats to create eye shadows, often in bold colors like green, blue, and purple.

The early 20th century saw the rise of modern cosmetics, and eyeshadow became more accessible to the masses. Brands like Max Factor and Maybelline introduced eyeshadow products in the form of creams, powders, and pencils. The 1960s and 1970s saw dramatic shifts in makeup trends, with the popularity of bold and vibrant eye shadows, influenced by fashion icons like Twiggy and psychedelic culture. Eye shadow continued to evolve with new formulations, colors, and techniques. The rise of makeup tutorials on platforms like YouTube and social media allowed for greater experimentation and creativity in eye makeup application. Today, eyeshadow is available in a wide range of colors, textures, and finishes, catering to diverse tastes and preferences. It remains an essential component of many people's beauty routines, allowing for endless possibilities in self-expression and creativity.

1.8 Chemical Oriented Eye Shadow

Chemically oriented eyeshadows refer to products formulated with a variety of synthetic ingredients to achieve specific cosmetic effects. Here's a breakdown of the components typically found in modern eyeshadows: Synthetic pigments are commonly used in eyeshadows to provide color. These pigments are finely ground particles that impart hues ranging from subtle neutrals to bold, vibrant shades. They are often derived from various chemical compounds, including oxides, ultramarines, and dyes. Binders are ingredients that help hold the pigments together and adhere them to the skin. Common binders in eyeshadows include silicones, polymers, waxes, and oils. These substances create a smooth texture and ensure the eyeshadow stays in place without flaking or creasing. Fillers are used to bulk up the product and adjust its texture. Talc, mica, and silica are commonly used fillers in

eyeshadows. These ingredients help improve the application and bendability of the product while also providing a smooth and lightweight feel on the skin. To prevent microbial growth and extend the shelf life of eyeshadows, preservatives are added to the formula. Common preservatives include parabens, phenoxyethanol, and potassium sorbate. These ingredients ensure the product remains safe for use over an extended period. Emollients and humectants are moisturizing agents that help hydrate the skin and improve the spreadability of the product. Ingredients like glycerin, dimethicone, and various oils are often included in eyeshadows to provide a creamy texture and prevent the formula from drying out. Some eyeshadows contain antioxidants like vitamin E or green tea extract to help protect the delicate skin around the eyes from environmental damage and premature aging. Fragrance and flavorings are sometimes added to eyeshadows to enhance the sensory experience of using the product. However, fragrance ingredients can be irritating to sensitive skin, so many formulations are fragrance-free or use minimal fragrance. Overall, chemically oriented eyeshadows are formulated with a combination of synthetic ingredients to provide long-lasting color payoff, smooth application, and a comfortable wear experience. These products undergo rigorous testing to ensure they meet safety standards and regulatory requirements for cosmetics.

1.9 Merits Of Organic Eye Shadow

Organic eyeshadows are made from natural ingredients, often derived from plants and minerals, which are gentle on the skin. Since they don't contain harsh chemicals, organic eyeshadows are less likely to cause irritation or allergic reactions. Organic eyeshadows are often produced using sustainable practices that are less harmful to the environment. Many organic eyeshadows are not tested on animals, making them cruelty-free options for consumers. They are free from harmful chemicals like parabens, phthalates, and synthetic fragrances, which can be damaging to both your skin and the environment. Organic eyeshadows often contain nourishing ingredients like vitamins, antioxidants, and essential oils that can benefit the skin. Despite being natural, organic eyeshadows can be long-lasting and offer vibrant color payoff. They allow for buildable coverage, so you can achieve the

desired intensity of color without caking or creasing. Organic eyeshadows are suitable for those with sensitive skin or skin conditions like eczema or rosacea, as they are less likely to cause flare-ups. They allow the skin to breathe, reducing the likelihood of clogged pores and breakouts. Organic eyeshadows often come in a variety of shades and finishes, allowing you to create endless looks. Some organic eyeshadows can double as eyeliners or brow powders, offering versatility in your makeup routine. They blend seamlessly on the skin, making them easy to work with for both makeup novices and experts. Organic eyeshadows are free from toxic chemicals, making them a safer choice for your overall health. They are often formulated without artificial preservatives, relying instead on natural preservatives like vitamin E or essential oils. Despite their long-lasting nature, organic eyeshadows are easily removable with gentle cleansers or makeup removers. They are gentle on the delicate skin around the eyes, reducing the risk of irritation or redness. By purchasing organic eyeshadows, you support brands that prioritize ethical sourcing and production methods. Low Environmental Impact: Organic eyeshadows often come in eco-friendly packaging and have a lower environmental impact compared to conventional makeup products. Overall Health Benefits: Using organic eyeshadows can contribute to better overall health by reducing exposure to harmful chemicals and supporting a more natural lifestyle.

1.10 Demerits Of Organic Eyeshadow

Organic eyeshadows may have a more limited color range compared to conventional ones due to the use of natural pigments. They may have shorter wear-time or require more frequent touch-ups compared to synthetic eyeshadows. Higher Price: Organic eyeshadows tend to be more expensive than conventional ones due to the costlier ingredients and production methods. They might be less readily available in stores compared to mainstream eyeshadows, requiring you to purchase them online or from specialty retailers. Organic eyeshadows may offer less intense or vibrant colors compared to synthetics. Even though they are formulated with natural ingredients, some individuals may still be allergic to certain botanical extracts or minerals used in organic eyeshadows. Due to the absence of synthetic

preservatives, organic eyeshadows may have a shorter shelf life and expire more quickly. They may not be as waterproof or resistant to sweat and oil compared to conventional options. They might be more fragile and prone to breakage since they lack certain binding agents found in synthetic formulas. The texture of organic eyeshadows can vary from batch to batch due to the natural variations in ingredients. Some organic eyeshadows may have less pigmentation or require more layers to achieve the desired color payoff. Organic eyeshadows may not offer as many specialized formulas, such as matte, shimmer, or metallic finishes, compared to conventional options. Certain natural pigments used in organic eyeshadows may have a higher potential to stain the skin, especially in brighter or darker shades. They may fade more quickly throughout the day, requiring more frequent touch-ups to maintain the desired look. Organic eyeshadows may offer fewer options for special effects like duochrome or holographic finishes. Some organic eyeshadows may have a different consistency or bendability, leading to challenges in application for some users. While organic eyeshadows are generally eco-friendlier, the production and transportation of natural ingredients can still have an environmental impact. They may be more prone to smudging or creasing, especially in humid or oily skin types. Organic eyeshadows may provide less coverage for imperfections or uneven skin texture compared to conventional options. Transitioning to organic eyeshadows may require some adjustment and experimentation to find the right products and techniques that work best for your needs.

