UNIT-I

INTRODUCTION TO COSMETICS

- Cosmetics are the substances used to enhance or protect the appearance or odour of the human skin.
- Their use is widespread, especially among women.
- Many manufacturers distinguish between decorative cosmetics and care cosmetics.
- Recent years have seen an increasing market for prescription or surgical cosmetic procedures.
    - Range from temporary enhancements, such as cosmetic colored contact lenses, to major cosmetic surgery.
    - Many techniques such as microdermabrasion and physical or chemical peels, remove the oldest top layers of skin cells.
    - The younger layers of skin left behind appear more plump, youthful and soft.
    - Permanent application of pigments (tattooing) is also used cosmetically.
- The manufacture of cosmetics is currently dominated by a small number of multinational corporations that originated in the early 20th century. Spread among wid range of businesses.
- The term cosmetics have been derived from the greek term "**KOSMETICOS**" which means the skill to decorate. Thus cosmetics is the art of decorating yourself to look beautiful.
- **According to D & C Act:-** Cosmetics mean any articles meant to be **rubbed, poured, sprinkled or sprayed on** or **introduced into** or otherwise applied to any part of the human body for **cleansing, beautifying, promoting attractiveness or altering appearance** and include any article intended for use as a component of cosmetic. Soap is not covered under cosmetic product.
- **FDA** defines cosmetics as, "intended to be applied to the human body for cleansing, beautifying, promoting attractiveness or altering the appearance without affecting the body's structure or functions."

CLASSIFICATION OF COSMETICS

(A) Depending on the physical form:

Emulsions e.g. cold cream, vanishing cream

Powders e.g. face powder, talcum powder, tooth powder

Sticks e.g. lipsticks, deodorant sticks

Oils e.g. hair oils

Jellies e.g. hand jelly

Paste e.g. tooth paste, deodorant paste

Soap e.g. shampoo, shaving soap

Solution e.g. after shave solution

Aerosols e.g. after shave spray

(B) Depending on the widely used body parts:

Hair cosmetics

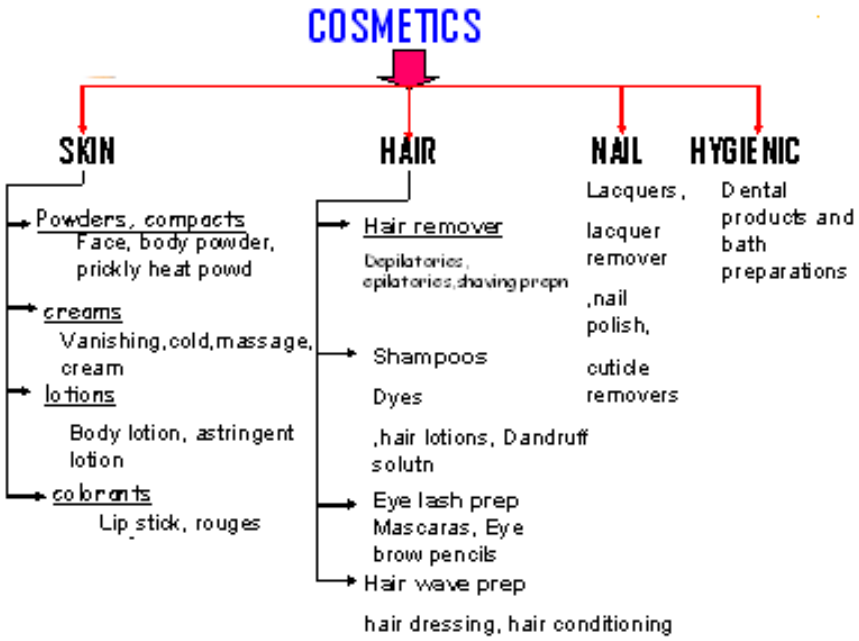
Face cosmetics

Eye make ups

Lip decorators and carers

Nail cosmetics

Skin cosmetics



FUNCTIONAL EXCIPIENTS

The functional ingredients are the ones that actually make the cosmetic product work. These would include the detergents, conditioning agents, moisturizers, colorants in make-ups, and any other active ingredient that provides a benefit to the consumer. To make working products, every cosmetic must have at least one of these ingredients.

COLORANTS:

- It is defined as visual sensation caused by a definite wavelength by an object by one/more phenomenon of emission, reflection, refraction, transmission.
- In many countries colors in cosmetics are listed as numbers from the Color Index International. So for example you will not normally see tartrazine listed in lipstick ingredients, but it may be their listed as C.I. 19140. Erythrosine will be listed as C.I. 45430 and so on. In US and Canada colors are listed as FD and C colors. Tartrazine (E012) is FD and C Yellow 5 and erythrosine 9E127) is FD and C Red 3.
- Colors can be classified into three classes:-

a) Natural colors:-

Plant source :- e.g. Saffron, turmeric, chlorophyll, carotene, indigo etc.

