



ECO SUSTAINABLE GREEN COSMETICS: An Emerging Alternative For Conventional Cosmetics

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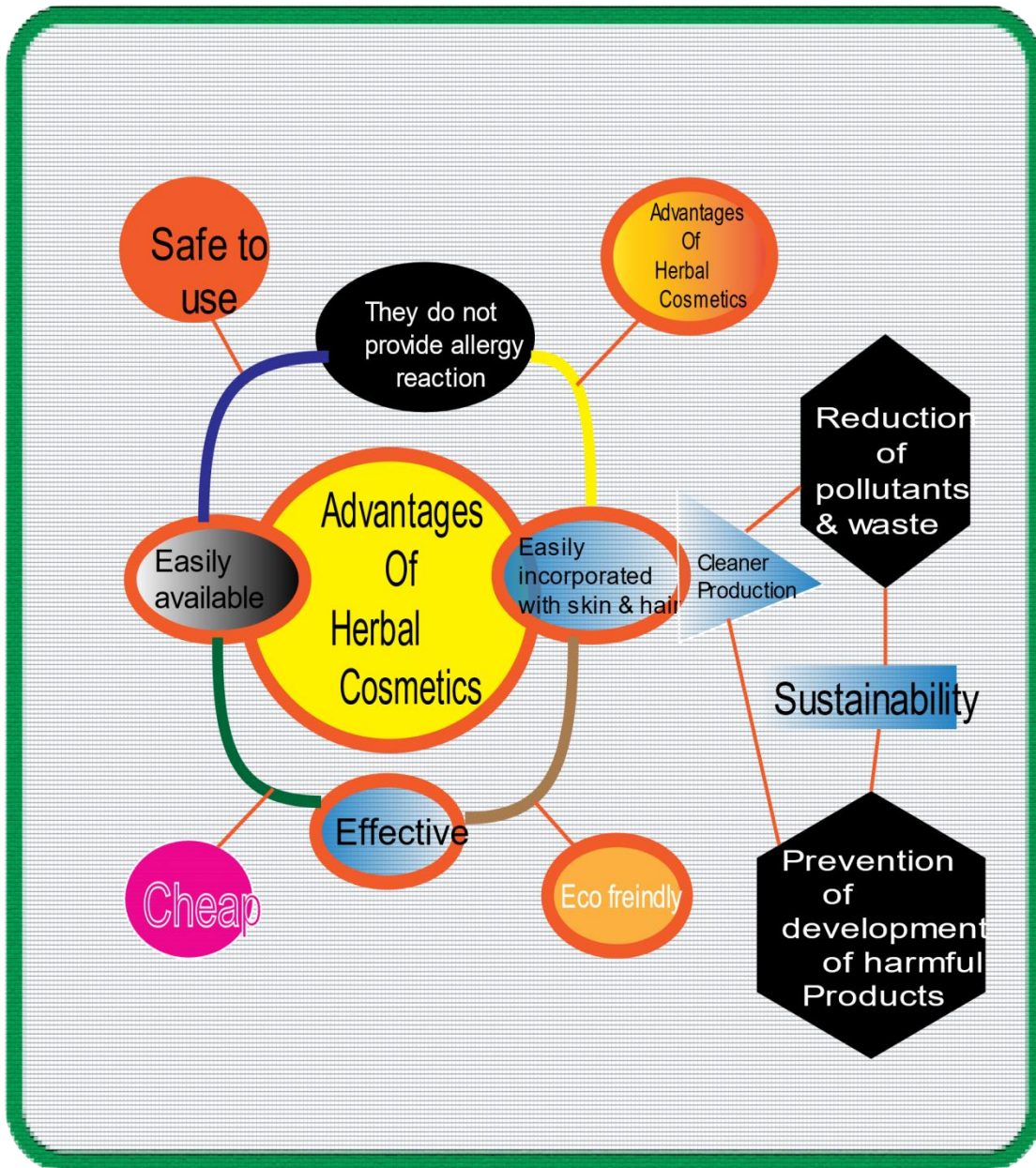
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Abstract: Green cosmetics present ecological appeals and claim to be developed according to the principles of green chemistry. Green chemistry can be defined as the set of processes and products that reduces or eliminates the use or generation of hazardous substances. Methods and raw materials used for making green cosmetic should be non-hazardous to human health and environment. Green, eco-friendly, or herbal cosmetics which are prepared using plant products have cosmetic actions.

The present review on eco sustainable green cosmetics helps in understanding importance of green cosmetics with special reference to sources of green cosmetics, classification of green cosmetics, ingredients used, preparative methods of eco sustainable cosmetics and its application. This work further emphasizes the importance of eco friendly cosmetics by avoiding the chemicals such as DBP, BHA, BHT etc which are used in conventional cosmetics as an ecofriendly measure. The present review also includes certification of organic and inorganic cosmetics by government agencies, Environmental and social impacts of sustainable products. Our study also encourages the use of ecofriendly biocosmetics, as it reduces the risk to human health and environment. Furthermore, it gives us the clear idea that herbal products are more sustainable than conventional ones.