CHAPTER 2

LITERATURE SURVEY

Nileshwari P. Chaudhari *et al.*, 2019 states that formulation F3 stands out as the most superior and stable among three herbal lipstick formulations, based on evaluation tests. It demonstrates desirable properties such as shine and spreadability after application. These findings underscore the significance of using natural ingredients in lipstick formulations, providing a safer alternative to synthetic products and reducing the risk of toxic effects associated with chemical additives.

Dini Agustina Yuniaty *et al.*, 2023 Reported that the use of eyeshadow as a decorative cosmetic applied to the eyelids, traditionally available in colors such as blue, pink, dark red, silver, green, and brown. Natural dyes, sourced from plants, animals, and microorganisms, offer a safer alternative to synthetic counterparts. Specifically, butterfly pea flower (*Clitoria ternatea L.*) and secang wood (*Caesalpinia sappan L.*) are two plant sources known for their natural dye content, extracted through maceration in 70% ethanol. A study focused on eyeshadow preparation utilized a combination of these extracts, resulting in three formulations (F3, F4, F5) with varying ratios, ultimately yielding a purple hue. Hedonic tests revealed no significant differences ($>0.05\%$) in color preference among the formulations. Furthermore, an irritation test demonstrated that the eyeshadow cream caused only mild irritation, with an irritation index of 1.00, indicating its potential as a safe and effective cosmetic product.

Lorenzo Martini *et al.*, 2016 States that formula one, containing talc and zinc stearate as prime bulking agents and excipients, releases significant amounts of metallic ions and ferrocyanides due to their intrinsic chemical structure. These inert powders lack free electric charges on their molecules, making them unable to sequester ions. Volunteers applying this formula of pressed powder showed elevated levels of

cadmium, chromium, cobalt, tin, and ferrocyanide (as thiocyanates) in their blood. In contrast, natural cakes containing gum resins and biopolymers such as shellac and/or karaya gum offer an alternative. Shellac, derived from the resin secreted by the female lac bug on trees in India and Thailand, contains polyhydroxy acids that may exist as lactides or inter-esters, contributing to its liquid-viscous texture and its ability to bind bivalent and polyvalent metallic ions. Karaya gum, a vegetable gum from the *Sterculia* genus, is an acid polysaccharide composed of galactose, rhamnose, and galacturonic acid, with carboxylate ions capable of capturing and sequestering hazardous ions and ferrocyanides.

Parveen Zia *et al.*, 2021 states that the pigment content of beetroot (*Beta vulgaris*), specifically anthocyanin and betacyanin, both water-soluble compounds with aesthetic appeal and positive health effects in food. This natural source contrasts with artificial colorants, which can have adverse effects on human health. Beetroot is increasingly recognized as a functional food with significant health benefits, leading to its popularity as a superfood. Betanine, the primary component responsible for the red color of beetroot, is extracted from *Beta vulgaris* and has been used successfully in commercial food coloring agents for several years. The phytochemical profile of beetroot suggests a range of health benefits, making it a promising candidate for the development of innovative food products.

Boris Nemzer *et al.*, 2011 States that the first comparative analysis of betalainic composition, focusing on dehydrogenated and decarboxylated betalain derivatives in red beetroot extracts concentrated through various methods, which are widely used sources of betalains. These products, extensively utilized in the food industry, constitute a significant portion of betalain consumption alongside natural pigment sources. Betalains are primarily employed as food colorants.

Arthikha *et al.*, 2019 States that the beetroot as a major source of natural pigments, particularly betacyanins. The study demonstrates that optimal extraction is achieved using 5 grams of beetroot in 10 ml of distilled water at 100°C for 10 minutes, with a

pH of 4. Betalains in beetroot exhibit high thermal stability, retaining their characteristics even at high temperatures. The pigment also shows remarkable stability under acidic conditions. This stability contributes to the pigment's increased activity. These findings suggest that beetroot powder, rich in betacyanin, has potential applications in textiles, medicine, preservatives, and molecular analysis. This research represents a step towards replacing synthetic dyes with eco-friendly and safe natural alternatives.

Davinder Kumar *et al.*, 2016 States that the realm of herbal cosmetics, which are concocted using cosmetic ingredients as a base, augmented by one or more herbal components to address diverse skin afflictions and enhance beauty. These products' chemical formulations incorporate various natural additives such as waxes, oils, natural colors, fragrances, and plant parts like leaves. Positioned between traditional cosmetics (e.g., lipstick, rouge) and pharmaceuticals (e.g., antibiotics, corticosteroids), cosmeceuticals offer a compelling middle ground. Herbal cosmetics emerge as an optimal solution for mitigating skin issues like hyperpigmentation, wrinkling, aging, and rough texture, with a burgeoning demand fueling their market growth. Their appeal lies in being cost-effective, devoid of side effects, environmentally friendly, and safe. Moreover, they hold a promising future compared to synthetic cosmetics. However, to unlock their full potential, the industry must prioritize the regulation and standardization of herbal ingredients, paving the way for substantial growth in the field of herbal cosmetics.

Saloni Agarwal *et al.*, 2021 States that the contemporary trend of incorporating natural colors alongside synthetic ones. This project specifically focuses on utilizing beetroot powder as a natural colorant, particularly in the formulation of "liquid foundation and compact rouge." The decision to use beetroot powder was based on its successful passage in all analytical tests, meeting the standards set by the Bureau of Indian Standards (BIS). The formulations incorporating beetroot powder passed both analytical and stability tests, indicating its viability for colored makeup

preparations. Additionally, it was found that wetting the beetroot powder in vegetable glycerin enhances its incorporation, especially in formulations containing polar components. However, it is advised against using vegetable glycerin in non-polar products, as it may settle out. This wetting procedure is particularly effective in emulsified scrubs and lotion formulations containing an emulsifying wax.

Le Sang Gilisni *et al.*, 2015: States that the durability of powder-based makeup products once applied to the skin, with the makeup forming a film that adheres for 8 to 12 hours but can be affected by sweat and sebum. Evaluating the film's durability is crucial, and in this study, the characteristics of semi-finished powder products were assessed for water absorption, oil absorption, water repellency, and oil repellency using various methods. The study also aimed to identify simple methods unaffected by factors like sweat and sebum secretion, temperature, and humidity to predict product durability. The researchers measured these properties using tablet, capillary, and dipping methods and compared the results with data from a color difference meter and ROBO skin analyzer. They found that durability was more closely associated with oil absorption and water-repellent properties than water absorption and oil repellency. The tablet and capillary methods for oil absorption and the dipping method for water repellency emerged as simple and rapid predictors of makeup product durability.

Dela Amalia Putri *et al.*, 2022 states that an organic lip cream containing beetroot extract and chia seed oil meets the specified requirements for quality control, safety, and efficacy, particularly in terms of its moisturizing effectiveness.