Animal source:-e.g. Cochineal (red), carminic acid (from coccus cacti), tyrian purple (from snail) etc.

Mineral:- e.g. Iron oxides, chromium oxides, carbon black, titanium dioxide, zinc oxide, prissian blue, red oxide of iron, yellow and black oxide of iron etc.

b) Artificial colors:- e.g. caramel

c) Coal tar colors:- Green- Quinazarine, Green S, Green SS, Green F

Yellow- Tartrazine, Sunset Yellow FCF, Quinoline Yellow WS

Orange- Orange G

Red- Amaranth, Erythrosine, Eosin YS or Eosin D, Sudan III, Fast Red E

Blue- Indigocarmine, Brillant Blue FCF

Violet- Alizurol Purple

Brown- Resorcin Brown

Black- Naphthol Blue

PLASTICIZERS:

- A suitable plasticizer is most important component of nail lacquers. Nitrocellulose or other film formers alone, normally, make a dull and brittle film which can easily flake off the nail. Incorporation of a plasticizer imparts the regular flexibility, gloss, adhesion to the nails and reduces its tendency to shrink. It also has effect on viscosity and the volatility or rate of drying.
- Functionwise they can be placed into two categories:

a) Solvent plasticizers, which also act as solvent for film formers.

b) Non-solvent plasticizers, which only act as softener.

- A good plasticizer should have the following characters-

1) Miscible with other ingredients
2) Non-irritating and non-toxic
3) Low volatility
4) Improve the flexibility, gloss and adhesion
5) Should not destabilize the preparation
6) Should not discolour the product
7) Colourless, odourless and stable
8) Improve the viscosity of the preparation

- The plasticizers are, normally, used in 5% of the total mixture or 25 to 30% of the film formers.
- The plasticizers used successfully are dibutyl phthalate, n-butyl stearate, resorcinol diacetate, castor oil, triethyl citrate, camphor or urea derivatives, chlorinated diphenylenes etc.
- Incorporation of acetylated monoglycerides along with other plasticizers improves the flexibility and lasting power.

HUMECTANTS:

- Humectants are frequently used in cosmetics as a way of increasing and maintaining moisture in the skin and hair, in products including shampoo, conditioner, lotions, creams, lip treatments, cleansers, after-sun lotion, and some soaps or body lotions.
- As hygroscopic moisturizers, humectants work by attracting water to the upper layer of the skin (stratum corneum).
- All humectants have common hydroxyl groups which allow them to participate in hydrogen bonding and attract water. This process attracts moisture from the outer layer of the skin or, in high humidity, from the atmosphere. The moisture is then trapped against the epidermis or the shaft of the hair, depending on

where the humectant is applied. Various humectants have different ways of behaving because they differ in water binding capacity at different humidities.

- Glycerin is one of the most popular humectants used because it produces the desired result fairly frequently and is low in cost.
- A category of humectants called nanolipidgels allow skin to retain moisture, but also possess antifungal properties.
- Humectants have been added to skin moisturizing products to treat xerosis. Some moisturizers tend to weaken the skin barrier function, but studies on xerosis have proven that moisturizers containing humectants increase desired moisturizing effects on the affected area without damage to the skin barrier function. In this xerosis treatments study, some "smarting and stinging" was also reported from the use of humectant-rich treatment products.

Type of Humectant	**Examples**
1.Inorganic	Calcium chloride (not used now due to compatibility problems)
2.Metal organic	Sodium lactate (used in sunscreen lotions)
3.Organic	Polyethylene glycol, propylene glycol, polypropylene glycol, hexylene glycol, butylene glycol, glycerol, sorbitol, mannitol, glucose, urea, collagen

THICKENERS:

- One of the requirements of most cosmetic products is that they have an appealing rheology. Thickeners are used very often in various cosmetic products. They enhance the consistency, volume and viscosity of cosmetic products, thereby providing more stability and better performance.
- While some thickeners have also emulsifying or gelling properties, the majority of thickeners have the ability to retain water on the skin and act therefore as moisturizers.

Types of thickeners:

Lipid Thickeners

- Lipid thickeners are primarily composed of lipophillic materials.
- They work by imparting their natural thickness to the formula.
- Typically, these materials are solids at room temperature but are liquified via heat and incorporated into emulsions.
- They are used most often in creams and lotions.
- Some common types include Cetyl Alcohol, Stearyl Alcohol, Carnauba Wax, and Stearic acid.

Naturally derived thickeners

- Various thickeners are found in nature or are derivatives of natural thickeners. These ingredients are polymers that work by absorbing water to swell up and increase viscosity.
- Cellulose derivatives like Hydroxyethylcellulose are frequently used in liquid cleansing products such as shampoo or body wash.
- Guar gum is another example of a naturally derived thickener.

