Chapter

1

Cosmetic and Cosmeceuticals Products

Cosmetic science is a fascinating and ever-evolving field that explores the science behind the products we use to enhance our appearance and boost our confidence. From face creams to hair dyes, cosmetics are a part of our daily lives and have a significant impact on our sense of well-being. Cosmetic scientists are at the forefront of this field, developing new formulations that are safe, effective, and appealing to consumers.

In India, the regulatory body for cosmetics is the Central Drugs Standard Control Organization (CDSCO) under the Ministry of Health and Family Welfare. The CDSCO defines cosmetics as any substance or preparation intended to be placed in contact with the various external parts of the human body (epidermis, hair system, nails, lips, and external genital organs) or with the teeth and the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming them, changing their appearance, protecting them, keeping them in good condition or correcting body odors."Cosmetic science in India encompasses the research and development of safe and effective cosmetic products, as well as the regulatory and quality control aspects of the industry. This includes the study of ingredients, formulation development, stability testing, safety and efficacy evaluation, packaging and labeling, and compliance with regulatory requirements". The goal of cosmetic science in India is to create products that enhance the beauty and well-being of consumers while ensuring their safety and quality.

In the United States, the regulatory body for cosmetics is the Food and Drug Administration (FDA). The FDA regulates cosmetics under the Federal Food, Drug, and Cosmetic Act, which defines cosmetics as "articles intended to be rubbed, poured, sprinkled, or sprayed on, introduced into, or otherwise applied to the human body for cleansing, beautifying, promoting

attractiveness, or altering the appearance." The FDA has established regulations for cosmetic labeling, safety, and good manufacturing practices to ensure that cosmetic products are safe for consumers. Cosmetic science in the United States encompasses the development, testing, and regulation of cosmetic products. This includes the study of ingredients, formulation development, safety and efficacy evaluation, manufacturing practices, packaging and labeling, and compliance with regulatory requirements. The goal of cosmetic science is to create safe and effective products that meet the needs and expectations of consumers. In recent years, cosmetic science has undergone a transformation, with a growing focus on natural and organic ingredients, sustainability, and ethical considerations.

COSMETIC CLASSIFICATION

Cosmetics can be classified in different ways, depending on the criteria used. Here are a few common classification systems for cosmetics (Fig. 1.1).

By product type: This is feasibly the most common classification system, which groups cosmetics by their intended use and formulation. Some common product types include makeup (e.g. lipstick, foundation), skin care (e.g. moisturizers, cleansers), hair care (e.g. shampoo, hair dye), fragrance (e.g. perfumes, colognes), and personal care (e.g. deodorants, toothpaste).

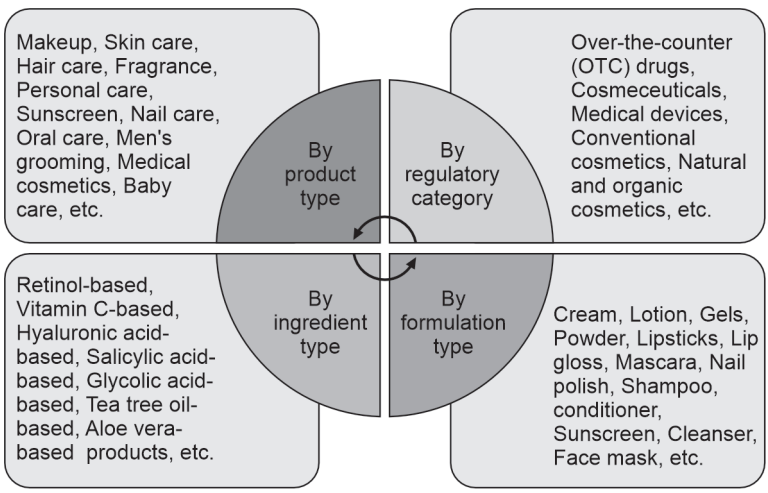

Fig. 1.1: Classification of cosmetic

By regulatory category: Cosmetics can be classified based on how they are regulated in a given country. In the United States, cosmetics are regulated by the Food and Drug Administration (FDA) and are defined as products that are intended to be applied to the human body for cleansing, beautifying, promoting attractiveness, or altering appearance. In contrast, drugs are intended to cure, mitigate, treat, or prevent disease and are subject to different regulatory requirements.

