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COSMETIC PREPARATION

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- **Cosmetics** are defined as the Preparations intended to be rubbed or sprinkled or applied to any part of the external surfaces of the human body (Face, lips, nails) for cleansing, beautifying, promoting attractiveness or perfuming or protecting or altering the appearance or masking the body odour.
- Generally Cosmetic preparations are not used to prevent or treat any disease
- **Cosmetology** is defined as the science that deals with the laws governing the production, storage and application of cosmetic products

CLASSIFICATION OF COSMETIC PREPARATION

On the basis of Physical form, It is classified into

- Oils - Eg: Hair oils
- Emulsions - Eg: Cold Cream, Vanishing cream, Cleansing cream
- Suspensions - Eg: Calamine Lotion
- Pastes - Eg: Tooth paste
- Sticks - Eg: Lipstick
- Jellies - Eg: Brilliantine jelly
- Cakes - Rouge compacts, makeup compacts
- Powders - Face powder, Tooth powder
- Solutions - After shave lotions, Astringent lotions

- **On the basis of application in the organ**, it is classified into
- Cosmetics for Skin - Eg: Powders, Creams, Lotions, Suntan preparations
- Cosmetics for hairs - Eg: Shampoos, hair tonics, Shaving creams, Depilatories
- Cosmetics for nails - Eg: Nail polishes and polish removers, Manicure preparations
- Cosmetics for teeth and mouth - Eg: Dentrifices and Mouth washes
- For baby preparation Eg: Baby powders, Baby oils, Baby shampoos
- Other cosmetics Eg: Eye preparations, Foot powders etc

LIPSTICK

- It is the cosmetic preparation prepared by disperion of colouring matter in a base consisting of mixture of oils, fats and waxes which are moulded into sticks.

Uses:

- To give attractive colour and appearance to the lips
- To prevent cracking and chapping of lips
- For emollient action (Soft and prevent drying)

Ideal Characteristics

- Free from grittiness
- Should have uniform color
- Stable through out the shelf life
- Should be safe dermotologically
- Should be easily apply

Formulation of Lipstick

Colouring agents:

- Colour is imparted to the lips in two ways
  - a) By staining the skin in which dye to be penetrate into the outer surface of lips
  - b) By covering lips with dye which hide roughness of lips
- Soluble dyes like methylene blue, Brilliant green, Erythrosine red
- Insoluble dyes like iron oxide colours, calcium, Barium, Strontium lakes of red

Bases:

- These are used to give proper consistency to the preparations.
- Oils, fats and waxes are used as bases in lipsticks.
- It produces greasy and emollient action which keep the lips soft and moist in appearance.
- Eg: Bees wax, Carnauba wax, Ozokerite, Hydrogenated Castor oil, Petroleum jelly, Liquid paraffin, Wool fat (Lanolin), Cetyl alcohol, Lecithin

Dye stuff Solvents

- For dissolving the colouring agents
- To give plasticity to the lipsticks
- Eg: Tetra hydro furfuryl esters, Polyethylene glycols

Wetting agents:

- Used to soubilize the dyestuff and improve the staining power
- Eg: Loramine wax, Polyethylene glycols

Preservatives:

- Prevents the microbial growth
- Eg: Methyl paraben, Propyl paraben

Fragrance:

- Mask the fatty odour of the base
- Eg: Rose oil, Jasmine oil

Method of Preparation of Lipstick

Formula

Color	%	Wax & Oils &	%	Other ingredients	%
Eosin	2%	Beeswax	20%	Methyl paraben	0.8%
Eosol	22%	Lanolin	10%	Propyl paraben	0.2%
Titanium dioxide	8%	Ozokerite	6%		
Solvent		Cetyl alcohol	2%		
Polyethylene Glycol	10%	Liquid Paraffin	10%		
		Castor Oil	10%		

- Colouring agent is **dissolved** in Solvent. Then add other ingredients in solution and mix well.
- Wax and fats are **melted** separately. The melted base added to the dye stuffs.
- The whole contents are **milled** for several times to get smooth appearance
- Vaccum is applied to remove air.
- Perfume is added to the mass and **poured** into the moulds
- Moulds are chilled. By this sticks are formed.
- Then the sticks are removed and inserted in holders.
- Finally these are passed through flame for perfect and smooth finish.

