Chapter

1

Cosmetic and Cosmeceutical Products

Introduction

Cosmetics definition:

- The word "cosmetics" arises from Greek word "Cosmetics" which means adorn (attractive).
- The materials used for beautification or improvement of appearance is known as cosmetics.

What is cosmetic science:

- It is a study of effects that Raw materials and mixtures can have on parts of the human body like Hair, Skin, lips and Nails.
- They learn to develop, formulate and produce cosmetics and personal care products. They also study regulations and how to assess products safety, performance and quality.

"**Cosmetic product**" means 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.

Uses:

1. They are used as a cleansing, moisturizing and beautifying agent.
2. They help in enhancing attractiveness of the body.
3. They help in altering the appearance of the body without affecting its functions.
4. Sunscreen products help in protecting the body from UV rays and treating sunburns.
5. Acne, wrinkles, dark circles under eyes and other skin imperfections are treated or repaired by treatment products.
6. Cosmetics help in treating skin infections.

1.1 CLASSIFICATION OF COSMETIC AND COSMECEUTICAL PRODUCTS

Cosmetic Products

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Cosmetics classified as:

1. **Skin products:**
   a. Powders: Compact, Face, Body and Pricking heat powder
   b. Creams: Cold, Vanishing, All-purpose, Cleansing, Emollient and Foundation
   c. Lotions: Astringent lotion
   d. Colorants: Lip-stick.
2. **Hair products:** Hair remover, Depilators, Epilators, Shaving cream, Hair dressing, Hair conditioners, Shampoos, Hair dyes, Lotions, Eye lashes (Mascara), Eye brow pencil & Eyelid inside.
3. **Nails:** Nail lacquers & lacquer removal, Nail polish and Cuticle removal.
4. **Hygien:**
   a. Dental: Powder, paste, dentifrices, Lotions & Mouth washes.
   b. Bath: Bath soaps.

1. Skin Products

a. **Powders:** Powder is a fine, dry particles produced by the grinding, crushing, or disintegration of a solid substance.

Compact powders have a lightweight powdery texture and come in a pressed form. Compact powder is meant to touch up your makeup throughout the day.

Face powder is the finishing touch to your make-up and can be easily refreshed throughout the day.

Body powder is regularly used in deodorants and can be used in and of itself for the same basic purpose. Apply in areas where you sweat regularly and watch them stay dry and smelling nice. Talcum powders are saviors for people suffering from excessive sweating and its inherent companion foul odour.

Prickly heat: Cooling Powder. Prickly Heat Powder from Snake brand is a classic refreshing powder. The original cooling, refreshing and soothing powder which is effective in relieving itching, prickly

heat rash and skin irritation from hot weather. To be used after bath as an antiseptic and absorbent dusting powder

b. **Creams:** Cream means to form into a foamy consistency. A water-soluble medicinal preparation applied to the skin. An ointment differs from a cream in that it has an oil base, as opposed to being water-soluble

Cold cream: It is just as effective at relieving dry itchy skin on other body parts as it is on the face. Whether you suffer from dry skin or just need some extra hydration to get through these cold winter months, cold cream can help your skin feel moisturized and more even textured.

Vanishing Cream can be used to both soften and clean the skin. It also provides a smooth base for cosmetic products and prevents pores being clogged, while providing skin with a matte finish. It's usually applied under makeup or at night.

All-purpose cream: A pasteurized and reconstituted version of the real stuff made with milk fat, emulsifiers, stabilizers, and other ingredients that allow it to behave much in the same way.

Cleansing cream also known as cold cream is usually made of a combination of mineral oil, petrolatum, water and waxes. It can moisturize your skin and remove dirt, sweat, and makeup at the same time. Many cleansing creams also contain emulsifiers, which prevent the ingredients of the cream from separating into layers.

Emollients are creams, lotions, or ointments that contain ingredients that soothe and soften the skin

Foundation creammeans the supporting structure of a home. ... An example of a foundation is the slab of cement that a house rests on. The definition of foundation is the skin colored makeup used as a base on the face before other makeup is applied.

c. **Lotions** a thick, smooth liquid preparation designed to be applied to the skin for medicinal or cosmetic purposes.

Astringent lotion applied to the skin to reduce bleeding from minor abrasions or as a cosmetic to make the skin less oily.

d. **Colorants** can be either dyes or pigments. Dyes are soluble colored organic compounds that are usually applied to textiles from a solution in water. They are designed to bond strongly to the polymer molecules that make up the textile fibre.