Afnan F. Halwani *et al.*, 2018 States that reveals that the concentration of total red beet betalains extracted using water was higher than that extracted using citric acid. Furthermore, the pigments extracted with water were more stable with increasing pH and temperature compared to those extracted with citric acid. Increasing pH, extraction temperature, and extraction time led to a reduction in the concentration of red beet pigments. However, the concentration of vulgaxanthin-1 pigment extracted

from red beet using both water and citric solvents remained unaffected by changes in pH, extraction temperature, and extraction time.

Amani M. D. El-Mesallamy *et al.* States that the top 10 potent vegetables rich in phytochemicals with strong antioxidant and anticancer properties, commonly used in traditional medicine. The aim is to characterize the chemical composition and assess the cytotoxicity and antibacterial activity of *B. Vulgaris* root extract. Gas chromatography-mass spectrometry (GC-MS) analysis of the unsaponifiable matter revealed 18 components, with undecane as the major hydrocarbon compound and α -citronellol as the major oxygenated compound. The methanolic extract contained a complex mixture of phenolic acids and flavonoids, including ellagic acid, pyrogallol, salicylic acid, catechol, benzoic acid, protocatechuic acid, chlorogenic acid, and p-hydroxybenzoic acid, identified for the first time in this plant. High-performance liquid chromatography-electrospray ionization-mass spectrometry (HPLC-ESI-MS) identified major flavonoids like vitexin-2"-O-rhamnoside, demethylated-2"-xylosylvitexin, isorhamnetin-3-gentiobioside, and rutin, alongside minor components such as luteolin-6-arabinose-8-glucose, hesperidin, acacetin, kaempferol-3-(2-p-comaroyl)glucose, apigenin-6-arabinose-8-galactose, quercetin, and naringin. The methanolic extract exhibited significant cytotoxic activity against pancreatic carcinoma (PANC-1), mild activity against hepatocellular carcinoma (HEPG-2) and lung carcinoma (A549), and weak activity against prostate carcinoma (PC-3). Moreover, the extract showed antimicrobial activity against *Staphylococcus aureus* and *Pseudomonas aeruginosa*. This study enhances the understanding of *B. Vulgaris*'s bioactive compounds and highlights its potential as a source of natural medicine for various ailments.

Swati Chaturvedi *et al.*, 2021 States that survey highlights Beta Vulgaris (BV) leaves as a valuable source of functional ingredients possessing antiradical and antiobesity bioactivities through their methanolic and saponin extracts.

CHAPTER – 3

AIM AND SCOPE

3.1 AIM:

To prepare organic cosmetic eyeshadow using *Beta Vulgaris*.

3.2 OBJECTIVES:

- Formulation of organic cosmetic eye shadow testing for antioxidant properties
- Assessment of physical properties test carried out
- Anti bacterial activity
- Anti oxidant test
- Gcms analysis

CHAPTER– 4

MATERIALS AND METHODOLOGY

4.1 *Betavulgaris*

Betavulgaris, commonly known as beetroot, is a plant species that belongs to the Amaranthaceous family. It is widely cultivated for its edible taproot, which is commonly consumed as a vegetable. Beetroot is native to Europe, Asia, and North Africa but is now grown in many regions around the world. The plant has a rosette of leaves with petioles that are often edible and a taproot that varies in color from deep purple to red, yellow, or white, depending on the variety. Beetroot is not only valued for its culinary uses but also for its nutritional benefits. It is rich in vitamins, minerals, and antioxidants, particularly vitamin C, folate, potassium, and manganese. Beetroot is also a good source of dietary fiber and contains unique phytonutrients like betalains, which have been studied for their potential health-promoting properties, including anti-inflammatory and antioxidant effects. In addition to its culinary and nutritional uses, beetroot has been utilized for various purposes throughout history. It has been used as a natural dye for textiles and food coloring, imparting a vibrant red hue.

Beetroot juice has gained popularity as a health drink and sports supplement due to its purported benefits for improving athletic performance and enhancing cardiovascular health. In traditional medicine, beetroot has been used to treat a variety of ailments, including digestive disorders, anemia, and hypertension. While research on the health effects of beetroot is ongoing, preliminary studies suggest that it may have potential benefits for heart health, exercise performance, and cognitive function. Overall, *Betavulgaris*, or beetroot, is a versatile plant with culinary, nutritional, and potential medicinal uses, making it a valuable addition to both the kitchen and the garden.

4.1.1 Benefits of Beta Vulgaris

Beta vulgaris, commonly known as beetroot, is a nutrient-rich vegetable that offers numerous health benefits. Rich in essential vitamins, minerals, and antioxidants, beetroot has been consumed for centuries and is praised for its potential to promote overall health and well-being. One of the primary benefits of beta vulgaris is its high content of dietary nitrates, which have been linked to various health advantages. When consumed, these nitrates are converted into nitric oxide in the body, which helps to dilate blood vessels, improve blood flow, and lower blood pressure. This vasodilatory effect may reduce the risk of cardiovascular diseases such as heart attack, stroke, and atherosclerosis. Moreover, beetroot is a good source of fiber, which aids in digestion and promotes gastrointestinal health. The fiber content helps to regulate bowel movements, prevent constipation, and maintain a healthy digestive system. Additionally, beetroot contains betaine, a compound that supports liver function and helps to detoxify the body. Betaine assists in the metabolism of fats, protects liver cells from damage, and may reduce the risk of fatty liver disease. Furthermore, Beta vulgaris is packed with essential vitamins and minerals, including vitamin C, vitamin B6, folate, potassium, and manganese.

Vitamin C is a powerful antioxidant that boosts the immune system, promotes collagen production, and helps to repair damaged tissues. Vitamin B6 plays a vital role in metabolism, neurotransmitter synthesis, and immune function, while folate is essential for DNA synthesis and cell division. Potassium is crucial for maintaining fluid balance, nerve function, and muscle contractions, while manganese supports bone health and antioxidant defenses. In addition to its nutritional profile, beetroot contains phytonutrients such as betalains and anthocyanins, which possess antioxidant and anti-inflammatory properties. These compounds help to neutralize harmful free radicals, reduce oxidative stress, and combat inflammation in the body. By protecting cells from damage and inflammation, beetroot may lower the risk of chronic diseases such as cancer, diabetes, and arthritis. Moreover, research suggests that Beta

vulgaris may improve athletic performance and enhance exercise endurance. The nitric oxide produced from dietary nitrates in beetroot can increase oxygen delivery to muscles, improve energy efficiency, and delay fatigue during physical activity. Athletes and fitness enthusiasts often incorporate beetroot juice or beetroot supplements into their training regimen to enhance performance and recovery. Additionally, beetroot has been studied for its potential cognitive benefits. The nitric oxide generated from beetroot consumption improves blood flow to the brain, enhances neurovascular function, and may support cognitive function and mental acuity. Some studies have suggested that beetroot supplementation could help to improve memory, attention, and cognitive performance, particularly in older adults. Furthermore, Beta vulgaris may have anti-cancer properties due to its antioxidant and anti-inflammatory effects.