Defects in Lipsticks

Formulation related

- **Sweating:** Due to high oil content or inferior oil blending capacity
- **Bleeding:** Separation of color from waxy base
- **Blooming:** Dull appearance instead of glossy appearance
- **Streaking:** Thin line of different color appears to the surface of finished products

Mould related

- **Laddering:** Ladder like appearance after congealing and setting due to uneven melting and cooling
- **Deformation:** Deformed structure appear on sides of lipsticks
- **Catering:** Dimples or spots appeared on the surface of lipstikcs.
- **Mushy failure:** Central core of stick are not strong enough to hold the base.

Evaluation

- **Color Control:** Dispersion of pigment is checked stringently. It is checked by Calorimetric equipment. This provides the numerical reading of color shades. Matching the colour shades visually.
- **Melting Point:** Lipstick base should have melting point 55 C to 75C. It is measured by capillary tube temperature method.
- **Softening Point:** Lipstick should be resistant to varying temp both hot and cold weather. It is measured by Ring and Ball method.
- **Microbial testing:** Known amount of mass is placed in two culture media and analysed for suitable growth of bacteria and fungi. Limit is NMT 100 microorganism per gram.
- **Rancidity:** Rancidity is due to decomposition of fats, oils and lipids by hydrolysis or oxidation. It leads to color change, bad odour and taste. It is determined by its peroxide number
- **Breaking Load Test:** To find out the value of maximum load that a lipstick can withstand before it breaks.
- **Rupture test:** Crushing or rupturing of lipstick is measured when it is placed inbetween the two holders which contain weight.

SHAMPOO

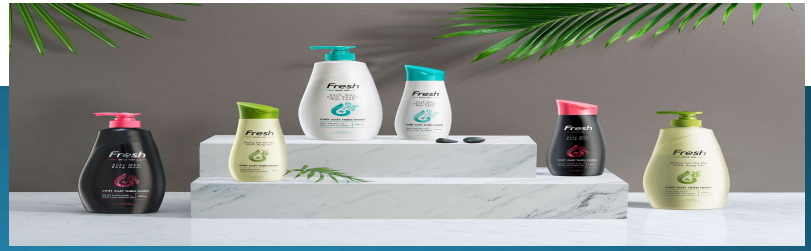
- Shampoos are cleansing agents containing synthetic detergents with various additives. After shampooing, it leaves the hair soft, nonsticky and free from oils, dirt, dandruff, pollutants and contaminant particles.

Functions of Shampoo:

- Cleaning agent - Removes dust and excess oils from the hair.
- Anitseborrhoeic agent - Agents used to prevent excessive secretion of sebum
- Antidandruff agents - This will treat dandruff and pruritis which are associated with fungal infections.
- Keratolytic agents - They remove the hard scales from the scalp.

Ideal properties

- Easily soluble even in hard water
- Easy spreading; no damage to hair, low toxicity, minimum eye irritation
- Good foaming ability
- Slightly acidic. Since basic environment weakens the hair by breaking disulfide bond of hair keratin.



Formulation of Shampoo

- **Detergents:** Used to clean the hair. Surfactants like Anionic surfactants (Sodium Lauryl sulphate, Alkyl polyethylene glycol sulphates, alpha olefin sulphate), Non ionic surfactant (Amineoxides, Fatty acid alkanolamides), Cationic surfactants (Alkyl amines, Ethoxylated amines, Alkyl betains), Amphoteric surfactants.
- **Foam Boosters:** Stabilize the foam produced by surfactants Eg. Fatty acid alkanolamides, amine oxides.
- **Disinfectants and Germicides:** Used to prevent itching caused by bacteria. Eg: Hexachlorphene, Dichlorophene
- **Antidandruff agents:** To prevent formation of scaly scurf on skin under the hair Eg: Benzalkonium chloride, Cetrimide, Hyamines
- **Conditioning agents:** Gives smoothness and softness to the hair. Also known as pearlescent agents. Eg: Lanolin, Mineral oils, aminoacids
- **Preservatives:** Prevent microbial growth Eg: Parabens, PMN, PMA
- **Sequestering agent:** Prevent the calcium and magnesium like salts present in water which deposit on the hair Eg: EDTA, Pyrophosphates
- **Coloring agent:** Give attractive appearance to the formulation. Eg: Water soluble colours
- **pH modifier:** To make the formulation slightly acidic Eg: Citric acid, acetic acid
- **Perfumes:** To provide pleasant feeling. Eg: Lavendar oil, Rosemary oil, Jasmine oil are used

Preparation and Evaluation of Shampoo

PREPARATION OF SHAMPOO: (Antidandruff Shampoo)