Keywords : Green Cosmetics, Eco Friendly, Sustainable, Organic, InOrganic, Certification

GRAPHICAL ABSTRACT



INTRODUCTION

With the increase in love and concern for nature, the trend of sustainability towards natural products have increased. We hear words like Organic, Natural, Herbal, Crueltyfree, Ecofriendly, Vegan, Biodegradable, Recyclable etc, but what does this mean? Green cosmetics/Bio cosmetics/Eco friendly make up all these terms gives us an idea that they are cosmetics which are manufactured using all natural ingredients, nontoxic ingredients which are safe for human use and

environment. Green cosmetics uses environmentally friendly formulations, production practices and packaging methods. Green cosmetics are sustainable cosmetics made with biodegradable formulations and utilizing ingredients from renewable plant food and bacteria sources. A cosmetic can be considered green if its formulation contains active ingredients derived from plants such as minerals and plants and not analogous active ingredients chemically reproduced in the laboratory. It is better to produce in an Eco sustainable way through processing methods that respect nature and plants. Much attention is paid to ecology and sustainability. Many consumers choose green cosmetics which are environmentally friendly creams, and beauty products. A significant correlation between intake of food supplements and the skin wellbeing is also important. Herbal face packs are nowadays being used on a large scale, due to various benefits of them over chemical-based packs. They are nontoxic, non-allergic, and safer to use. They have no added preservatives. They can be easily formulated and stores over a larger span of time.

However, it is possible to highlight some questions about green cosmetics. How is it possible to ensure that certain products follow the principles of green chemistry? What characteristics are necessary for a cosmetic to be green? What are the advantages of green cosmetics over the conventional ones? The aim of the study is to analyze the state of the art of green cosmetics and will take an insight into the journey of Herbal Cosmetics.

CLASSIFICATION OF HERBAL COSMETICS

Herbal cosmetics for skin include emulsions like cold cream, vanishing cream, cleansing cream, deodorant and face powders and cakes like rouge compacts. For oral care include paste like toothpaste. Herbal cosmetics for hair include herbal hair rinse herbal hair conditioner, herbal hair oil, Amla hair shampoo.

TYPES OF HERBAL PRODUCTS

COLD CREAM

DEFINITION: Cold cream is an emulsion in which the fatty material predominates and when it is applied to the skin produces cooling effect due to slow evaporation of the water contained in the emulsion. [1]



FORMULATION OF COLD CREAM (BP Formula)

As a pharmaceutical preparation cold cream was included in the issue of the British pharmaceutical codex in 1949, as an ointment of rose water. [2]

Name of raw materials	Quantity	Function
Almond oil	610.00ml	Emollient, solvent, and vehicles of an oil phase
White beeswax	180.00g	Stiffening agent
Borax	10.00g	Emulsifying agent
Rose water	199.00	Vehicle and solvent of an aqueous phase
Oil of rose	1.00ml	Flavoring agent

PREPARATION OF COLD CREAM

Melt the beeswax and almond oil at 75-80 C together. Melt borax dissolved in rose water at 75-80 c. Mix the two phases with constant stirring. Then add the rose oil, homogenize, and congeal until cold.

PROPERTIES OF COLD CREAM

- 1) In cold cream the major portion is the oil phase.
- 2) The cold cream is an oil based semi solid preparation. [3]

3) It contains mineral oil, beeswax, borax, and water. [4]

4) Cold cream is an example of a water in oil emulsion.

APPLICATIONS

1) Used as a cleansing preparation to remove make up.

2) Used to maintain moisture balance of skin.

3) Provides an emollient effect.

4) Provides chemical barrier as with sunblock ingredients.

VANISHING CREAMS

Creams are semisolid emulsions intended for application to the skin or mucous membrane. A lot fat moisturizer that disappears into the skin is called as vanishing cream



FORMULATION OF VANISHING CREAM [5] google search

INGREDIENTS	QUANTITY %
Poly herbal extract	45
Stearic Acid	17
Glycerin	6
Potassium hydroxide	0.5
Sodium Carbonate	0.5
Water	7.1
Perfume	0.5

PREPARATIONS

It involves three steps

- 1- Preparation of oil phase: 17% stearic acid, 0.5 % potassium hydroxide & 0.5 % sodium carbonate was mixed thoroughly into porcelain dish vigorously by melting at 70 °C
- 2- Preparation of aqueous phase 45% of ethanolic extract of crude drugs, 6% glycerin & 71% of water taken into another porcelain dish & heated at 70 °C
- 3- Addition of aqueous phase to oil phase : The aqueous phase was mixed with the oil phase with constant stirring at 70 °C once the transfer was done it was cooled down to room temperature followed by addition of 0.5% perfume the final product was then transferred to a suitable airtight container.

PROPERTIES

It softens skin [6]

These are oil water emulsion-based preparations containing aqueous phase & oil phase [6]

Less oily and sticky, user friendly [7]

They give nonglossy appearance [8] These creams are generally oil water type emulsion consisting of stearic acid, an alkali (form soap), a polyol (skin softening agent) and water. Hazeline snow was the first marketed vanishing cream in 1982 by Burroughs Welcome.[9] Glycerin is nontoxic polyol compound widely used in

giving smoothness and lubrication to pharmaceutical preparations. Stearic acid is a

fatty acid utilized in the manufacture of detergents soaps and cosmetics. Potassium

hydroxide is an emulsifier compound used to prepare the corresponding potassium soaps. Methyl paraben used as a preservative and anti-fungal agent in various cosmetic and personal care products (10)

Applications

Used to soften soothe and hydrate skin.

Leaves our skin beautiful, smooth under make up.

It dries completely leaving no body finish.

CLEANSING CREAMS

Creams are defined as a semisolid dosage form containing one or more drug substances dissolved or dispersed in a suitable base.