The phytonutrients found in beetroot have been shown to inhibit the growth of cancer cells, induce apoptosis (programmed cell death), and prevent tumor formation in animal and laboratory studies. While more research is needed to fully understand the anti-cancer potential of beetroot, preliminary findings are promising. Moreover, beetroot is a versatile vegetable that can be enjoyed in various culinary preparations. Whether eaten raw, cooked, juiced, or pickled, beetroot adds color, flavor, and nutritional value to meals. It can be incorporated into salads, soups, stews, smoothies, and even desserts. Its earthy sweetness pairs well with a wide range of ingredients, making it a popular choice in both savory and sweet dishes. In summary, Beta vulgaris, or beetroot, offers a multitude of health benefits due to its rich nutrient content and bioactive compounds. From supporting cardiovascular health and digestion to boosting immunity and cognitive function, beetroot has earned its reputation as a nutritional powerhouse. Incorporating beetroot into a balanced diet can contribute to overall health and well-being, providing essential vitamins, minerals, antioxidants, and phytonutrients that promote longevity and vitality.

Mica powder is a versatile mineral renowned for its shimmering, reflective properties, making it a popular choice in the cosmetic industry, especially for organic cosmetic eyeshadows. Derived from natural sources, such as muscovite and phlogopite rocks,

mica is ground into a fine powder to create a lustrous effect without the use of synthetic ingredients or harmful chemicals. Organic cosmetic eyeshadows that incorporate mica powder offer a safe and eco-friendly alternative to traditional makeup products. Mica is non-toxic and hypoallergenic, making it suitable for all skin types, including sensitive skin. Additionally, mica is non-comedogenic, meaning it does not clog pores, allowing the skin to breathe and preventing breakouts.

One of the key benefits of mica powder in organic cosmetic eyeshadows is its ability to provide a smooth and even application. The fine particles of mica blend effortlessly onto the skin, creating a seamless finish with a beautiful, natural-looking shimmer. This makes mica powder an ideal ingredient for achieving a glamorous yet understated look. Furthermore, mica powder is highly versatile, allowing for a wide range of colors and effects in organic cosmetic eyeshadows. It can be combined with other natural pigments and ingredients to create custom shades and textures, giving consumers the freedom to express their unique style and preferences.

Another advantage of mica powder in organic cosmetic eyeshadows is its long-lasting wear. Once applied, mica adheres to the skin, providing a durable finish that resists fading, creasing, and smudging throughout the day. This makes it an excellent choice for those seeking makeup products with staying power. In addition to its aesthetic benefits, mica powder also offers some skincare benefits. It has a soothing effect on the skin, helping to reduce inflammation and irritation. Mica is also known to reflect light, which can help to minimize the appearance of fine lines and wrinkles, giving the eyes a more youthful and radiant look.

Overall, mica powder is a valuable ingredient in organic cosmetic eyeshadows, offering a safe, effective, and environmentally friendly option for enhancing natural beauty. Its versatility, longevity, and skincare benefits make it a popular choice among consumers looking for high-quality, sustainable makeup products.

4.1.2 Benefits Of Mica Powder

Mica powder is a versatile mineral renowned for its shimmering, reflective properties, making it a popular choice in the cosmetic industry, especially for organic cosmetic eyeshadows. Derived from natural sources, such as muscovite and phlogopite rocks, mica is ground into a fine powder to create a lustrous effect without the use of synthetic ingredients or harmful chemicals. Organic cosmetic eyeshadows that incorporate mica powder offer a safe and eco-friendly alternative to traditional makeup products. Mica is non-toxic and hypoallergenic, making it suitable for all skin types, including sensitive skin. Additionally, mica is non-comedogenic, meaning it does not clog pores, allowing the skin to breathe and preventing breakouts. One of the key benefits of mica powder in organic cosmetic eyeshadows is its ability to provide a smooth and even application. The fine particles of mica blend effortlessly onto the skin, creating a seamless finish with a beautiful, natural-looking shimmer. This makes mica powder an ideal ingredient for achieving a glamorous yet understated look. Furthermore, mica powder is highly versatile, allowing for a wide range of colors and effects in organic cosmetic eyeshadows. It can be combined with other natural pigments and ingredients to create custom shades and textures, giving consumers the freedom to express their unique style and preferences. Another advantage of mica powder in organic cosmetic eyeshadows is its long-lasting wear. Once applied, mica adheres to the skin, providing a durable finish that resists fading, creasing, and smudging throughout the day. This makes it an excellent choice for those seeking makeup products with staying power. In addition to its aesthetic benefits, mica powder also offers some skincare benefits. It has a soothing effect on the skin, helping to reduce inflammation and irritation. Mica is also known to reflect light, which can help to minimize the appearance of fine lines and wrinkles, giving the eyes a more youthful and radiant look. Overall, mica powder is a valuable ingredient in organic cosmetic eyeshadows, offering a safe, effective, and environmentally friendly option for enhancing natural beauty. Its versatility, longevity, and skincare benefits make it a popular choice among consumers looking for high-quality, sustainable makeup products.

4.2 METHODOLOGY

The beta vulgaris are thoroughly washed to remove any dirt or impurities. They should be cut into small pieces to increase the surface area for extraction. The beta vulgaris are kept in a natural sunlight for one week. The beta vulgaris should be thoroughly checked each day for the entire one week. It should be checked and should open the layers of beta vulgaris every day. Daily change the paper as it should not be wet. After one week, collect the dried beta vulgaris and stir in in mixer until it comes to a fine powder mixture. If the beta vulgaris doesn't come to a fine powder mixture, we can use mortar and pestle to fine grind the dried beta vulgaris.

4.3 PREPARATION OF FINAL PRODUCT

Check for the purity of beta vulgaris powder, if in case it might have contamination or fungus. We have to filter the beta vulgaris powder. Mix the Beta Vulgaris powder substance with Mica Powder. Beta vulgaris powder should be added based on the color of the substance unless it reaches our target color.

Table 4.1 :Final product's quantity

INGREDIENTS	QUANTITY
<i>Beta vulgaris</i>	5 grams
Mica powder	1 gram

CHAPTER-5

RESULTS AND DISCUSSION

5.1 PHYSIO CHEMICAL PROPERTY ANALYSIS

5.1.1 Skin Irritability Test

Skin irritability testing is crucial for evaluating the potential of cosmetic products to cause irritation or allergic reactions when applied to the skin. Testing methods often involve applying the cosmetic product to a small area of skin, typically on the forearm or back, and observing for any signs of irritation, such as redness, swelling, or itching, over a specified period. Cosmetic manufacturers conduct skin irritability tests to ensure compliance with regulatory standards and guidelines, prioritizing consumer safety and minimizing the risk of adverse reactions from product use.