- Dissolve Part A in Water, heat at 40 C
- Dissolve Part B in water, heat at 40 C
- Mix these two phase at same temperature
- Make up the volume with water and mix well
- Cool the mixture and add perfume

EVALUATION/ QUALITY CONTROL TEST OF SHAMPOO

- Determination of pH
- Determination of solid content
- Foam Formation, Foam Quality and Retention test
- Viscosity
- Dirt dispersion
- Skin and Eye irritation test

FORMULA
Part A
Triethanolamine lauryl sulphate
Lauric monoethanolamide
Preservative
Color
Water
Part B
Hexachlorophane
Water
Part C
Water
Perfume

COLD CREAM

- This will produce smooth skin and also remove makeup. It produces cooling effect because slow evaporation of water present in emulsion. It is Water in oil type of emulsion

FORMULATION OR COMPOSITION

- Base: It melts at 70 °C and form smooth cream at room temperature when it mixed with suffecient amount of water
  Eg: Stearic acid, Cetosteryl alcohol, Cetomacrogol
- Emulsifying agent: Spans, Polysorbates
- Alkalis: Borax, Sodium hydroxide and Potassium hydroxide
- Preservatives: Parabens, Sodium Benzoate, Boronpol
- pH modifier: Sodium hydroxide, lactic acid

METHOD OF PREPARATION

- Melt Oil soluble ingredients at 70 °C
- Dissolve water soluble ingredients and heat at 70 °C
- Mix oil phase and water phase at same temperature and mix well
- Borax reacts with fatty acids from waxes and oils and forms soap which act as self emulsifying agent
- Cool the mixture and add perfume

EVALUATION

- Viscosity, Skin irritation
- Microbial growth and Rancidity
- Color and Physical appearance

FORMULA
Oil Soluble ingredients
Bees Wax
Mineral Oil
Paraffin Wax
Cetyl alcohol
Water Soluble ingredients
Borax
Preservative
Water
Perfume

VANISHING CREAM

- These are referred as Day creams. This provide emollient and protective action to the skin by forming occlusive film on the skin.
- They are oil in Wate type of emulsion. When applied on the surface of skin, it will disappear immediately and form thin film which is not visible to naked eye. Hence it is known as Vanishing cream.

FORMULATION OF VANISHING CREAM

- Main ingredient: Stearic acid, water and soap are basic constituents of stearate based creams. Soap is formed in-situ by the reaction between suitable alkali and stearic acid.
- Humectants: It prevents excessive drying out of cream. Eg: Glycerin, Sorbitol and propylene glycol
- Alkali: Potassium hydroxide, Borax, Sodium hydroxide, Sodium carbonate, Triethanolamine
- Emulsifying agent: Polysorbates, spans
- Preservatives: Parabens, Benzoates
- Perfume: Lavener oil, Terpineol, Sandal wood oil
- Purified Water

PREPARATION OF VANISHING CREAM

- Stearic acid is melted to 70C
- KOH, Methyl paraben, Glycerin dissolved in water and heated to 70C
- Two phases are mixed at same temperature and mix well
- Cool the mixture to 50 C and add the perfume.

EVALUATION

- Viscosity, Skin irritation
- Microbial growth, Color and Appearance test.

Formula
Water Soluble ingredients
Stearic acid
Oil soluble ingredients
Glycerin
Methyl paraben
KOH
Water
Perfume

TOOTH PASTE

- It is a paste or gel dentrifice used with tooth brush to clean and remove the food debris and plaque adhere to the surface of the teeth.

Formulation or Compostion of Tooth paste

- Abrasives: Used to clean and polish the teeth and remove the debris. Eg: Calcium carbonate (Precipitated chalk), Dicalcium phosphate dihydrate, Tricalcium phosphate.
- Detergents: Used to produce foam and reduce the surface tension of adherents and staining. Eg: SLS, Sodium N lauryl Sarcosinate
- Humectants: Prevents drying of formulation. Eg: Glycerin, Sorbitol, Propylene glycol
- Binders: Give good consistency to the preparation. They provide protective colloidal effect stabilises and thicken the preparation. Eg: Tragacanth, Acacia, Carboxymethyl cellulose, Guar gum, Carageenan etc.
- Flavoring agents: They give good flavor and freshness to the preparation. Eg: Peppermint oil, Lavendar oil, Clove oil, Menthol
- Sweetening agents: Give pleasant taste to the preparation. Eg: Saccharine, Sodium cyclamate
- Preservatives: Binding agent in the form of mucilage will support microbial growth. To prevent microbial growth, preservatives are added. Eg: Parabens, Formalin, Benzoates
- Corrosion inhibitor: To prevent corrosion to the aluminium tube, Sodium silicate, silica are added.
- Colours: Erthyrosine, Eosin, Carmine are used to improve the appearance and palatability
- Flouride Actves: Increase resistance to enamel solubility. Eg: NaF, MFP