Formulations of Walnut cleansing cream [11]

S. No	Ingredients	F1	F2	F3
1	Wall nutshell powder	10gm	10gm	10gm
2	Liquid paraffin	40ml	45ml	50 ml
3	Bees wax	15gm	10gm	5gm
4	Borax	1gm	1gm	1gm
5	Methyl paraben	0.5ml	0.5ml	0.5ml
6	Rose oil	0.5ml	0.5ml	0.5ml
7	Distilled water	28ml	28ml	28ml

PREPARATION

Formulation of cleansing cream. Beeswax- Borax

Step 1

Weigh the quantity of liquid paraffin, Beeswax, Borax, Methyl paraben, Rose oil, distilled. Required quantity of Bees wax and liquid paraffin were taken in a beaker and heated on water bath up to 70°C to obtain a molten mass (phase A)/oily phase.[12]

Step2

In another beaker take borax water and heated up to 80 c (phase B)/aqueous phase. Then add walnut shell powder and mix it such that it should not form any clumps.[13]

Step 3

Mix both solution by adding both phases with continuous stirring till a cream like consistency is formed. Then add preservative (methyl paraben) andperfume (rose oil) and pack its suitable container.[14]

PROPERTIES

1)Cleansing cream is formulated using hydrophilic or hydrophobic bases to provide preparations that miscible with the skin secretion.

2)Semi solid emulsions are of either oil/water or water /oil type emulsions.

APPLICATIONS

Cleansing creams (15-20) is useful for keeping the body clean. It is the most important and primitive need for personal hygiene and beautification. They are used for the purpose of removing makeup, surface grim (layer of dirt on skin).and secretions of skin from the face and throat, respectively.

BENEFITS OF WALNUTS

Improves heart function boost bone health improve metabolism, control diabetes, prevents cancer, inflammation, skin care, astringent properties, weight management etc.[21]

HERBAL HAIR PRODUCTS [slide share Hemant Khandoliya [22]

Name	Important herbal cosmetics	Users Claim
Herbal hair rinse	Mint, Brahmi& other herbal extracts	Promote hair growth used in combination with henna/amla shampoo.
Herbal hair conditioner	Amla, Heena, Shikakai and other herbal extracts	Specially created to prevent hair loss & promote luxurious hair growth.
Herbal hair Oil	Arnica, Heena, Shikakai and other herbal extracts	Specially created to prevent hair loss & promote luxurious hair growth
Hair Shampoo	Extracts of amla dates arnica and rate herbal extracts	For normal to dry hairs. Cleansing the scalp while retaining & Stimulating hair growth.



Mint hair rinse



PROPERTIES OF AN IDEAL HAIR PRODUCT

- Protects the hair cuticle.
- Cleans without stripping natural oils.
- Replace lost protein, moisture, and nutrients
- Prevents moisture loss.
- Prevents intense drying from environment.

TYPES OF MOISTURIZING AGENTS

The skin moisturizing agents can be emollients, occlusives, and humectants

Emollients cover the skin with a protective film to hydrate and soothe it. They contribute to decreasing flaky skin and roughness. Food used as emollients include butter and oils such as the butter of shea, cocoa, and the oil of almond, avocado, olive, chia seed, passion fruit.

Occlusives form an epidermal barrier to stop trans epidermal water loss and regulate keratinocyte proliferation [23] Foods used as occlusive moisturizing agents are oil and waxes such as olive, jojoba, and coconut oils, and the wax of candelilla and bees [24]

Humectants are water loving moisturizing agents that draw moisture from the dermis to the stratum corneum and binding water vapor from the environment [25]. Honey, sorbitol, glycerin, and glycerol are humectants moisturizing agents [26]

TYPES OF BARRIER REPAIR AGENTS

The Skin barrier stops trans epidermal water loss and defends against pathogens.[27] Barrier repair agents are essential fatty acids, phenolic compounds, tocopherols, phosphor lipids, cholesterol, and ceramide. Higher levels of linoleic acid to oleic acid have better skin barrier potential.[28]. Some natural oils contain fatty acids that play critical roles in maintaining the skin barrier. Flax seed oil, walnut oil, chia oil contains omega threes and grape seed oil. Safflower oil, sunflower, black current seed oil, evening primrose oil, and borage oil hold omega sixes [29]

TYPES OF SKIN LIGHTENING AGENTS

The commonly used active ingredients include citrus extracts, white mulberry extract, Indian goose berry extract, vitamin c, vitamin B3, hydroquinone, alpha beta hydroxy acids [30]

TYPES OF ANTI- INFLAMMATORY AGENTS

Inflammation is involved in acne's pathogenesis and determines pain, swelling, and redness in the skin. Licorice root, turmeric, oats, chamomile, and nuts are some food plants with anti-inflammatory activity [31]

TYPES OF SUNBLOCK INGREDIENTS

Aloe vera, green tea, coconut oil, grape seeds, and ginger contain phytochemicals that prevent photoaging and skin cancer [32]

HERBAL FACE MASK FORMULATION

In one of the research articles, they have formulated homemade face pack to whiten, lighten and brighten the skin naturally for men and women. This face pack has natural skin lightening property and can be easily prepared at home [33] Face packs with natural constituents are rich in vital vitamins that are essential for the health and glow of the skin. These substances have been proven to be beneficial for skin in many ways. Natural facial packs are easy to use. They increase the circulation of the blood within the veins of the face, thereby increasing the liveliness of the skin [34]. All the ingredients were washed, shade dried and powdered finely for further use. The following ingredients were used for the preparation of this polyherbal face pack formulation[35]

COMPOSITION OF HERBAL FACE MASK

S. No	Constituent	Percentage
1.	Gram flour	40
2.	Multani mitti	20
3.	Shwet Chandan	10
4.	Milk powder	10
5.	Turmeric	5
6.	Green tea	10
7.	Saffron	5

APPLICATION OF FACE PACK

The pack should be applied daily on wet face, forming a paste of it in water with optimum thickness. It should be applied evenly on the face with the help of a brush. It should be left for 15 minutes for complete drying. Then it should be removed with the help of a wet sponge.