By formulation: Cosmetics can also be classified based on their formulation, such as whether they are water-based or oil-based, or whether they are designed for specific skin types or conditions.

By ingredients: Some classifications group cosmetics by their active ingredients, such as those that contain retinoids, alpha hydroxy acids, or antioxidants.

Cosmetic Classification by Product Type

Cosmetics can be classified into different categories based on their intended use and formulation. Here are some common product types of cosmetics:

Makeup: This category includes products that are applied to the face, eyes, lips, and nails to enhance or change one's appearance. Examples of makeup products include lipstick, foundation, eyeshadow, mascara, nail polish, and blush.

Skin care: This category includes products that are used to improve the health and appearance of the skin, such as moisturizers, cleansers, toners, serums, and anti-aging products.

Hair care: This category includes products that are used to clean, condition, style, and color hair, such as shampoo, conditioner, hair gel, hairspray, and hair dye.

Fragrance: This category includes products that are used to add a pleasant scent to the body or the environment, such as perfumes, colognes, body sprays, and scented candles.

Personal care: This category includes products that are used for hygiene and grooming purposes, such as deodorants, toothpaste, mouthwash, shaving cream, and body wash.

Oral care: This category includes products that are used to maintain oral hygiene and freshness, such as toothbrushes, toothpaste, mouthwash, and dental floss.

Baby care: This category includes products that are formulated for the delicate skin of infants and young children, such as baby oil, diaper cream, baby shampoo, and baby lotion.

These cosmetic product types provide a wide range of options for consumers to choose from based on their specific needs and preferences.

Cosmetic Classification by Regulatory Category

Some cosmetic regulatory categories for classification:

Over-the-counter (OTC) drugs: These are cosmetic products that contain active ingredients that are regulated by the US Food and Drug Administration (FDA) as drugs. Examples of OTC drug cosmetics include acne treatments, antiperspirants, and sunscreens.

Cosmeceuticals: These are cosmetic products that contain bioactive ingredients that are intended to provide medicinal or therapeutic benefits beyond traditional cosmetics. Examples of cosmeceuticals include anti-aging creams, skin-lightening products, and hair growth serums.

Medical devices: These are cosmetic products that are used for a medical purpose, such as to diagnose, treat, or prevent a disease or condition. Examples of medical device cosmetics include laser hair removal devices, light therapy devices for acne, and microdermabrasion machines.

Natural and organic cosmetics: These are cosmetic products that are formulated with natural or organic ingredients and are often marketed as being free from synthetic chemicals and preservatives. Natural and organic cosmetics are not regulated by the FDA, but they may be certified by third-party organizations, such as the USDA or NSF.

Conventional cosmetics: These are cosmetic products that are formulated with synthetic chemicals and are not intended to provide any therapeutic or medicinal benefits beyond traditional cosmetics. Conventional cosmetics are not regulated by the FDA, but they must comply with labeling and ingredient requirements.

Classification of cosmetic products based on these factors helps in identifying the target market and the specific needs of consumers.

Cosmetic Classification by Formulation

Cosmetic products can also be classified based on their formulation. Here are some common classifications:

Creams and lotions: These are cosmetic products that are emulsions of oil and water. Creams are thicker and heavier, while lotions are lighter and more fluid.

Serums: These are lightweight cosmetic products that contain a high concentration of active ingredients. Serums are designed to penetrate deeply into the skin for maximum effectiveness.

Gels: These are cosmetic products that have a jelly-like consistency. Gels can be formulated for various skin concerns, such as acne, hydration, or cooling.