5.1.2 PH Test

pH testing measures the acidity or alkalinity of a substance, indicating its level of acidity (below 7), neutrality (7), or alkalinity (above 7). pH testing is crucial in cosmetics to ensure products are formulated within a safe and effective pH range for the skin, preventing irritation or adverse reactions. pH testing is an essential aspect of quality control in cosmetics manufacturing, ensuring consistency and stability of products throughout production and shelf life.

5.1.3 Transfer Resistance Test

Durability Assessment: Transfer resistance testing evaluates the ability of organic eye shadow to resist transfer on to surfaces such as skin, clothing, or other materials throughout wear. **Methodology:** The test typically involves applying the eyeshadow to a standardized surface and then assessing the degree of transfer by lightly pressing or rubbing the surface to simulate real-world conditions. **Quality Assurance :** Conducting transfer resistance tests helps cosmetic manufacturers ensure that their organic eyeshadow formulations adhere well to the skin and maintain their color intensity without smudging or transferring onto other surfaces during wear, enhancing product quality and customer satisfaction.

5.1.4 Antioxidant test

Antioxidants are compounds that help prevent or slow damage to cells caused by free radicals, which are unstable molecules that the body produces as a reaction to environmental and other pressures. Antioxidants can neutralize these free radicals, reducing their harmful effects on the body. There are many different types of antioxidants, including vitamins C and E, selenium, and beta-carotene, found in various foods and supplements. Testing the antioxidant activity of a substance typically involves measuring its ability to neutralize free radicals or prevent oxidative damage in a controlled laboratory setting. One common method is the Oxygen Radical Absorbance Capacity (ORAC) assay, which measures the antioxidant capacity of a substance by its ability to neutralize a specific type of free radical. Another popular method is the Trolox Equivalent Antioxidant Capacity (TEAC) assay, which compares the antioxidant activity of a substance to that of Trolox, a water-soluble analog of vitamin E. This measures the ability of antioxidants to scavenge the ABTS⁺ radical cation. In addition to these assays, there are several other tests used to evaluate antioxidant activity, including the

Ferric Reducing Ability of Plasma (FRAP) assay and the Total Radical-Trapping Antioxidant Parameter (TRAP) assay. Each of these methods has its advantages and limitations, and the choice of assay depends on factors such as the type of sample being tested and the specific antioxidant properties being evaluated. When conducting an antioxidant test, researchers typically start by preparing a sample of the substance being tested, such as a plant extract or a synthesized compound. This sample is then exposed to a source of free radicals or oxidative stress, either in vitro or in cell cultures. The antioxidant activity of the sample is then measured using one of the aforementioned assays, and the results are compared to those of known antioxidants or standard reference compounds. The antioxidant activity of a substance can vary depending on factors such as its concentration, chemical structure, and interactions with other compounds. Therefore, it's important to conduct multiple tests and replicate the results to ensure accuracy and reliability. In conclusion, antioxidant testing plays a crucial role in evaluating the potential health benefits of various substances and identifying new sources of natural antioxidants. By understanding how antioxidants work and how to measure their activity, researchers can develop better strategies for preventing and treating oxidative stress-related diseases.

5.1.5 Antibacterial test

Testing for antibacterial properties in cosmetics is essential to ensure product safety and efficacy, as well as to comply with regulatory standards. Various methods exist to assess the antibacterial activity of cosmetic formulations, each with its advantages and limitations. One common method is the disk diffusion assay, also known as the Kirby-Bauer method. In this test, a bacterial culture is spread evenly on an agar plate, and paper disks containing the cosmetic formulation are placed on the surface. After an incubation period, the diameter of the inhibition zone around each disk is measured, indicating the degree of antibacterial activity. Another widely used method is the broth microdilution assay, which involves diluting the cosmetic formulation in a liquid growth medium containing bacteria. The bacterial growth is then monitored over time, and the

minimum inhibitory concentration (MIC) of the formulation, the lowest concentration that prevents visible growth, is determined. The agar dilution method is similar to the broth microdilution assay but involves incorporating the cosmetic formulation directly into agar plates before bacterial inoculation. The MIC is determined by observing bacterial growth on plates containing various concentrations of the formulation. In addition to these methods, there are alternative assays, such as the time-kill assay, which measures the rate at which a cosmetic formulation reduces bacterial viability over time, and the agar overlay method, which assesses the ability of a formulation to inhibit bacterial growth in a semi-solid agar matrix. When conducting antibacterial tests on cosmetics, it's important to consider factors such as the type of bacteria being tested, the concentration and formulation of the product, and any relevant regulatory requirements. Testing should be performed under standardized conditions to ensure reproducibility and reliability of results. Furthermore, it's essential to interpret test results in the context of the intended use of the cosmetic product. For example, a product intended for use on intact skin may have different antibacterial requirements than one intended for use on mucous membranes or broken skin. In conclusion, antibacterial testing is a crucial aspect of cosmetic safety assessment, helping to ensure that products meet regulatory standards and are safe for consumer use. By employing appropriate testing methods and interpreting results accurately, cosmetic manufacturers can develop effective formulations that protect against harmful bacteria while maintaining product quality and safety.

5.1.6 GAS CHROMATOGRAPHY/MASS SPECTROGRAPHY TEST (GC-MS)

Gas Chromatography-Mass Spectrometry (GC-MS) is a powerful analytical technique widely used in the cosmetic industry to identify and quantify compounds present in cosmetic products. This method combines the separation capabilities of gas chromatography with the detection and characterization abilities of mass spectrometry. Firstly, the cosmetic sample is prepared by extraction techniques such as solvent extraction or solid-phase microextraction (SPME). This step aims

to isolate the target compounds from the complex matrix of the cosmetic product. Once extracted, the sample is injected into the gas chromatograph. In gas chromatography, the sample is vaporized and injected into a chromatographic column where the compounds are separated based on their volatility and affinity for the stationary phase. As the compounds travel through the column, they elute at different times, resulting in separation. As the separated compounds exit the gas chromatograph, they enter the mass spectrometer. Here, the compounds are ionized by electron impact or chemical ionization, producing ions that are characteristic of each compound. These ions are then accelerated and passed through a magnetic field, causing them to follow a curved path based on their mass-to-charge ratio (m/z). The ions are detected by a detector, typically a mass analyzer such as a quadrupole or a time-of-flight (TOF) analyzer. The detector generates a mass spectrum, which represents the abundance of ions at different m/z values. Each compound produces a unique mass spectrum, allowing for identification. GC-MS analysis provides valuable information about the composition of cosmetic products, including the presence of fragrance compounds, preservatives, and other ingredients. Additionally, it can detect trace levels of contaminants or impurities, ensuring the safety and quality of cosmetic formulations. Overall, GC-MS testing plays a crucial role in quality control, regulatory compliance, and product development in the cosmetic industry. It offers precise and reliable analysis, enabling manufacturers to produce safe and effective cosmetic products for consumers.