USES OF FACE PACK

- Softens the skin, removes the dryness as it is rich in hydrating agents as milk powder.
- Brightens the skin tone due to the presence of shwet Chandan, turmeric, and saffron.
- Cleanses the skin, due to the presence of gram flour as it clears the skin by removing the dirt particles adhered to it.
- Clarifies the skin by fighting the problems of acne and blemishes, by the removal of excess oil from the face due to the presence of Multani mitti.
- Contains antiseptic action to deal with the minor cuts, marks due to the presence of turmeric.
- Exfoliates skin by removing the dead cells.

HERBAL LIP BALM

Lip balms offer a natural way to maintain and promote healthy lips. The natural lip balm can be made using naturally occurring base, oils, extract, colour, and flavouring agents. Lip balms are formulations applied onto the lips to prevent drying and protect against adverse environmental factors. To formulate lip balms, it is necessary to balance the concentration of the main ingredients including butter and waxes. Common Ingredients used in Natural Lip Balm

Formulation

The list of materials used as key formulation ingredients for natural lip balm given in the Table no.1 as described below

Base 36, 37-39	Oils 40,38-40	Coloring agents 40,38-40	Flavoring agents 37-38-39
Cocoa butter	Coconut oil	Beet root	Strawberry
Bees wax	Olive oil	Pomegranate	Honey
Shea butter	Almond oil	Marigold	Orange

White bees wax	Vitamin E	Tomato	Saffron
Yellow bees wax	Peanut oil	Jabul	Raspberry
Carnauba wax	Tea tree oil	Watermelon	Vanilla
Candelilla wax	Glycerin	Honey	Mango
Mango butter	Castor oil	Saffron	Rose oil
Avocado butter	Jojoba oil	Turmeric	Sandalwood
Olive wax	Corn	Capsicum	Jasmine
Jojoba wax	Lemon oil	Orange	Apple
Olive butter	Avocado oil	Strawberry	Lemon
Sweet almond butter	Seasame oil	Mango	Apricot
Sweet almond wax	Sunflower oil	Carrot	Rosemeg
Raspberry butter	Grapeseed	Lemon	Pineapple

HOME MADE LIP BALM



ROSE LIP BALM

What You Need

- 1 tablespoon beeswax
- ½ tablespoon castor oil
- 3 tablespoons rose-infused oil
- One teaspoon vanilla extract
- One tablespoon cocoa butter
- ¼ teaspoon powdered alkanet root

Steps

1. **Melt the beeswax and add castor oil, cocoa butter, and rose infused oil into it.**
2. Add vanilla extract for some fragrance.
3. Add your alkanet root powder for some natural colour.
4. When the mixture cools down, pour it in a lip balm container and place it in the fridge for it to set. [google search]

HERBAL TOOTHPASTE

The effective removal of dental plaque is important for manufacturing periodontal and oral health. [41] Various chemical agents have been used in tooth paste and mouth rinses and a few have been shown to reduce dental plaque formation. [42,43] Herbal ingredients have been present in oral care products. The most common herbal ingredients to be incorporated into oral care products like toothpaste and mouth rinse are Sanguinarine, Propolis, Azadiracta indica [Neem], Charcoal, Clove, and Miswak [44]. In some regions the sale of Herbal products outnumbers fluoride-based toothpastes [45]

FORMULATION OF HERBAL TOOTHPASTE

Herbal toothpaste was formulated utilizing plant extract like Neem leaves, Guava leaves, Cinnamon bark other ingredient are Camphor, Honey.

The extracts are used in various category like Neem -Antibacterial, guava-Anti-inflammatory, Babul-Astringent, Kalmi-Flavoring agent and other ingredients are Camphor -Antiseptic, Honey -sweeting agent,

Glycerine-Humectant, calcium carbonate -Abrasives-Detergent and also use the sodium chloride and distilled water. This led to paying increased attention on using natural ingredients in herbal Dentifrices[46]

PLANT EXTRACTS

INGREDIENTS	QUANTITY IN (G)
Neem stem & bark	0.5
Babul leaves	0.5
Guava leaves	0.5
Kalmi bark	0.5

COMPOSITION OF CHEMICALS

INGREDIENTS	QUANTITY IN (G)
Camphor	0.5
Honey	0.5
Calcium carbonate	3.5
Glycerine	2.0
Para hydroxyl benzoic acid	0.3
Sodium lauryl sulphate	0.5
Sodium chloride	0.2
Distilled water	q. s

PREPARATION [46]

All herbal ingredients were dried and grounded using domestic mixer. The required quantity of ingredients were weighed and taken in motor. Calcium carbonate, sodium lauryl sulphate, methyl cellulose, honey and glycerine when mixed in water. Acacia were added in the above mixture the solution was added dropwise into motor containing herbal ingredients and triturated well until a paste consistency is formed the above table show plant extract and combination of chemical. [46]

APPLICATIONS




Herbal toothpaste is effective in reducing dental plaque or gingivitis

SOURCES OF GREEN COSMETIC PREPARATIONS


These includes natural oils, agricultural plants, food sources and Bacteria.