Powders: These are cosmetic products that are typically used for makeup application. Powders can be pressed or loose and can be used to set makeup or provide coverage.

Lipsticks and lip glosses: These are cosmetic products that are applied to the lips for color and shine. Lipsticks are typically more opaque, while lip glosses are more sheer and shiny.

Mascara: This is a cosmetic product that is applied to the eyelashes to enhance length, thickness, and color.

Nail polish: This is a cosmetic product that is applied to the nails for color and shine.

Shampoos and conditioners: These are cosmetic products that are used for hair cleansing and conditioning. Shampoos are designed to remove dirt and oil, while conditioners are formulated to moisturize and detangle hair.

Sunscreen: This is a cosmetic product that is used to protect the skin from the harmful effects of the sun. Sunscreen can be formulated as a lotion, cream, gel, or spray.

Cleansers: These are cosmetic products that are used to remove dirt, oil, and makeup from the skin. Cleansers can be formulated as gels, foams, creams, or oils.

Face masks: These are cosmetic products that are applied to the face for various purposes, such as deep cleansing, exfoliating, or hydrating. Face masks can be formulated as creams, gels, or sheet masks.

Cosmetic Classification by Ingredients

By ingredients, cosmetic products can be classified into various categories based on the primary active ingredients used in

their formulation. Some common ingredients-based cosmetic classifications are:

Retinol-based products: These are cosmetic products that contain retinol or its derivatives, which are known to improve the appearance of fine lines, wrinkles, and hyperpigmentation.

Vitamin C-based products: These are cosmetic products that contain vitamin C, which is known for its antioxidant properties and ability to brighten the skin.

Hyaluronic acid-based products: These are cosmetic products that contain hyaluronic acid, which is known for its ability to hydrate and plump the skin.

Salicylic acid-based products: These are cosmetic products that contain salicylic acid, which is known for its ability to exfoliate and unclog pores, making it particularly effective for acne-prone skin.

Glycolic acid-based products: These are cosmetic products that contain glycolic acid, which is known for its ability to exfoliate and improve the texture and tone of the skin.

Aloe vera-based products: These are cosmetic products that contain aloe vera, which is known for its soothing and hydrating properties, making it particularly effective for sensitive and dry skin.

Charcoal-based products: These are cosmetic products that contain activated charcoal, which is known for its ability to draw out impurities and toxins from the skin, making it particularly effective for oily and acne-prone skin.

Niacinamide-based products: These are cosmetic products that contain niacinamide, which is known for its ability to improve skin tone and texture, reduce the appearance of fine lines and wrinkles, and regulate sebum production.

Squalane-based products: These are cosmetic products that contain squalane, which is known for its ability to deeply moisturize the skin without clogging pores or causing breakouts.

Tea tree oil-based products: These are cosmetic products that contain tea tree oil, which is known for its antibacterial and anti-inflammatory properties, making it particularly effective for treating acne and other skin conditions.

COSMECEUTICALS

Cosmeceuticals are a relatively new category of cosmetic products that are intended to have both cosmetic and therapeutic effects on the skin. They are cosmetic products that contain biologically active ingredients, which have been demonstrated to have pharmaceutical-like effects on the skin.

The term "cosmeceutical" was first introduced by Albert Kligman, a dermatologist at the University of Pennsylvania, in 1984. Since then, the use of cosmeceuticals has become increasingly popular among consumers, and the market for these products has grown significantly. Cosmeceuticals are different from traditional cosmetics in that they are designed to penetrate the skin and affect the function of the skin's cells. They are also different from pharmaceuticals in that they do not require a prescription, and they are intended for topical use only.

Cosmeceuticals have gained popularity because they offer an intermediate option between traditional cosmetics and pharmaceuticals. They are often perceived as safer than pharmaceuticals, but more effective than traditional cosmetics. As a result, they have become a popular choice for consumers who want to address specific skin concerns without the need for a prescription or a visit to a dermatologist.