Lipstick colored cosmetic applied to the lips from a small solid stick.

2. Hair Products

a. **Hair remover—**a cream or lotion for removing unwanted hair.

b. **Epilator** is an electrical device used to remove hair by mechanically grasping multiple hairs simultaneously and pulling them out. The

way in which epilators pull out hair is similar to waxing, although unlike waxing, they do not remove cells from the epithelium of the epidermis.

c. **Depilatory** used to remove unwanted hair.
d. **Shaving cream** frothy cosmetic cream applied to the skin before shaving with a razor.
e. **Hairdresser—**a preparation for grooming and styling the hair.
f. **Conditioner** mean a thick liquid that you put on and wash off your hair after you have washed it, to improve the quality and appearance of your hair. a thick liquid that you wash clothes in to make them feel soft: fabric conditioner. Hair conditioner is a liquid applied to the hair after shampooing to improve its condition.
g. **Shampoo—**a special liquid that is used for cleaning your hair a special liquid used for cleaning rugs, carpets, etc. an act of cleaning hair, a carpet, etc., with shampoo.
h. **Hair dye** a natural or synthetic substance used to change the color of a person's hair.
i. **Eyelash—**each of the short-curved hairs growing on the edges of the eyelids, serving to protect the eyes from dust.
j. **Eyebrow pencil**- a cosmetic pencil for defining or accentuating the eyebrows.
k. **Eyelid** is a thin fold of skin that covers and protects an eye.

3. Nail Products

Care products that are used to colour the nails, to protect them against damage, to soften and condition cuticles, and to supplement the nails.

a. **Nail lacquers or Nail polish** (also known as nail varnish or nail enamel) is a lacquer that can be applied to the human fingernail or toenails to decorate and protect the nail plates, typically of women and girls.
b. **Lacquer thinner (**also known as cellulose thinner) is usually a mixture of solvents able to dissolve a number of different resins or plastics used in modern lacquer. These formulations are often mostly acetone with small quantities of aromatic solvent.
c. **Cuticle remover** to remove the dead skin around your nails. It gives your fingernail a chance to breathe, and it avoids your skin from growing with the nail. If you ever take a long time to push back your cuticles, you'll notice that your skin is growing with the nail.

4. Hygiene

Refers to conditions and practices that help to maintain health and prevent the spread of diseases.

a. **Dental powder:** Using tooth powder is similar to brushing teeth with toothpaste. Simply wet your toothbrush and dip it into the powder. Or if you're using a small squirt bottle, carefully squirt the powder onto a wet toothbrush. Brush teeth holding the brush at a 45-degree angle, thoroughly cleaning your teeth.

   Dentifrice a paste or powder for cleaning the teeth.

   Mouthwash also called oral rinse is a liquid product used to rinse your teeth, gums, and mouth. It usually contains an antiseptic to kill harmful bacteria that can live between your teeth and on your tongue. Some people use mouthwash to fight against bad breath, while others use it to try to prevent tooth decay.

   Paste a thick, soft, moist substance typically produced by mixing dry ingredients with a liquid.

b. **Bath soap** used as a toiletry. Face soap, toilet soap. Soap - a cleansing agent made from the salts of vegetable or animal fats. Dove Cream Beauty Bathing Bar.

1.2 COSMETIC EXCIPIENTS

An excipient is a substance formulated alongside the active ingredient of a medication, included for the purpose of long-term stabilization, bulking up solid formulations that contain potent active ingredients in small amounts (thus often referred to as "bulking agents", "fillers", or "diluents"), or to confer a therapeutic enhancement on the active ingredient in the final dosage form, such as facilitating drug absorption, reducing viscosity, or enhancing solubility. Excipients can also be useful in the manufacturing process, to aid in the handling of the active substance concerns such as by facilitating powder flow ability or non-stick properties, in addition to aiding *in vitro* stability such as prevention of denaturation or aggregation over the expected shelf life. These are limited used in cosmetics.

1.2.1 Surfactants

Surfactants are perhaps the most important of all cosmetic ingredients. Surfactants have so many useful applications that the cosmetic industry probably wouldn't exist without them. In cosmetics, surfactants are used for cleansing, foaming, thickening, emulsifying, solubilizing, penetration enhancement, antimicrobial effects, and other special effects.