Natural oils	Bioactive molecule	Bioactivity	Cosmetic relevance
Coconut oil 	Fatty acids, (e.g., lauric and palmitic acids [47])	Antioxidants and anti-inflammatory properties [48]	Coconut oil inhibits uv light mediated skin aging, moisturizes skin [49], reduces protein loss in the hair [50], is a useful scrub and can be used as a deodorant. Coconut milk reduces black spots on the skin [51]

Natural oils	Bioactive molecules	Bio activity	Cosmetic relevance
<p>Avocado oil</p> 	<p>Oleic and palmitoleic acids, linoleic acids and stearic acids</p>	<p>Antioxidant, anti-tumor, anti-inflammatory and anti-microbial activities [52]</p>	<p>Acta as a cleanser, moisturizer Prevents dry skin, minimizes breakouts [53]</p>
<p>Palm oil</p> 	<p>Vitamin E (tocopherol and tocotrienols), phytosterol, and squalene</p>	<p>Antioxidants, natural inhibitors of cholesterol synthesis [54]</p>	<p>Emollient and foaming properties.</p>
<p>Argan oil</p> 	<p>Fatty acids and a variety of phenolic compounds. oleic acid, linoleic acids</p>	<p>Antioxidant</p>	<p>Has an anti-sebum effect. treats different types of acne</p>

Sources	Bioactive molecules	Bio activity	Cosmetic Relevance
<p>Aloe vera</p> 	<p>Aloes in, mucopolysaccharides, and amino acids (arginine, histidine, threonine glycine, serine, and alanine)</p>	<p>Antioxidant, Anti-inflammatory, And water retention properties</p>	<p>Have skin lightening Effect, Improve skin elasticity, Reduces wrinkles [60]</p>
<p>CITRUS</p> 	<p>Flavones (hesperidin), citral, D-limonene and beta pinene</p>	<p>Antiaging Antioxidant properties</p>	<p>Reduces wrinkles, improves collagen production, [61] Positively Effects acne prone skin [62]</p>
<p>GREEN TEA</p> 	<p>Catechin derivatives (epicatechin, epicatequina-gelato, epigallocatechin, and epigallocatechin-3-gallate.</p>	<p>Free radical scavengers</p>	<p>Have prolonged moisturizing effect, reduces [63] skin roughness, sebum production, prevents acne vulgaris. [64]</p>

Sources	Bioactive molecules	Bioactivity	Cosmetic Relevance
FICUS CARICA 	Ficin and phenolic compounds	Antioxidant properties	Ficus carica, extract restores the regular epidermal, improves skin lightness, reduces sebum production, exfoliation, Hyperpigmentation [65]
ALMOND 	Triterpenoids Urosolic, betulinic and oleanolic acids), catechin, Flavanol glycosides, phenolic acids	Antioxidant properties [66]	Prunus dulcis extracts reduce eczema and pimples. [67] Almond oil nourishes, softens, and strengthens the hair

<p>CARICA PAPAYA</p> 	<p>Flavonoids (Kaempferol, quercetin Myricetin and their glycosides and phenolic acids) [68]</p>	<p>Antioxidant Anti-inflammatory actions</p>	<p>Reduces skin erythema, proteolytic wound, have antibacterial effects. [69]</p>
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MICRO ORGANISMS AS A SOURCE OF GREEN COSMETICS

Microbes exist over range of natural habitats. The diversity within the communities includes bacteria lichen and fungi. Few of microbes are commercially utilized in cosmetic industry. [74]



Bacteria:One example of a renewable resource currently under development is the Deinococcus bacteria, a bacterium studied by Deinove in France for its chemical production properties. Deinove has used the bacterium to create aromatic ingredients and pigments for the cosmetic industry,

The bacterial and fungal biomolecules, source, origin, and applications

Molecules Class	Cosmetic application	Compound	Species	Origin	Ref
Pigments	Improves skin, Antioxidant	Astaxanthin	Paracoccus, Agrobacterium aurantiacum, Thraustochytrids, Rhodotorula, Phaffia rhodozyma	Bacteria	[75]
Enzymes	Skin regeneration	Collagenases	Clostridium histolyticum	Bacteria	[76]
	Antioxidants, free radical scavenging, anti-aging	Superoxide dismutase	Bacillus cereus		
		Catalases	Sulfolobus acidocaldarius		
Biosurfactants	Skin repair, Anti-aging, emulsifying agent, and skin hydrating properties	Glutathione peroxidase	Streptococcus thermophilis	Bacteria	[77], [78]
		Hyaluronic acid	Pseudomonas sp		

OTHER SOURCES

Multani mitti

Multani mitti which helps to remove the impurities in the form of dead skin cells. It helps to make the skin radiant. It has been proven best for the irritation-prone skin. Its soothing action calms the skin, cures the inflammation caused due to elevated phlogistic agents. It is perfect for oily skin. It removes the dirt and excess of oil by acting as a perfect adsorbent. It provides fresh, radiant, and glowing skin [44].

Haridra

Haridra has been used in this preparation due to its blood purifying property and helps in wound healing, because of its antiseptic action. It cures the skin diseases occurring due to blood impurities. It is a very good anti-inflammatory and anti-allergic agent. The phytoconstituents, mainly terpenoids present in it helps to lighten the skin tone. Haridra delays the signs of aging like wrinkles, improves skin elasticity. It cures pigmentation, uneven skin tone and dull skin [45].

ShwetChandan (Santalum Album)

White Sandalwood powder in Fig. is used to cure various skin allergies. It has cooling and soothing action. It protects the skin from environmental pollution and keeps it glowing, fair and healthy. Sandalwood possesses antimicrobial properties, therefore it is used to cure various skin problems and also removes scars, acne etc [46].

Saffron

Mainly consists of dried stigmas and upper parts of styles of plant known as *Crocus sativus* belonging to the family Iridaceae. It is rich in carotenoid glycosides, mainly containing terpenoids. It lightens the skin tone and provides fair and glowing skin [48].

BIOACTIVE AND BOTANICAL EXTRACTS OF COSMETICS

Among the active ingredients usually used in this type of preparation, there is a worldwide trend of incorporating vegetable source products due to their commercial appeal, safety, and rich composition, which is frequently associated with a synergistic or multifunctional effect. Botanical extracts are rich in secondary metabolites that occur in plants in a high structural diversity. Phenolic compounds, substances structurally characterized by having one or more hydroxyls attached to an aromatic ring, are classified into simple phenolics and polyphenols, which may be subdivided into tannins and flavonoids. Both flavonoids and non-flavonoids are associated with various interesting cosmetic properties. [83]

INGREDIENTS OF GREEN COSMETICS

Ingredients: emulsifier, water, preservative, thickener, emollient, fragrancecolor and pH stabilizers [84]



EMULSIFIERS

The term emulsifiers refer to any ingredient that helps to keep unlike substances (such as oil and water) from separating.