Classification of Cosmeceuticals

Cosmeceuticals can be classified based on their intended use, formulation, and active ingredients as shown in Fig. 1.2.

Each of these classifications represents a different approach to skin care and targets specific skin concerns. For example, anti-aging cosmeceuticals typically contain ingredients such as retinoids and peptides, which help to reduce the appearance of fine lines and wrinkles. Acne-fighting cosmeceuticals, on the other hand, often contain salicylic acid and benzoyl peroxide, which help to unclog pores and reduce inflammation. It is important to choose a product that is appropriate for your skin type and concerns, and to use it as directed for best results.

Anti-aging Cosmeceuticals

Anti-aging cosmeceuticals are designed to reduce the visible signs of aging, such as fine lines, wrinkles, and age spots. These products often contain active ingredients that help to stimulate collagen production and improve skin elasticity, leading to a firmer, more youthful

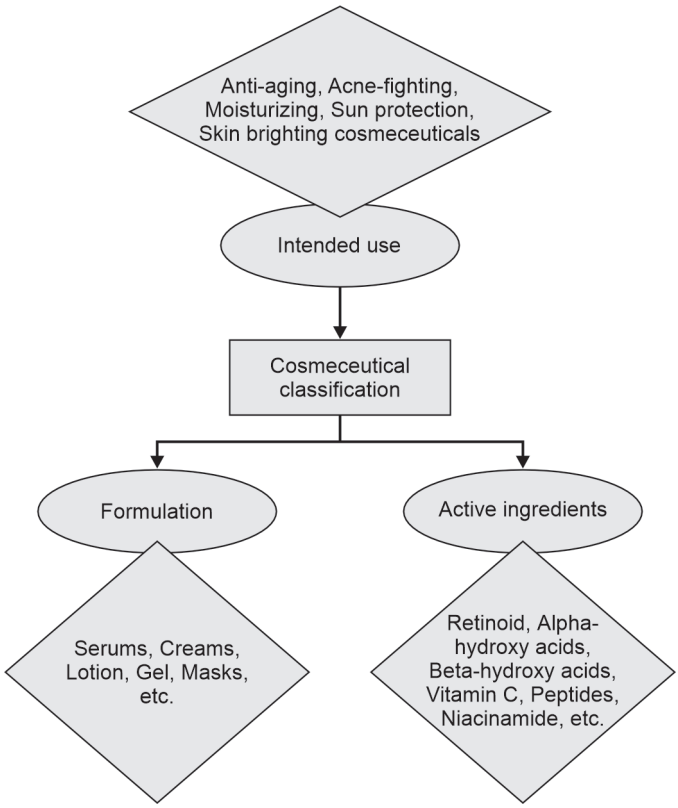

Fig. 1.2: Classification of cosmeceuticals

appearance. Some common active ingredients found in anti-aging cosmeceuticals are shown in Fig. 1.3. Anti-aging cosmeceuticals come in a variety of formulations, including serums, creams, and masks.

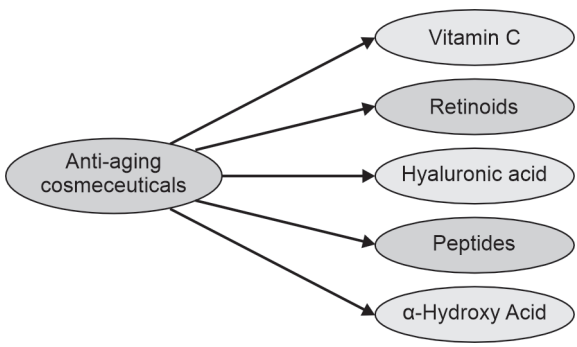

Fig. 1.3: Common active ingredient used in anti-aging cosmeceuticals

Acne-fighting Cosmeceuticals

Acne-fighting cosmeceuticals are designed to treat and prevent acne breakouts by reducing inflammation, unclogging pores, and controlling oil production. These products often contain active ingredients that can target specific acne-causing bacteria, reduce redness and inflammation, and improve the overall appearance of the skin. Some common active ingredients found in acne-fighting cosmeceuticals are shown in Fig. 1.4.