5.2 RESULT

5.2.1 Extraction 1 Result



Fig 5.1 extraction 1

5.2.2 Extraction 2 Result



Fig 5.2 extraction 2

5.2.3 Ph Test

The test of the of the cosmetic product you can use Ph testing stripes , simply dip the ph strip in to the product or place a drop of the product on to the stripe and compare the color change ,typically around4.5to7for the most skin care product.

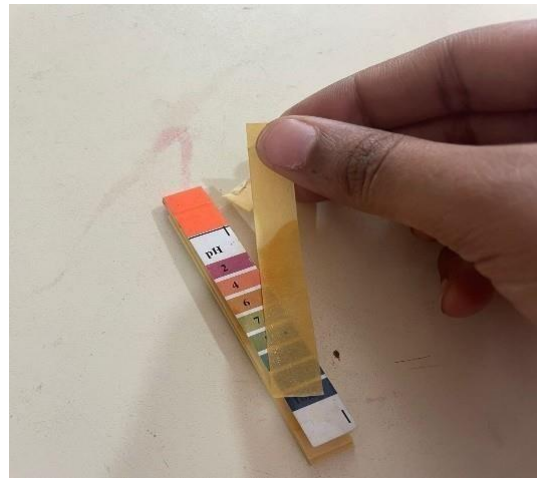


Fig 5.3 PH

5.2.4 Skin Irritability Test

To test for skin irritability caused by cosmetics, you can perform a patch test. Apply a small amount of the cosmetic product on a small area of clean skin (usually on the forearm or behind the ear) and leave it for 24-48 hours. If there's no redness, itching, or other signs of irritation, the product is likely safe to use. If any irritation occurs, discontinue use and consult a dermatologist.



FIG 5.4 SKIN IRRITATION TEST

TABLE 5.1 SKIN IRRITABILITY TEST

S.N O	PARAMETERS	OBSERVATION
1.	Irritation	No
2.	Redness	No
3.	Swelling	No
4.	Photo irritation	No Irritation No Redness No Swelling

5.2.5 Transfer Resistance Test

To test the transfer resistance of a cosmetic product, such as foundation or lipstick, you can apply a small amount onto your skin and wait for it to dry completely. Then, gently press a tissue or blotting paper onto the area and see if any product transfers onto the paper. If there's minimal to no transfer, the product can be considered transfer-resistant. You can also conduct a wear test throughout the day to observe how well the product holds up against transfer during normal activities. By performing the test, the product which is non-transferable



FIG 5.5 TRANSFER RESISTANCE TEST

5.2.6 Antibacterial test

To perform an antibacterial test for a cosmetic product, you typically use a standardized method like the agar diffusion assay. In this test, a sample of the product is applied to a bacterial culture on agar plates. After an incubation period, the size of the inhibition zone around the product is measured. This zone indicates the product's ability to inhibit bacterial growth. Alternatively, you can use other methods such as broth dilution or time-kill assays to assess the product's antibacterial efficacy. It's essential to follow standardized protocols and consult with a microbiologist or testing laboratory for accurate results.