Examples of emulsifiers used in cosmetics include polysorbates, laureth-4, and potassium acetyl sulfate.

WATER

Water used in the formulation of cosmetics is not your everyday, regular tap water. It must be 'ultra-pure'—that is, free from microbes, toxins, and other pollutants. For this reason, your label may refer to it as distilled water, purified water or just aqua.

EMOLLIENT

Emollients soften the skin by preventing water loss. They are used in a wide range of lipsticks, lotions, and cosmetics. emollients, including beeswax, olive oil, coconut oil and lanolin, as well as petrolatum (petroleum jelly), mineral oil, glycerin, zinc oxide, butyl stearate



THICKENERS

Thickening agents work to give products an appealing consistency. They can come from four different chemical families

Lipid thickeners Examples include acetyl alcohol, stearic acid, and carnauba wax.

Naturally derived thickeners Examples include hydroxyethyl cellulose, guar gum, xanthan gum and gelatin.

The final group are the **synthetic thickeners**. can be used to form clear gels. Examples include acetyl palmitate, and ammonium acryloyldimethyltaurate.

FRAGRANCE

Fragrances aren't just used in perfumes. They're also in creams, lotions and even in food, to give an appealing smell.



COLOURING AGENTS AND PIGMENTS

Mineral ingredients can include iron oxide, mica flakes, manganese, chromium oxide and coal tar. Natural colors can come from plants, such as beet powder, or from animals, like the cochineal insect.



GLITTERING EFFECT

Shimmering effects can be created via a range of materials. Some of the most common ones are mica and bismuth oxychloride. Bismuth oxychloride (BiClO) is used to create a silver-grey pearly effect.

PRESERVATIVES USED IN GREEN COSMETICS

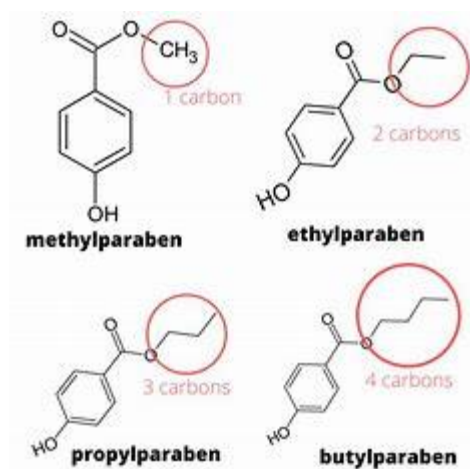
PARABENS

Parabens are chemicals which are used as preservatives in cosmetic products. They are derived from para -hydroxybenzoic acid (PHBA). Parabens comes in different forms like methyl paraben, ethyl paraben, propylparaben, butylparaben, isobutyl paraben. They keep the product bacteria free and increase the shelf life of the product.

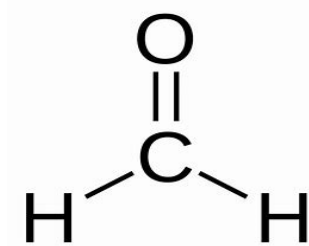
The use of parabens in cosmetics hit the media in 2004. Research conducted by Dr. Philippa Darbre of the university of Reading in England reported findings that 18 out of 20 breast cancer tissue samples contained parabens. The presence of parabens in breast tumors was picked up by the media and presented as evidence that parabens contribute to breast cancer was incorrect. later Dr Darbre said No claim was made that presence of parabens has caused breast cancers. Dozens of studies demonstrated that parabens are broken down, metabolized, and excreted harmlessly from the body.

Currently, both in Australia and internationally, the science community consider the use of parabens to be safe.

Some companies have begun to manufacture paraben free products, which consumers can purchase if they are concerned.[85]

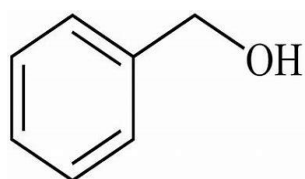


FORMALDEHYDES :



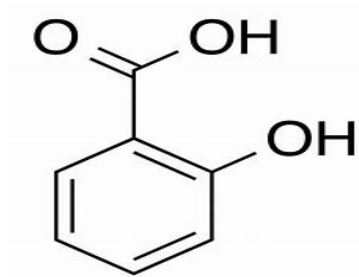
Formaldehyde works as a preservative in cosmetics. Formaldehyde is not used in the pure form, it is slightly altered and listed under the name formalin. Formaldehyde is classified as a group 1 carcinogen by the World Health Organization. At low levels the use of formaldehyde is deemed to be safe.[85]

BENZYL ALCOHOL



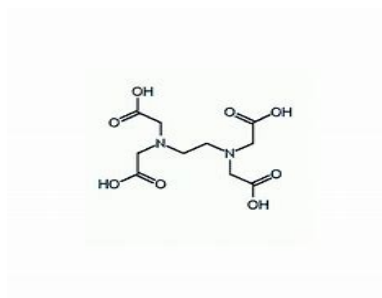
Benzyl alcohol is an aromatic alcohol and is frequently used as a preservative [86]

SALICYLIC ACID



Salicylic acid is widely used in cosmetic industry. It is used as a preservative up to a maximum level of 0.5% to protect against the growth of microorganisms. It is used in pharmaceutical formulations such as acne products.