Moisturizing Cosmeceuticals

Moisturizing cosmeceuticals are designed to hydrate and nourish the skin, improving its overall appearance and texture. These products typically contain a combination of ingredients that work together to lock in moisture and protect the skin from external factors that can cause dryness and damage. Some common active ingredients found in moisturizing cosmeceuticals are shown in Fig. 1.5.

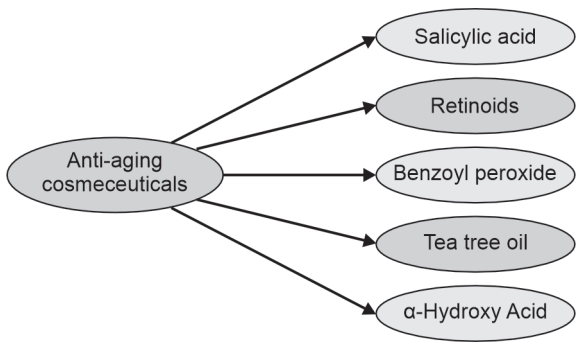

Fig. 1.4: Common active ingredients found in acne-fighting cosmeceuticals

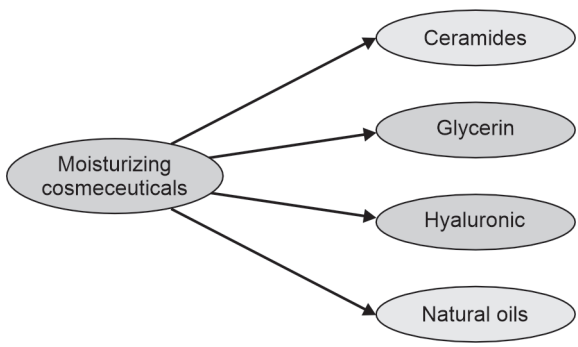

Fig. 1.5: Common active ingredients found in moisturizing cosmeceuticals

Sun Protection Cosmeceuticals

Sun protection cosmeceuticals are designed to protect the skin from the damaging effects of ultraviolet (UV) radiation from the sun. Overexposure to UV radiation can cause sunburn, premature aging, and increase the risk of skin cancer. Sun protection cosmeceuticals contain a combination of ingredients that work together to block or absorb UV radiation, as well as antioxidants that can help to neutralize free radicals generated by UV exposure. Some common active ingredients found in sun protection cosmeceuticals are shown in Fig. 1.6.

Sun protection cosmeceuticals come in a variety of formulations, including lotions, creams, sprays, and powders. It is important to choose a product that provides broad-spectrum protection and has an SPF (sun protection factor) of 30 or higher.

Formulation-based Cosmeceuticals

Formulation-based cosmeceuticals refer to products that rely on specific formulations and combinations of ingredients to provide therapeutic benefits to the skin. Some examples of formulation-based cosmeceuticals are shown in Fig. 1.7. They are typically applied after cleansing and toning, and before moisturizing.

Serums cosmeceuticals: Serums are a type of cosmeceutical that are formulated with high concentrations of active ingredients in a lightweight, easily absorbed formula. They are designed to deliver potent doses of ingredients deep into the skin, providing targeted treatment for specific skin concerns. Some common types of serums