FIG 5.6 ANTIBACTERIAL TEST

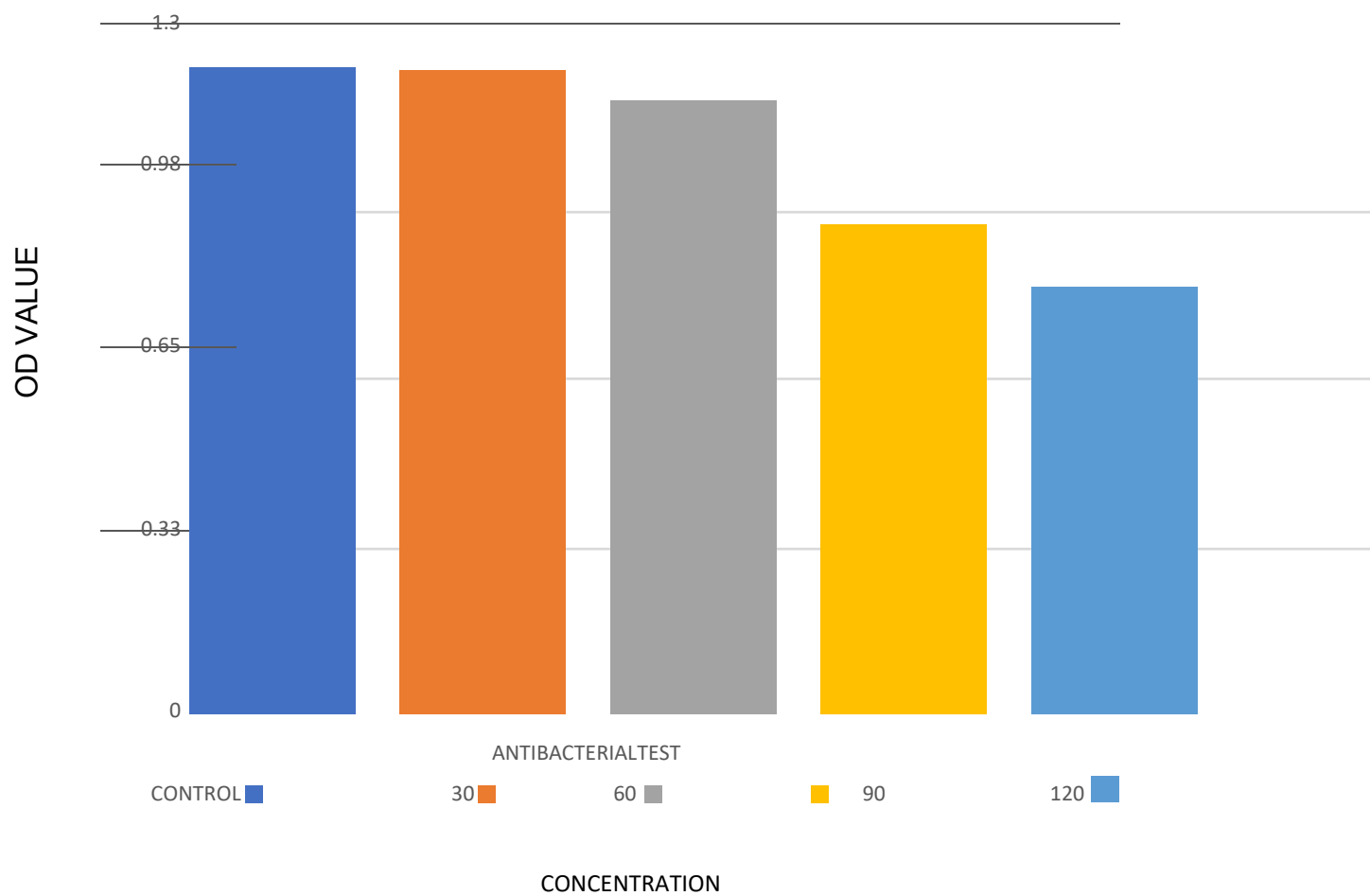


TABLE 5.2 ANTIBACTERIAL TEST

Control	30	60	90	120
1.26	1.25	1.19	0.95	0.83

5.2.7 GCMS TEST

Gas Chromatography-Mass Spectrometry (GC-MS) is a powerful analytical technique widely used in the cosmetic industry to identify and quantify compounds present in cosmetic products. This method combines the separation capabilities of gas chromatography with the detection and characterization abilities of mass spectrometry. Firstly, the cosmetic sample is prepared by extraction techniques such as solvent extraction or solid-phase microextraction (SPME).

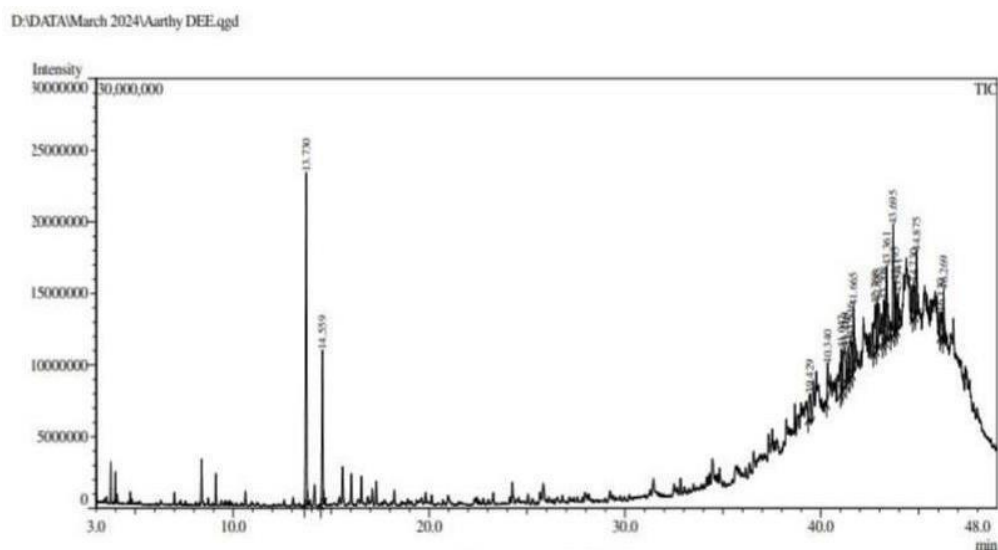


FIG 5.7 GCMS RESULT

This step aims to isolate the target compounds from the complex matrix of the cosmetic product. Once extracted, the sample is injected into the gas

chromatograph. In gas chromatography, the sample is vaporized and injected into a chromatographic column where the compounds are separated based on their volatility and affinity for the stationary phase. The table in the chromatogram shows a "Peak Report TIC". This table lists the retention time, area, and area% of each peak in the chromatogram. The retention time is the time it took for that molecule to travel through the gas chromatograph. The area is a measure of the intensity of the peak. The area% is the percentage of the total ion current that is from that peak. Some of the identified peaks include Dodecanoic acid 1,2,3 – Propanetriyl Ester, 9-Octadecenoic acid 1,2,3 – Propanetriyl ester, ETHYL (9Z,12Z) – 9,12 - OCTADECADIENO, HEXADECANOIC ACID, 2-HYDROOXY-1,3-ISOPROPYL-3A, 5A,8,8,11B,13A-HEXA

TABLE 5.3 GCMS RESULT

Peak Report TIC				
Peak#	R.Time	Area	Area%	Name
1	39.489	1865477	1.03	cis-9-Hexadecenal
2	40.140	2118601	1.17	DODECANOIC ACID, 1,2,3-PROPANETR
3	40.807	12421910	6.83	Dodecanoic acid, 1,2,3-propanetriyl ester
4	41.181	3134199	1.72	DODECANOIC ACID, 1,2,3-PROPANETR
5	41.595	9509156	5.23	Dodecanoic acid, 1,2,3-propanetriyl ester
6	41.932	10958436	6.03	DODECANOIC ACID, 1,2,3-PROPANETR
7	42.055	5116187	2.81	HEXADECANOIC ACID, 2-HYDROXY-1,
8	42.185	12972095	7.14	Dodecanoic acid, 1,2,3-propanetriyl ester
9	42.457	17114368	9.41	Dodecanoic acid, 1,2,3-propanetriyl ester
10	42.736	17686708	9.73	Dodecanoic acid, 1,2,3-propanetriyl ester
11	42.961	16274980	8.95	DODECANOIC ACID, 1,2,3-PROPANETR
12	43.185	27870201	15.33	Dodecanoic acid, 1,2,3-propanetriyl ester
13	44.598	10474936	5.76	14-METHYL-8-HEXADECYN-1-OL #
14	44.679	11466476	6.31	9-Octadecenoic acid, 1,2,3-propanetriyl ester
15	44.780	5506693	3.03	ETHYL (9Z,12Z)-9,12-OCTADECADIENO
16	45.044	2520300	1.39	Glycidol stearate
17	46.325	1957027	1.08	Octadecanoic acid, 3-[(1-oxododecyl)oxy]-1,
18	47.619	3426428	1.88	Tricyclo[20.8.0.0(7,16)]triacontane, 1(22),7(
19	48.031	2861950	1.57	3-ISOPROPYL-3A,5A,8,8,11B,13A-HEXA
20	48.568	6535741	3.60	4,4A,6B,8A,11,11,12B,14A-OCTAMETHY
		181791869	100.00	

5.2.8 ANTIOXIDANT TEST

Antioxidants help protect skin cells from damage and aging, and they may improve skin texture and appearance. People can consume antioxidants in their diet or apply them to their skin using skincare products. Retinoids are popular in skincare products and may benefit some people, but they can cause dryness in others.