TETRASODIUM EDTA



EDTA which stands for ethylene di amine prevents the deterioration of cosmetic and personal care products, as it stops the growth of mold and other microorganism. Tetrasodium EDTA also helps maintain clarity, protect fragrance compounds and prevents rancidity.

SUSTAINABLE COSMETIC COMPANIES AND THEIR PRODUCTS

Some of the well-known sustainable cosmetics and their products are given below: [87]

BLISSOMA:

- Focusses on skin care.
- Their preservative free cosmetics include natural ingredients like fruit enzymes, vitamin c and organic herbs and grains.

BURTS BEES :

- Focuses on beeswax candles to a lip balm.
- The company creates cosmetics and personal care products, natural, organic ingredients. It has no waste manufacturing policy.
- They rely on botanical oils, herbs, beeswax to come up with their world recognized products.

DRUNK ELEPHANT :

- Use clean natural ingredients.
- Manufactures a range of sustainable skin care products.
- Strive to create products that are both clinically effective and naturally sourced.

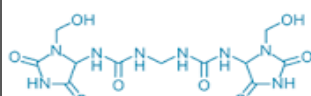
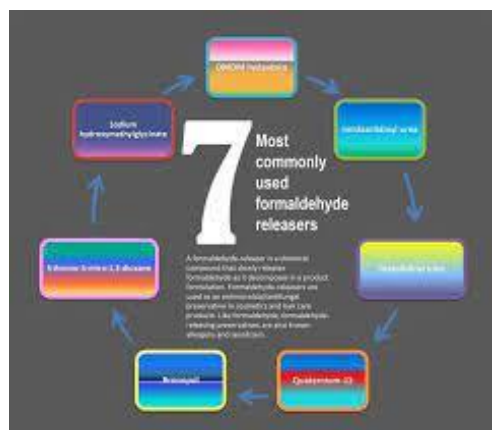
NATIVE :

- Native produce deodorants with natural ingredients.
- Includes simple, nontoxic ingredients.
- Their Oleo chemical derived ingredients include coconut oil, shea butter and castor bean oil.

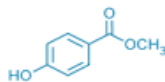
RMS BEAUTY :

- RMS Beauty provides a wide range of cosmetics, from foundation to mascara.
- Dedicated to use organic ingredients
- RMS creates nontoxic makeup products that heal and protect the skin.
- They use low heat processing to ensure their ingredients remain as natural as possible.

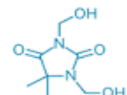
TOXIC CHEMICALS IN CONVENTIONAL COSMETICS

Formaldehyde-releasing preservatives :

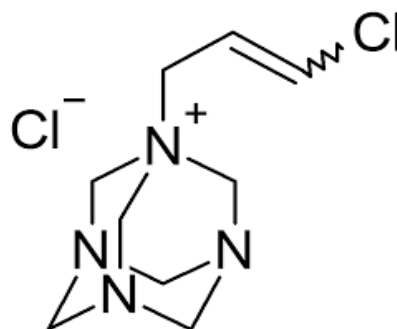
Imidazolidinyl urea



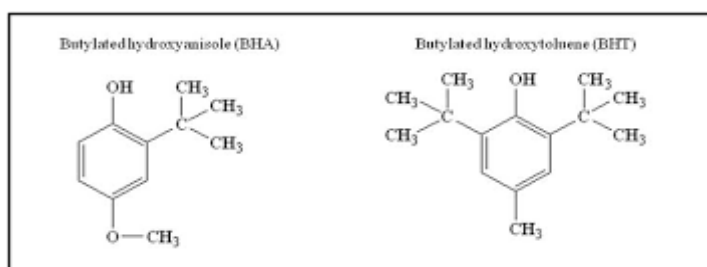
Methylparaben



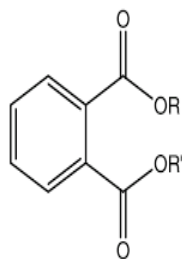
DMDM hydantoin



The preservatives like DMDM hydantoin, Imidazolidinyl urea are present in a wide range of cosmetics, as well as in cleaning products such as toilet bowl cleaners. As their name suggests, formaldehyde-releasing preservatives continuously release small amounts of formaldehyde, a known human carcinogen.[88] Quaternium-15 is a quaternary ammonium salt. It is known as formaldehyde donor, identified to cause contact dermatitis, allergy reactions.

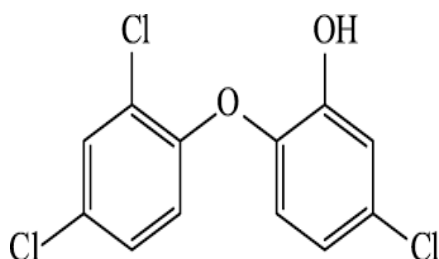
BHA and BHT :

BHA and BHT are synthetic antioxidants used as preservatives, and they are most common in lipsticks and moisturizing creams. The European Commission has released evidence that BHA and BHT disrupt the endocrine system[88]

PHTHALATES

These are another group of chemicals found in some cosmetics that have been red flagged by environmental groups. Phthalates are produced from oil. Some studies have indicated that at high, recurring concentrations different phthalates can act as endocrine disruptors—this means they upset the hormonal balance in the body and can lead to developmental problems, particularly in males. Other studies have indicated there may be a link between phthalates and type 2 diabetes.