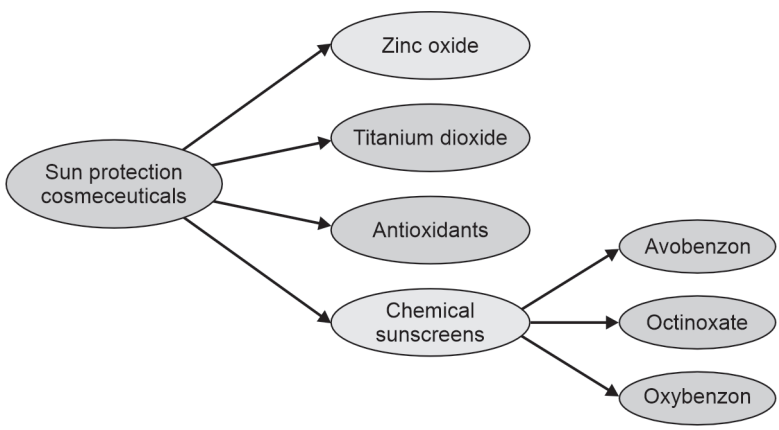

Fig. 1.6: Common active ingredients found in sun protection cosmeceuticals

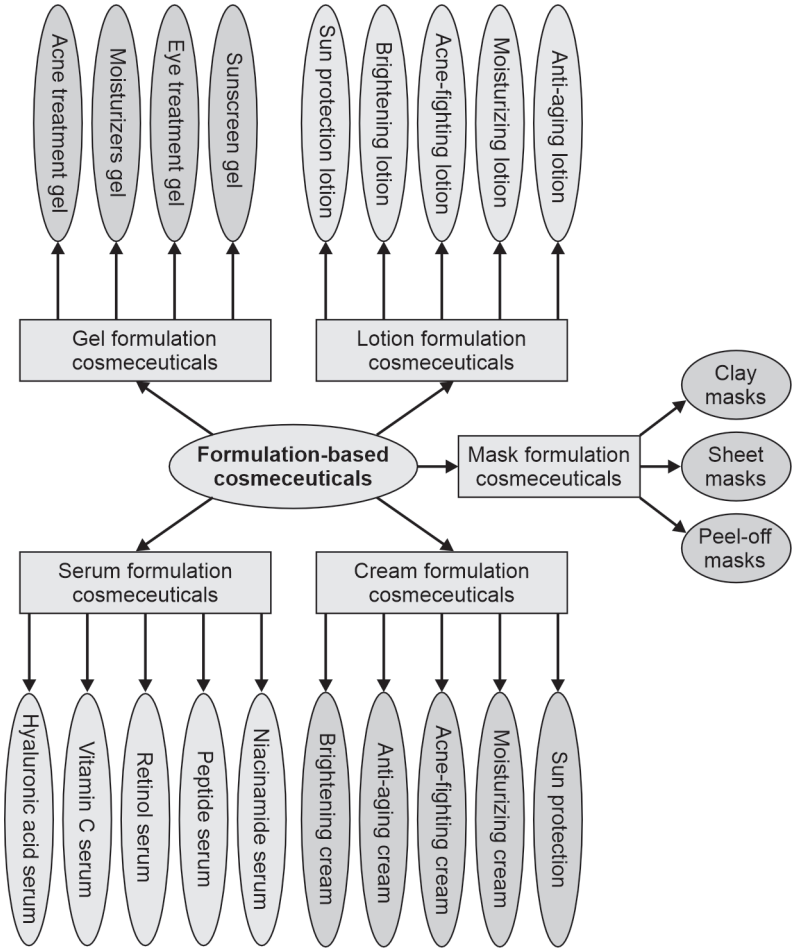

Fig. 1.7: Formulation-based cosmeceutical classification

used in cosmeceuticals are shown in Fig. 1.7. Serums can be used alone or in combination with other cosmeceuticals as part of a comprehensive skin care routine.

Creams cosmeceuticals: Creams are a popular type of cosmeceutical that is used to moisturize and protect the skin while also delivering targeted treatment for specific skin concerns. Creams are typically formulated with a combination of active ingredients, moisturizers, and emollients to provide a balance of hydration and treatment. Some common types of creams used in cosmeceuticals are shown in Fig. 1.7.