- Others include Locust Bean Gum, Xanthan Gum, and Gelatin.
- These thickeners can be used in any formula that contains a high level of water. Unfortunately, they can be inconsistent, cause clear formulas to become cloudy, and feel sticky on skin.

Mineral thickeners

- Mineral thickeners are naturally occurring, mined ingredients that can absorb water or oils and boost viscosity.
- They give a different kind of viscosity than the natural gums.
- Materials include Silica, Bentonite, and Magnesium Aluminum Silicate.
- These thickeners can be used to thicken oils as well as water based formulations.

Synthetic thickeners

- Perhaps the most versatile of all thickeners are the synthetic molecules.
- Carbomer is the most common example. It is a water-swellable acrylic acid polymer that can be used to form crystal clear gels.
- They have a desirable feel which makes them superior to other thickening agents that leave a sticky feel.
- Carbomer thickeners also have the ability to suspend materials in solution so you can have low viscosity formulas with large particles suspended.
- These thickeners also help to stabilize emulsions and are frequently used in lotion and cream products.

Ionic thickening

- The most common thickeners for surfactant solutions.
- Simply adding Salt (NaCl) you can get an anionic surfactant solution to become thicker.
- In fact, salt is frequently used as an adjusting agent during production.

PERFUMES:

- The word perfume has been derived from "per" means through and "fumum" means smoke. It suggests that early perfumes were pleasant smells obtained by burning wood and grass etc.

Source of perfume	**Example**
Natural (Animal source)	Musk ,civet, Ambergris, Castroreum etc.
Natural (Plant source)	Rose ,jasmine, lemon, lavender etc.
Aroma chemical	Eugenol, Farnesal, Rose oxide, Citral ,Limonene
Floral base	Rose base, Jasmine base
Woody base	Citrus base(in colognes),spice base, oriental base, fruity base ,etc

BRIEF STUDY OF SKIN STRUCTURE

SKIN FACTS

- Skin care is a multi-billion dollar business.
- Skin is the largest organ of the human body.
- We loose about 50 million skin cells a day.

FUNCTIONS

- Protection
- Sensation
- Heat regulation
- Excretion
- Secretion
- Absorption

THREE MAIN LAYERS

- Epidermis
- Dermis
- Subcutaneous

EPIDERMIS:

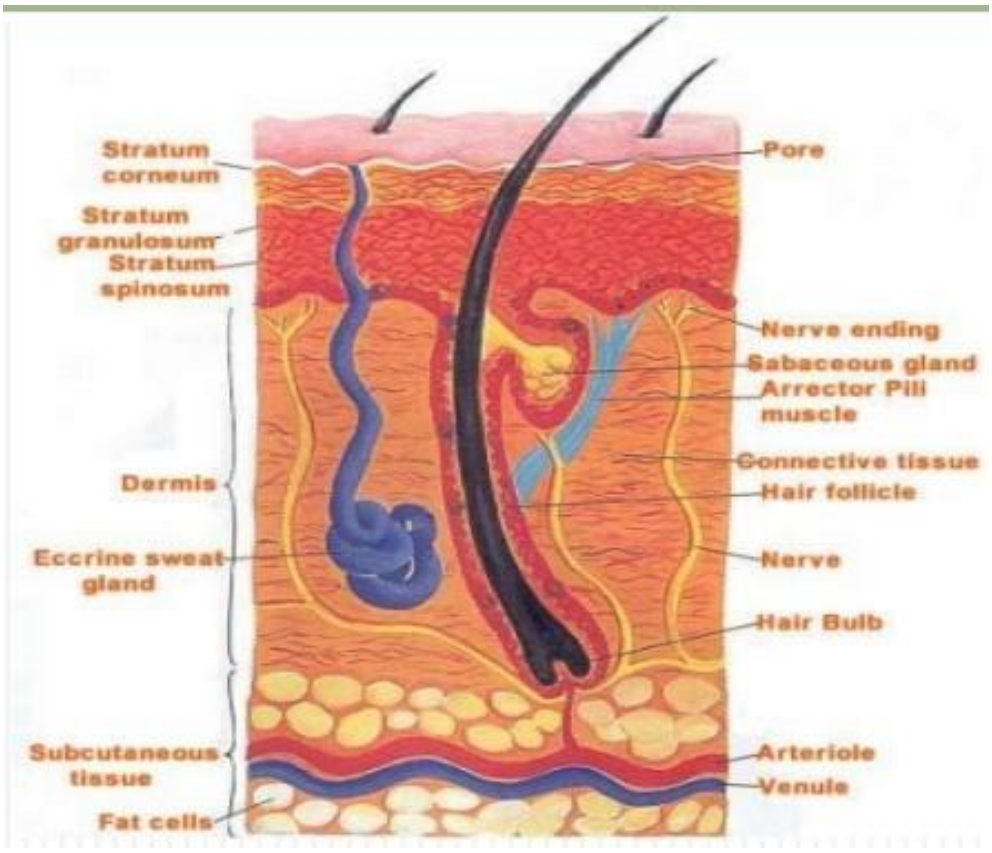
- Outermost layer (cuticle)
- No blood vessels
- Small nerve endings
- Consists of-
    - **Keratinocytes:** - about 90%of the cells in the epidermis