In response, the European Union and the United States have imposed bans on some types of phthalates for use in cosmetics. Research conducted in Australia has identified a small level of risk in relation to one phthalate, bis(2-ethylhexyl) phthalate or DEHP, and as a result NICNAS has prohibited products that contain DEHP above the prescribed level—this generally relates to children's toys. [88]

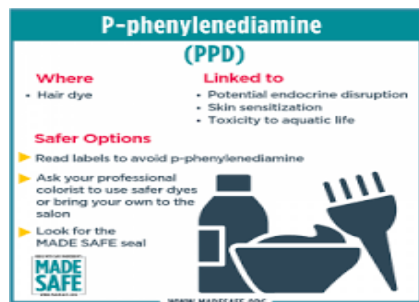
TRICLOSAN:

IS added to a wide range of consumer products including deodorant, soap, toothpaste, cosmetics, and general house-hold cleaning products.

In Australia, a full risk assessment conducted by NICNAS found no cause for public concern in general, though did recommend controls for maximum

concentrations of triclosan (0.3%) in personal care and cosmetic products. At present, cosmetic products containing more than 0.3% triclosan must clearly carry the word 'poison' on the label—not the best marketing strategy for producers.[88]

COAL TAR DYES :



Coal tar dyes: On labels, coal tar dyes are listed as p-phenylenediamine, or colours titled "CI" and followed by a five-digit number. These dyes are mixtures of petrochemicals, and they have been linked to cancer in humans.[88]

ADVANTAGES OF NATURAL AND SUSTAINABLE COSMETICS

KINDER TO THE ENVIRONMENT :

The harsh chemicals used in it are polluting the air, land, and water in micro form but in huge quantities. The production of conventional cosmetics is causing tremendous plastic wastes and other toxic pollutants which are discarded into the environment. The microbeads/plastic from shower scrubs and exfoliating products are washed into our waterways every day which do not dissolve, causing a threat to marine life as well as ours.

Green cosmetics on the other hand are made from eco-friendly ingredients that are biodegradable hence, there is nothing to worry when they mix with nature. [89]

GENTLER TO THE SKIN:

Green cosmetics are gentler to skin and are even suitable to use by the most sensitive ones. Natural and oleochemical ingredients are less likely to cause skin irritation or allergic reaction. Consider glycerin, a natural derivative of palm oil acts as a moisturizer and perfect example of the natural effectiveness of sustainable cosmetics [90].

LONG TERM HEALTH

The natural ingredients in cosmetic nourish our skin from within without causing any side effects. For example, applying simple organic cold pressed castor oil is way better and safer than expensive lotions for dry skin which we must apply often for. But the ricinoleic acid present in castor oil not only moisturizes the skin but also helps retain it by preventing water loss through the outer layer of the skin. So, you can see which is a better and cheaper option here.[91]

LOW IN COST

The general mindset is that all natural products are expensive. Well, not at all. In fact, the amount of petroleum-based cosmetics costs way higher than green ones because green cosmetics contain homely ingredients.[92]

INDUSTRIAL IMPORTANCE OF GREEN COSMETICS

1-ENHANCES BRAND REPUTATION

This provides quality, safety, and sustainability of green products. By moving towards sustainability of green products one can show their global and social awareness. Green products send the message to the consumers that the companies which produce green products are committed to quality, safety, sustainability and the products are worthy of their trust. As more people are concerned about synthetic products, consumers are looking for companies that practice transparency and honesty. One can show their global and social awareness promotes customers loyalty towards the company.

2- HIGH QUALITY PRODUCT

With most bio-based products, the toxicity to the end-user is reduced, creating safer, higher-quality products. High-quality cosmetics provide effective results without putting the consumer at risk.[93]

3- INCREASES CORPORATE RESPONSIBILITY

Corporate responsibility is about the impact an organization makes on society, the environment, and the economy and it ensures that it operates in a sustainable way.[93]

CERTIFICATION SYSTEMS

Certification systems verify the ingredients, processes, production, storage of rawmaterials, packaging, labeling, energy use, waste management and labeling of producers, ensuring the quality of the final product. Certified products have some advantages over others, including the control and track of the raw material supply chain, increased confidence in the product brand, recognition, and differentiation of the product in the market [94]. Some examples of green cosmetic certification systems and their countries of origin are: BDIH (Germany) [95], Ecocert (France), IBD (Brazil)[96], ICEA (Italy)[97] and Natrue (Belgium)[98]. Each of these systems establishes requirements for a cosmetic to be considered organic or natural. The term "organic" is also not defined by the FDA regulations on cosmetics, as well as the term "natural" (United States, 2002). ICEA, for example, explicitly determines the use of naturally occurring chemicals derived from Green Chemistry (ICEA, 2019a). The minimum percentage of natural ingredients, for example, ranges from 15% for IBD's "natural cosmetics with organic portions" label to 95% for Ecocert's "natural cosmetic" label. It allows certain products to be certified as organic or natural by some certification systems and not by others, making it difficult for consumers to understand green certificates and the differences among them. Ecocert, France, 1991 (Ecocert, 2012; 2019a; 2019b; 2019c) has scope for natural and organic cosmetics. More than 95% ingredients are of natural origins; more than 95% are of plant ingredients organic; more than 10% of all ingredients certified as organic. [99-102]

CONCLUSION

Sustainability is very important when considering the purchase of a beauty product. We need to look at the ingredients of a beauty product, assess the packaging, check for sustainable certifications, and need to ensure that products are cruelty free.

Green cosmetics represents a perspective of reducing the risks to human health and environmental impacts caused by cosmetics. The prospects for the risk analysis of green cosmetics include the existence of studies demonstrating the possibility of using natural ingredients with different functions instead of synthetic ingredients known to be harmful to human and environmental health.

Synthetic and chemical products do give instant results but slowly damage our skin cells. Moreover, production of such beauty products is contaminating our environment as well which has to stop for our future generation.

Hence switching to green cosmetics doesn't mean we will nourish our skin with the goodness of nature but will also be doing a bit for nature as well by causing minimal waste and impact on the environment.

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