Lotion cosmeceuticals: Lotions are another popular type of cosmeceutical that are commonly used to moisturize and treat the skin. Lotions are typically lightweight and fast-absorbing, making them a popular choice for those with normal to oily skin types. Some common types of lotions used in cosmeceuticals are shown in Fig. 1.7.

Gel formulation cosmeceuticals: Gel formulations are commonly used in cosmeceuticals due to their ability to provide a lightweight and non-greasy application that is easily absorbed into the skin. Gels are also useful in delivering active ingredients to the skin due to their ability to maintain a stable and uniform dispersion of particles. Some examples of cosmeceuticals that are commonly formulated as gels are shown in Fig. 1.7.

Masks formulation cosmeceutical: Cosmeceutical masks are topical products that are applied to the face and left on for a specific period to enhance the appearance and health of the skin. These masks may contain a variety of active ingredients, such as vitamins, antioxidants, and exfoliants that are designed to penetrate deep into the skin and provide therapeutic benefits. There are several different types of cosmeceutical masks as shown in Fig. 1.7, each with its unique benefits and formulations (Table 1.1).

Table 1.1: Differences between cosmetic and cosmeceuticals

Sl.No.	*Cosmetic*	*Cosmeceuticals*
1.	Cosmetic can applied to the outer surface of the skin	Cosmeceuticals can improve and enhance the skin's appearance by using biologically active ingredients
2.	It can maintain, protect and clean	Active principles can pass through the epidermis
3.	Alters the appearance and external feel of the skin for a short time	Designed to have long-term, clear effects
4.	Cosmetic products only deliver their ingredients at a very superficial level into the skin for beauty and style	Cosmeceuticals are more concentrated, pure and more effective giving pharmaceuticals benefits
5.	Results through cosmetics are immediate and fast	Cosmeceutical products give slow but permanent results
6.	Cosmetics do not heal your damages they only cover up	Cosmeceuticals have ingredients that have rejuvenating properties
7.	Examples: Makeup, hair care, skin care	Examples: Serums, creams, and dermaceutical products

DEFINITION OF COSMETICS AS PER INDIAN REGULATION

As per the Indian regulation, cosmetics are defined "as any substance or preparation intended to be placed in contact with the external parts of the human body, such as the skin, hair, nails, lips, or teeth, with a view to cleaning them, perfuming them, changing their appearance, correcting body odors, or protecting them or keeping them in good condition". This definition also includes any article intended for use as a component of cosmetic products. The regulation further specifies that cosmetics shall not include soaps, which are regulated separately.

DEFINITION OF COSMETICS AS PER EUROPEAN REGULATION

As per the European Union (EU) regulation, a cosmetic product is defined as any substance or mixture intended to be placed in contact with the external parts of the human body (epidermis, hair system, nails, lips, and external genital organs) or with the teeth and the mucous membranes of the oral cavity with a view exclusively or mainly to cleaning them, perfuming them, changing their appearance, protecting them, keeping them in good condition or correcting body odors. This definition also includes any substance or mixture intended for use as a component of a cosmetic product.

In India, the regulatory body responsible for overseeing the safety and efficacy of cosmetics is the Central Drugs Standard Control Organization (CDSCO), under the Ministry of Health and Family Welfare. The CDSCO regulates cosmetics under the Drugs and Cosmetics Act and Rules.

In the European Union, the regulatory body responsible for cosmetics is the European Commission, under Regulation (EC) No. 1223/2009. This regulation establishes a comprehensive set of rules on cosmetic products to ensure their safety and protection of human health.