The key property of surfactant molecules that makes them useful cosmetic ingredients is that they are compatible with both water and oil. When put in a water solution, they naturally create structures with lipophilic portions aligning with lipids and hydrophilic portions aligning with water. The exact structure that is produced depends on the

concentration of the surfactant solutions but the most important structure for cosmetics is micelles.

a. **Detergency:** One of the most common applications of surfactants in cosmetics is for cleansing formulations. When skin and hair get dirty there are really two types of dirt: solid particulates and oily deposits. The oily deposits come from natural sebum which is produced in the hair follicles. Solid particulates are just naturally picked up from the environment. They remain on hair and skin via Van der Waals forces.

   Although rinsing the surface with water can remove some of the dirt, oily deposits will tend to adhere to the more lipophilic surfaces of hair and skin. Surfactants in detergent help get rid of these oily deposits. The lipophilic ends of the molecules are attracted to and align with the lipids on the surface of hair and skin. Meanwhile, the hydrophilic ends of the molecules align toward the surface of these deposits, thereby increasing the hydrophilicity. That allows the lipid deposits to lift off the surface of skin or hair where the rinse water washes them away.

b. **Wetting:** Surfactants are also wetting agents that reduce the contact angle between a solution put on a surface and the surface. This property allows surfactants to spread more easily on the surface and inject themselves between the oily deposit and the skin or hair surface. This lifts up the oil and allows it to be removed. Wetting also makes the product easier to spread and prevents it from balling up on the surface. This is useful in cosmetic creams and lotions.

c. **Foam:** Foam is an important characteristic of cleansing cosmetics. It is formed when air is dispersed in a continuous liquid medium. The air bubbles are surrounded by thin layers of liquid, and the surfactants help stabilize the bubbles that are formed, creating foam. It's important to note that foam doesn't really contribute much to the removal of dirt but consumers like it, so it's very important for a cleansing product to foam.

d. **Thickening:** In a water/surfactant solution in which water is the major ingredient, surfactants align themselves in structures called micelles. These are tiny spherical structures in which the lipophilic tails orient inwards and the polar heads orient outwards toward the water. Micelles are important for the creation of emulsions and for thickening.

   The thickness of a surfactant solution depends on how closely the micelles pack together. Since cleaning products are typically made from charged surfactants, the outer surfaces of the micelles have a specific charge density that causes them to repel other micelles. The more distance between the micelles, the thinner the solution. When

the surface charge density is lowered—by adding salt, for example—the particles pack together more closely, and the solution thickens. For this reason, salt is frequently added to adjust the viscosity of detergent systems.

e. **Emulsification:** Another major application of surfactants to cosmetics is in the creation of semi-stable mixtures of oil and water, or emulsions. Emulsions are the creams and lotions that deliver beneficial lipid materials to the surface of skin and hair. They can be simple oil-in-water or water-in-oil emulsions or more complex multiple emulsions. Each type has benefits that make it ideal for certain cosmetic applications. An entire article can be written about emulsions, but for our purposes, suffice it to say that nearly all creams and lotions are created using surfactants.

Types of surfactants

Surfactants are classified into four types: anionic, amphoteric, cationic & nonionic.

Surfactants can be classified according to the charge of their counter ion or whether they form ions in solution or not, they are anionic surfactants, which have a negatively charged ion. The amphoteric surfactants, which are capable of both positive and negative charges depending on the pH conditions of the solution they are in. The cationic surfactants, which are positively charged. And, finally, nonionic surfactants, which have no charge at all. All four of these surfactant types are used in cosmetics for different reasons.

i. **Anionic:** Anionic surfactants, the most common of which are the alkyl sulfates, are really the primary ingredient used in cleansing products. They are positively charged surfactant ions. Examples include sodium lauryl sulfate and ammonium lauryl sulfate (ALS).

Sometimes anionic surfactants are modified to make them less irritating. For example, ALS is commonly "ethoxylated" by reacting it with ethylene oxide to produce ammonium laureth sulfate. This additional chemical processing makes the final product significantly less irritating and slightly more water soluble.

Nowadays there is a tendency for companies to get away from using ingredients with the name "sulfate" in them, so other options are used. Other anionic surfactants include sulfosuccinates, alkyl benzene sulfanate, acyl methyl taurates, acyl sarcocinates, the isethionates, propyl peptide condensates, monoglyceride sulfates and fatty glycerol, ether sulfanates. These are all anionic surfactants that have been used in shampoos or body washes. Anionics are used primarily as the main detergent in cosmetics because they are good at removing dirt and oil, they produce pleasing amounts of foam,

and they are relatively inexpensive. Their primary drawback is that they can be irritating. This is why they are often blended with amphoteric surfactants.

ii. **Amphoteric:** Amphoteric surfactants can have both a negative charge and a positive charge, depending on the pH. These materials are also referred to as zwitterionic materials, and they include ingredients such as cocamidopropylbetaine, cocoamphopropionate, and sodium lauraminopropionate. These three ingredients are probably the most commonly used amphoteric surfactants in cleansing products, particularly in shampoos.