Formulation, Preparation & Evaluation of Tooth Paste

PREPARATION OF TOOTH PASTE

- Glycerol + Sorbitol + Preservative + SCMC → Mucilage
- Add Sod. Saccharine → Mass
- Abrasive + SLS → Mass
- Add mineral oil, peppermint oil to above solution

Tooth paste as Therapeutic agent

- Anticaries agent - Fluoride
- Antiplaque agent - Triclosan, SLS, Zn,Sn ions
- Anticalculus agent - Pyrophosphate, Zinc
- Antidentine hypersensitivity agent - Potassium salts
- Whitening agents - Dimethicone, Papain

EVALUATION OF TOOTH PASTE

- Test for abrasiveness
- Particle size
- Cleansing property
- Test for flouride
- Consistency, pH and Foaming character and stability of Foam
- Limit test for Arsenic and Lead, Volatile matters and moisture

FORMULA
Abrasives - 20-40%
Calcium Carbonate
Dicalcium Phosphate
Detergent and Binder - 1-2%
Sodium lauryl sulphate
Sodium carboxy methy cellulose
Sweetener & Preservative 1-2%
Sodium Saccharine
Methyl Paraben
Humectants - 20-40%
Glycerin
Sorbitol
Mineral oil
Water - 20%

HAIR DYES

- These are colourants or the cosmetic preparations which are used to change the natural hair color and to mask the greying of hair

Ideal properties

- Color distribution should be even
- Should not damage the hair and scalp
- Should remain for longer duration
- Natural moisture of hair should be retained

Formulation depends on the Classification of hair dye:

1. Temporary hair colourants
2. Semi permanent hair colourants/ Direct dyes
3. Oxidative dyeing systems
4. Gradual hair colorants
5. Natural dyes

Temporary hair colorants:

- They are leave in preparation. Not rinsed after application.
- Absorbed into the cuticle and cannot enter into the cortex of hair.
- It consists of dyestuff and acid. Dyes are azodyes, anthroquinone dyes, benzoquinoneimine dye, Triphenyl methane dye.
- Available in Powder, Crayons, Liquids and Shampoos.

Semipermanent Hair Colourants/ Direct dyes:

- Retain color for longer duration.
- Doesnot contain H2O2 and so it doesnt get bleached
- Composition of semipermanent hair colorants are
- Dye - O nitro anilines, Aminonitrophenols & their ethers, Azo dyes, Nitrodiphenylamine, Anthroquinone
- Aliphatic primary amines, Fatty acid, Thickener, Surfactant
- Water, Organic solvent,Perfume

Oxidative Dyeing Systems

- Also called Para dyes. Colorants are based on chemical reaction, produces color.
- Mostly oxidation, coupling and condensation reactions involved
- Composition are,
- Dyes - Aromatic compounds, Resorcinol, m-phenylene diamine, Diaminoanisole, hydrogen peroxide
- Vehicles - Water, Ethyl alcohol, Glycerine, Ethylene glycol monostearate
- Alkalis - Oxidation dyes are active in alkaline medium Eg: Ammonium hydroxide, Amm. Carbonate, Mono ethanol amine, Guanidine or Arginine, Diethanol amine
- Oxidizing agent - Induces the oxidation reaction with hair Eg: Ferric chloride, Kmno4, H2O2
- Antioxidant - During manufacturing, the amino dyes are darken in presence of air. Nitrogen is supplied in manufacturing vessel or Sodium sulfite are added

Gradual Colourant:

- This colorants require several applications on hairs to achieve required darkness
- It contains heavy metals like Lead, Bismuth salts in their composition
- But it produces negative effect on health

Natural dyes:

- Plant contain color pigments, which are used as Hair colorants
- It has very less side effects
- Henna: Leaves are powdered and it is mixed with water to form paste. It gives reddish to reddish brown color to the hair. Active constituent is 2 hydroxy 14 napthoquinone (Lawsone). Indigo leaves or synthetic indigo is added to henna to alter the color
- Chamomile: Flowers of chamomile are used to obtaine the colour. Powder is mixed with hot water to form paste. Navy blue color is achieved

Preparation or Manufacturing of Hair dye:

- Dye chemicals premixed with hot water
- Other ingredients like alkalis, surfactants, oxidizing agent, viscosity enhancer and buffers are dissolved in suitable solvents
- Dye Premix and Other mixtures are pumped in to manufacturing vessel and mix well.
- Remaining volume is makeup with water

EVALUATION

- pH, Viscosity
- Assay for H2O2
- Residue on ignition

SUNSCREENS

- It is a lotion or spray or gel that absorbs or reflects the sun's ultraviolet radiation and prevents the damaging effect of it.
- They can be used as Sunblock or sunscreens
- UV rays damage the skin cells and DNA in the form of Sagging, Wrinkling and Photo carcinogenesis
- UV light is artificially divided into 3 ranges
- UVA → 320-400 nm → Low energy → prevented by Ozone layer, doesnot reach the earth
- UVB → 290-320 nm → High Energy → Cause more immediate damage (Sun burn, Skin cancer)
- UVC → 100-290 nm → Very High Energy → DNA Damage

Mechanism or Principle of Sunscreens

- By reflecting or absorbing UV rays. Eg: ZnO and TiO_2
- Filter the mid range UV rays (UVB). But allow the other range. All suntan preparations based on this principle. Eg: Chromophores, Inorganic particles
- Biologically active substances which prevents inflammation due to rays. Antihistamines substances are used to prevent inflammation
- By tanning the skin, which prevents the sun burn Eg: Dioxyacetone, Methoxypsoralene are taken 2 hrs before exposure to skin which induces tanning and avoids sunburn.

Ideal properties:

- Should be safe, chemically inert, non irritating and non toxic, Stable to heat, light and perspiration
- Retain the sunscreen property for several hours, Non stain and not be absorbed into the skin.
- Absorb UV rays in wide range

Classification of Sunscreens

- Physical preparation: Opaque formulation contains TiO_2, Talc, Kaolin, Zinc oxide, Ferric chloride, Which reflects the UV radiation due to large particle size
  Chemical Preparation: It contains PABA and its esters, Benzophenones, Cinnamates, Salicylates, Anthranilates which absorb UV radiation

SPF and Important of SPF

- SPF - Sun Protection Factor = $\frac{\text{Minimal Erythymeal dose for Product applied Protected Skin (MED - PS)}}{\text{Minimal Erythmeal dose for Product not applied unprotected Skin (MED - US)}}$
- Types of SPF

Type	Description	SPF Number	Character
I	Burn the skin easily & never tans	> 8	Sensitive
II	Burn the skin easily & minimum tan	6-7	Sensitive
III	Burn moderately & tan gradually	4-5	Normal
IV	Burn minimally & tans well	2-3	Normal
V	Barely burns & tans immediately	2	Insensitive
VI	Never burns & deeply pigmented	None	Insensitive

Formulation & Preparation of Sunscreen

- Suitable base may be Aqueous, Alcoholic, Fats, Natural oils coconut oil, peanut oil, olive oil have absorption ability of UV light.
- Antioxidants also used in the preparation

Preparation or Manufacturing of Sunscreen: The product can be

- Aqueous or Oil type: Mixing and Dissolving the sunscreen and other ingredients in vehicle (Water and Oil). Perfume added atlast
- Cream type: These are emulsion type.
- Lotions type: These are solution type or emulsion type
- Gel type: Solution based Viscous preparation.

Preparation:

- Cetyl alcohol + Benzophenone + Ethyl hexyl methoxy cinnamate + Stearic acid + Glycerin + Stearyl Dimethicone Silicate → Melt in beaker
- Water + Triethanolamine → Taken in beaker → Heat to 80-85C
- Melted content is addded to the hot water solution slowly and stirred well
- Mixture is cooled to get uniform smooth cream.

FORMULA
Cetyl alcohol - 2%
Benzophenone - 1.5%
Ethyl hexyl methoxy cinnamate - 1.5%
Stearic acid - 4%
Glycerin - 2%
Triethanolamine - 1%
Water - 78%
Stearyl Dimethicone Silicate - 10%

Evaluation of Suncreen

- Spectrophotometric evaluation: This will evaluate the UV absorption ability using UV Spectrophotometer
- Erythmeal damage: Erythema is estimated when the solar energy transmitted thro film of suntan preparation
- Sunscreen index - measurement of absorption coeffecient at 308 nm (Which is the effective UV rays wavelength which cause sun burn)
- Invivo skin testing - Sunscreens applied on the rabbit skin and exposed to radiation along with control unprotected skin for a period of time. The effects are observed at the end of period.