EVOLUTION OF COSMETIC

The evolution of cosmetics is a long and fascinating story that spans centuries. Humans have been using cosmetics for thousands of years for various purposes, such as religious rituals, personal grooming, and beautification. Over the years, the ingredients, formulations, and manufacturing techniques have evolved, and the perception of cosmetics has changed from being a luxury item

to a necessity in our daily lives. In ancient times, cosmetics were made from natural ingredients, such as herbs, minerals, and animal products. Egyptian women, for example, used kohl to darken their eyes and henna to dye their hair. The Greeks and Romans used lead-based powders and chalk to whiten their faces. During the middle ages, cosmetics fell out of favor as they were associated with vanity and sinful behavior. However, cosmetics made a comeback during the Renaissance period, and Queen Elizabeth I of England popularized the use of lead-based white face paint and bright red lipstick.

In the 20th century, cosmetics became more accessible to the masses, and the industry witnessed rapid growth and innovation. In the 1920s, the flapper culture popularized a new style of makeup that included dark eyeliner, red lipstick, and rosy cheeks. The invention of the first mascara and liquid foundation in the 1950s revolutionized the cosmetics industry, making makeup easier to apply and more long-lasting.

In recent years, there has been a growing demand for natural and organic cosmetics, driven by consumer awareness of the potential health risks associated with synthetic chemicals. This has led to the development of a new category of cosmetics known as "green beauty," which includes products made from natural and organic ingredients and uses environmentally sustainable packaging. The evolution of cosmetics can be traced back to ancient civilizations, where various natural ingredients were used to enhance one's appearance. In ancient Egypt, for example, women used a mixture of lead, copper, and ash to create a black powder called kohl, which was applied to their eyes to create a dramatic effect. In ancient Rome, women used lead-based face powders to achieve a pale complexion, while in ancient China, rice powder was used to create a smooth and even skin tone.

The evolution of cosmetics has been driven by a combination of technological advancements, changing consumer preferences, and a growing understanding of the science behind beauty products. As we continue to learn more about the chemistry of various ingredients and the needs of individual consumers, it is likely that we will see continued innovation and evolution in the cosmetics industry. Overall, the evolution of cosmetics reflects changes in social and cultural attitudes towards beauty and self-expression. As new technologies and ingredients continue to emerge, the cosmetics industry is poised for continued growth and innovation.

Evolution of Cosmeceuticals from Cosmetics

The evolution of cosmeceuticals can be traced back to ancient civilizations, such as Egypt, Greece, and China, where natural ingredients were used to enhance beauty and treat skin conditions. In the 20th century, advances in science and technology led to the development of synthetic ingredients and formulations, which paved the way for the modern cosmeceutical industry. The evolution of cosmeceuticals can be traced back to the early 1900s when researchers first began to explore the potential of various compounds for improving skin health and appearance. Here are some of the major milestones in the evolution of cosmeceuticals, as shown in Table 1.2.

In recent years, the cosmeceutical industry has experienced rapid growth, driven by advancements in technology and increased consumer demand for products that offer visible results. Today, there is a wide range of cosmeceutical products available on the market, including anti-aging creams, acne-fighting treatments, and sunscreens. There has been a growing trend towards natural and organic cosmeceuticals, as consumers become more concerned about the safety and environmental impact of the products they use. The

Table 1.2: Some major milestones in the evolution of cosmeceuticals

Sl.No.	*Year*	*Evolution*
1.	1980s	The term cosmeceutical was coined by Dr Albert Kligman, a dermatologist, to describe cosmetic products that have pharmaceutical-like benefits
2.	1990s	Retinoids, which are derivatives of vitamin A, became a popular cosmeceutical ingredient due to their ability to reduce fine lines and wrinkles
3.	Early 2000s	Antioxidants, such as vitamin C and green tea extract gained popularity in cosmeceuticals due to their ability to protect the skin from environmental damage
4.	Late 2000s	Growth factors, which are proteins that promote cell growth and differentiation, were introduced as cosmeceutical ingredients
5.	2010s	Stem cells and DNA repair enzymes became popular cosmeceutical ingredients due to their potential to repair and regenerate the skin
6.	Present day	With the rise of personalized skin care, cosmeceutical products are being formulated to address specific skin concerns, such as hyperpigmentation, acne, and rosacea