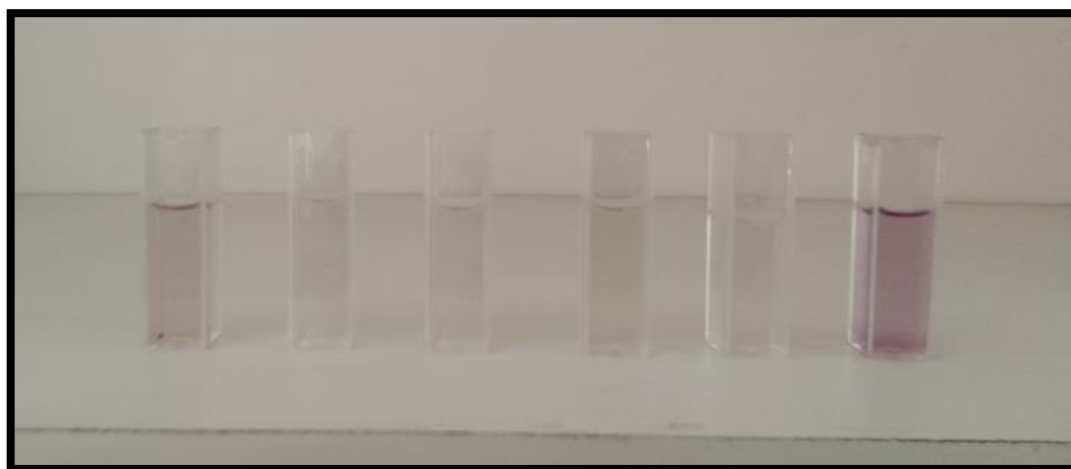


FIG 5.8 ANTI OXIDANT TEST



FIG 5.9 ANTIOXIDANT TEST RESULT

Components	S1	S2	S3	S4	S5	Control
Sample(μ l)	3	6	12	24	48	-
DMSO(μ l)	47	44	38	26	2	50
DPPH(ml)	2.95	2.95	2.95	2.95	2.95	2.950
	0	0	0	0	0	
	Incubate at dark for 20mins					
OD at 570nm	0.121	0.119	0.115	0.110	0.109	0.214

Calculation:

$$\%RSA = \frac{\text{Abs control} - \text{Abs sample}}{\text{Abs sample}} \times 100$$

$$S1 = 76.85\% / 3\mu\text{l}$$

$$S2 = 79.83\% / 6\mu\text{l}$$

$$S3 = 86\% / 12\mu\text{l}$$

$$S4 = 94.54\% / 24\mu\text{l}$$

$$S5 = 96.3\% / 48\mu\text{l}$$

It has highest % of scavenging activity of 96.3% /48 μ l

CHAPTER 6

CONCLUSION

From all the above datas and results I have observed that the beetroot powder can be used as organic eyeshadow alternative to the chemical infused eyeshadow. The results of the GC-MS analysis indicate that the organic eyeshadow formulation contains a significant abundance of DODECANOIC ACID and 1,2,3-propane tr.

The antioxidant test conducted on the organic eyeshadow aimed to assess its impact on skin health upon contact. Antioxidants are known to enhance skin texture and appearance while protecting against damage. Results indicate that 96.3% of the organic eyeshadow tested did not cause skin damage, highlighting its potential safety and skin-friendly properties. The antibacterial test conducted aimed to evaluate the efficacy of the organic eyeshadow in inhibiting bacterial growth, crucial for ensuring the safety and effectiveness of cosmetic products applied to the skin or mucous membranes. Results indicate that the organic eyeshadow effectively inhibits bacterial growth, underscoring its potential as a safe cosmetic option.

The pH test conducted on the organic eyeshadow was crucial for determining its acidity level and assessing its compatibility with the skin. Results indicated a neutral pH, reassuring users of its safety for skin application. Maintaining a neutral pH ensures that the product is gentle and less likely to cause irritation or disrupt the skin's natural balance. This finding underscores the organic eyeshadow's suitability for cosmetic use, offering users a comfortable and skin-friendly experience.

The skin irritability test involved real skin application to assess any potential irritation. Remarkably, no skin irritation was observed, confirming the safety of the organic eyeshadow for use on the skin. This positive result further solidifies its suitability as a gentle and non-irritating cosmetic option, providing users with peace of mind regarding its skin-friendly properties.

REFERENCES

- Agarwal, S., Shrivastava, K., & Sahasrabuddhe, S. (2021). Formulation and evaluation of colour cosmetics using beetroot. *World Journal of Pharmaceutical Research*, 10(3), 1707-1723.
- Arthikha, R., & Madhanasundareswari, K. (2019). Study on Optimization and Pigment Analysis of Beetroot (Beta-Vulgaris) and their Application as Natural Dyes. *Int. J. Innov. Sci. Res. Technol*, 4(3), 37-41.
- Chaturvedi, S., & Gupta, P. (2021). Functional components in extracts of Beta vulgaris (Chukandar) parts for antioxidant effect and antiobesity potential with lipase inhibition. *Food Bioscience*, 41, 100983.
- Chaudhari, N. P., Chaudhari, H. A., Chaudhari, N. U., Premchandani, L. A., Dhankani, A. R., & Pawar, S. P. (2019). Formulation and evaluation of herbal lipstick from beta vulgaris taproot. *Indian J. Drugs*, 7, 14-19.
- Kumar, D., Rajora, G., Parkash, O., Antil, M., & Kumar, V. (2016). Herbal cosmetics: An overview. *International Journal of Advanced Scientific Research*, 1(4), 36-41.
- Martini, L. (2016). The fascination of mineral pigments in organic and natural eye shadows and compact cakes: are they risky or innocuous?. *Our Dermatology Online*, 7(1), 123.
- Nemzer, B., Pietrkowski, Z., Spórna, A., Stalica, P., Thresher, W., Michałowski, T., & Wybraniec, S. (2011). Betalainic and nutritional profiles of pigment-enriched red beet

root (*Beta vulgaris* L.) dried extracts. Food chemistry, 127(1), 42-53.

Putri, D. A., Chaidir, C., & Hanafi, M. (2022). Moisturizing Effectiveness Of Organic Lip Cream Formulation With Beetroot Extract (*Beta Vulgaris* L) And Chia Seed Oil (*Salvia hispanica*). Media Bina Ilmiah, 17(5), 837-846.

SECANG WOOD (*Caesalpinia sappan* L.) AS A NATURAL COLOR. Medical Sains: Jurnal Ilmiah Kefarmasian, 8(3), 1185-1196.

Yuniaty, D. A., Rahmat, D., & Rachmat, R. (2023). FORMULATION OF EYESHADOW CREAM COMBINATION OF EXTRACT SPISSUM BUTTERFLY PEA FLOWER (*Clitoria ternatea* L.).

Zia, P., Sunita, M., & Sneha, S. (2021). Extraction of natural colour from beetroot (*Beta vulgaris*) its phytochemical analysis and antibacterial activity. EAS Journal of Nutrition and Food Sciences, 3(4), 80-85.