      -produces tough, fibrous protein called **'keratin'**
    - **Melanocytes:** - produce a dark pigment called **'melanin'**
    - **Langerhans cells:** - immune cells
    - **Merkel cell :** - found in sensitive, hairless areas such as fingertips and lips
- **5 layers:**
    1. Stratum corneum (The horny layer)
    2. Stratum lucidus- in the palm of the hand and sole of the foot
    3. Stratum granulosum (granular layer)
    4. Stratum spinosum (prickly cell layer)
    5. Stratum germinativum (basal layer and dermoepidermal junction)

DERMIS:

- Above subcutaneous layer
- Sensitive layer of connective tissues that contains-
    - Blood vessels
    - Lymph vessels
    - Nerves
    - Sudoriferous glands- sweat
    - Sebaceous glands- oil
    - Hair follicles
    - Arrector pili muscles
    - papillae
- Two layers- Reticular (deeper)

  -Papillary(dermal, papillae, tactile corpuscles, melanin)
- Collagen fibres and elastin allow skin to stretch and contract as necessary
- Weakenend fibres=wrinkles



SUBCUTANEOUS LAYER:

- Fatty layer, also called adipose
- Bottom most layer of the skin
- Varies in thickness
- Gives smoothness and contour to the body
- Energy source
- Protective cushion for the outer skin

DERMAL/PERCUTANEOUS ABSORPTION

- Skin **absorption** is a route by which substances can enter the body through the skin.
- Along with inhalation, ingestion and injection, dermal absorption is a route of exposure for toxic substances and route of administration for medication.
- Skin (percutaneous, dermal) absorption is a term that describes the transport of chemicals from the outer surface of the skin both into the skin and into circulation.
- Skin absorption relates to the degree of exposure to and possible effect of a substance which may enter the body through the skin.
- Human skin comes into contact with many agents intentionally and unintentionally.
- Skin absorption can occur from occupational, environmental, or consumer skin exposure to chemicals, cosmetics, or pharmaceutical products.
- Some chemicals can be absorbed in enough quantity to cause detrimental systemic effects.

- Skin disease (dermatitis) is considered one of the most common occupational diseases.
- In order to assess if a chemical can be a risk of either causing dermatitis or other more systemic effects and how that risk may be reduced one must know the extent to which it is absorbed, thus dermal exposure is a key aspect of human health risk assessment.

Factors influencing absorption

Absorption of substances through the skin depends on a number of factors:

- Concentration
- Molecular Weight of the molecule
- Duration of contact
- Solubility of medication
- Physical condition of the skin
- Part of the body exposed including the amount of hair on the skin.

Structures influencing absorption

- To be absorbed through the skin, a chemical must pass through the epidermis, glands, or hair follicles.
- Sweat glands and hair follicles make up about 0.1 to 1.0 percent of the total skin surface.
- Though small amounts of chemicals may enter the body rapidly through the glands or hair follicles, they are primarily absorbed through the epidermis.
- Chemicals must pass through the seven cell layers of epidermis before entering the dermis where they can enter the blood stream or lymph and circulate to other areas of the body.
- Toxins and toxicants can move through the layers by passive diffusion.
- The stratum corneum is the outermost layer of the epidermis and the rate-limiting barrier in absorption of an agent.
- Thus, how quickly something passes through this thicker outer layer determines the overall absorption.
- The stratum corneum is primarily composed of lipophilic cholesterol, cholesterol esters and ceramides.
- Thus lipid-soluble chemicals make it through the layer and into the circulation faster, however nearly all molecules penetrate it to some minimal degree.

Conditions affecting skin absorption

- Agents that injure the stratum corneum, such as strong acids, are absorbed faster than chemicals that do not.
- Skin damage due to burns, abrasions, wounds and skin diseases also increase absorption.
- Thus populations with skin damage may be more susceptible to adverse effects of agents that are absorbed through the skin.
- Certain solvents like dimethyl sulfoxide (DMSO) act as carriers and are frequently used to transport medication through the skin. DMSO increases the permeability of the stratum corneum.
- Surfactants like sodium lauryl-sulfate increase the skin penetration of water-soluble substances, possibly by increasing the skin permeability of water.