Amphoterics are used because they have good detergency and are less irritating than the anionic. They also can help thicken a formula and have a positive effect on foam, as they make the bubbles smaller and feel creamier. The main drawback to using them is that they are significantly more expensive and, on their own, don't really foam well enough to produce a good shampoo.

iii. **Nonionic:** Nonionic surfactants are molecules that do not have a charge. When placed in a solution of water, the molecules do not dissociate as the previously mentioned surfactant molecules do. Salt also has no effect on whether these chargeless surfactants thicken or not. Some types include fatty alcohols and fatty alkanolamides, including lauramidediethanolamine (DEA) and cocamide DEA. Other nonionic surfactants found in cosmetics include amine oxides such as lauramine oxide or stearamine oxide.

There are a variety of reasons to use nonionics in cosmetics. They are good foam enhancers (when used with anionic) and can reduce irritation. They also can thicken systems and provide a conditioning effect. Additionally, they are very good for solubilizing fragrances and other natural oils in formulating. Finally, gentle cleansers such as baby shampoos are based on nonionic, the most common of which is PEG-80 sorbitanlaurate. Nonionic surfactants are also the primary surfactants used to create emulsions.

The reason these surfactants aren't used as the primary cleansing surfactant in most formulas is that they don't foam nearly as well on their own and are significantly more expensive. Overall, nonionic do not work as well as anionics in shampoos.

iv. **Cationic:** These are positively charged surfactant molecules. They are not used for cleansing formulas because they don't clean, rinse, or foam as well, and they are more irritating—so they have a lot of drawbacks. They are also not compatible with anionic, so their positive benefits can't be obtained from formulations that also contain an anionic surfactant. That being said, cationic are great for

conditioning. They are substantive during use and are the primary ingredients for rinse-off hair conditioners.

1.2.2 Rheology Modifiers

Rheology can be defined as "the science or study of how things flow", and it is a requirement of personal care products that they flow in the right way. A skin cream should appear highly viscous in the jar but should be capable of being picked up and rubbed into the skin. Nail polish should be sufficiently viscous to suspend the high volume of suspended pigment, not drip from the brush but thin sufficiently on the nails to provide an even coverage without any obvious brush strokes. Rheology modifiers are often referred to as thickeners, and whilst increasing the apparent viscosity will confer a feeling of "quality" to the formulation, this is only one aspect of rheological control. The product itself can be Newtonian or pseudoplastic, thixotropic, is a ringing gel or a stringy flowable liquid. This will then affect the way that the product appears in the bottle, how easy it is to pour or scoop from the packaging, how easy it is to rub into the skin or along the hair shaft, and how easy it is to rinse and remove the product after use. It will also be essential to choose the correct rheological characteristics to ensure the stability of the finished formulation. To achieve such varied effects, a number of different types of rheology modifier are available to the formulator. These include natural gums such as guar and starch, modified naturals such as cellulose derivatives, synthetics such as acrylic polymers and inorganic such as clays.

Rheology Modifying Ingredients for Cosmetics: There are a variety of ways of modifying the viscosity and rheology of cosmetic formulations primarily by choosing ingredients that inherently exhibit particular rheological properties. In addition, there are a variety of formulation additives available which act as rheology modifiers. A few classes of rheology modifiers are:

a. **Mineral Colloidal Systems:** Minerals (naturally sourced) such as Magnesium Aluminum Silicate, Bentonite, and Hectorite can be used to create colloidal systems which impart viscosity in a non-Newtonian manner. Typically synergistic when used with gums (xanthan). They also have a smooth, 'dry' feel. Hydrophobically modified minerals can also provide rheology modification in non-aqueous systems.
b. **Polymeric Thickeners:** These, usually acrylate based polymer thickeners, are cost effective and efficient at low use levels, can provide suspension of particles but can be sensitive to salt content and tend to short, choppy rheology.
c. **Cellulosic Thickeners:** Based on cellulose (wood pulp), these synthetically modified polymers are similar to the polymeric