

**INDUSTRIAL PHARMACY-I****UNIT V- Cosmetics,Pharmaceutical aerosols,Packaging material science****CLASS:36****Topic: Cosmetics: Formulation and preparation of lipsticks, Shampoos, Cold cream and Vanishing cream,**

Cosmetic product" can be defined as "any substance or preparation intended to be put in contact with the different superficial parts of the human body (epidermis, head and body hair, nails, lips and external genital organs), or with the teeth and the mucous membrane of the mouth in order to exclusively or generally clean, perfume, modify their appearance and/or correct body odors, and/or protect or keep them in good condition“.

- The skin care creams can be classified on the following basis:-
- According to emulsion type:
- W/O creams -Cold cream
- O/W creams -Vanishing cream

Cold cream is water in oil type of emulsion. Cold cream has emollient action and prevents dehydration of skin.

- Cold cream is called cold cream because breaking up of emulsion on application to skin leads to evaporation of water giving cooling effect which is produced from slow evaporation of the water contained in the emulsion

**Purpose of cold cream**

- To protect skin from dehydration
- Prevents the roughness and maintains smoothness due to its emollient property.
- Protects skin from rupture or crack formation.
- Oil phase of cream gives emolliency to the skin.
- Gives elegancy to the skin.

**Ideal characteristics of cold cream**

- Should have optimum pH (4.6-6).
- Consistency should be optimum
- Should not be sticky
- Should be attractive in appearance
- Penetration through epidermis of skin should be desirable.
- Must be non-irritant and non-inflammatory.
- Should give cooling effects.

#### **Ingredients used for preparation of cold cream**

- **Mineral oil** ( liquid paraffin )
- **White beeswax** : Thickening agent and emulsifier (Base for the cream)
- **Borax**: Used as emulsifier and responsible for the whiteness of cold cream.
- **Alcohol, glycerin, and lanolin**
- **Perfume**: Provides Fragrance

#### **Cold cream**

Type of Emulsion –

- Water in Oil
- Beeswax acts as base for the cream.
- Borax is used as a preservative.
- White beeswax-20g
- Mineral oil-50g
- Water-28.8g
- Borax-0.7g
- Perfume-0.5g

#### **PROCEDURE**

- Heat the mineral oil and beeswax in a jacketed vessel at 75°C and maintain heat.

- In another container, dissolve borax and preservative in water and heat to 75°C (Aqueous phase).
- Slowly add this aqueous phase to the mineral oil-beeswax heated oily phase.

Cool to 35°C and add perfume

### **Evaluation of coldcream**

(i) Morphological Observation

(ii) Spreadability Test

(iii) Washability

(iv) Irritation

(v) pH Prepared Cold Cream

### **Vanishing cream**

- Vanishing cream is **oil in water emulsions** that contains large percentages of water and stearic acid or other oleaginous components.
- After application, the continuous phase evaporates, leaving behind a thin residue film of the stearic acid.

### **Ideal properties of vanishing cream**

- High melting point
- Pure whiteness
- Very little odor and low iodine number
- Rubbed easily on the skin

### **MAJOR INGREDIENTS**

Stearic acid

- Major component of vanishing cream and it governs the consistency of the cream

Soap formed in-situ by the reaction between a suitable alkali and stearic acid determines hardness of the cream.

### **Humectants**

- It is added to prevent excessive drying out of cream
- Glycerol most favored followed by sorbitol and propylene glycol

### **Alkali**

- Potassium hydroxide, sodium hydroxide, sodium carbonate, triethanolamine and borax are few examples of alkali used in vanishing cream.
- Potassium hydroxide is mostly used since makes a cream of fine texture without excessive harshness.
- Sodium or potassium hydroxide when used alone forms hard cream hence used always in combination.
- Borax used in combination with potassium hydroxide or triethanolamine to form white emulsion.

### **PROCEDURE**

- Dissolve the sodium hydroxide and potassium hydroxide in water, add glycerol and preservative and heat to 80°C.
- In another vessel, melt the stearic acid, cetyl alcohol and isopropyl myristate (oily phase) and heat to 75°C. Add the alkali solution to the melted oily phase with good agitation.
- The polyol (glycerol) prevents loss of moisture.
- Sodium stearate crystals give pearly shine.
- When the mixture is cooled to about 45°C, add the perfume and continue slow mixing until cool.
- Cover and let it stand overnight. Remix briefly next day before pack

### **Evaluation of vanishing cream**

- (I) Physical observation •
- (Ii) Spreadability test •
- (Iii) Washablity •
- (Iv) Irritation •
- (V) Vanishablity Prepared Vanishing Cream
- Rheology

## Shampoo

- Shampoo is a cosmetic preparation, basically used to provide cleansing action to hairs.
- It includes removal of dust oil, sebum and any other debris and prevent their redeposition.
- Modern shampoos are expected to be much more than just providing cleansing action.
- They are expected to not dry out the hair and to produce lather in hard and soft water when applied to oily hair.

### Requirements of Shampoo:

- It should effectively and completely remove dust or soil, **excessive sebum** or other fatty substances and loose corneal cells from the hair.
- It should produce a good amount of foam to satisfy the psychological requirements of the user.
- It should be easily removed on rinsing with water.
- It should leave the hair **non -dry, soft, lustrous** with good manageability and minimum fly away.
- It should impart a **pleasant fragrance** to the hair.
- It should not cause any side -effects / irritation to skin or eye.
- It should not make the hand rough and chapped

### Raw materials used in the preparation of shampoo

- **Cleansing agents:** The cleaning action of shampoo to the hair is due to the detergent.
- A detergent molecule in a shampoo works as a surfactant, meaning it lowers the surface tension between the water and the sebum.
- So surfactants are used for this purpose.
- Different types of surfactants like anionic cationic and nonionic surfactants are used based on their efficiency and compatibility with other ingredients used.

### Surfactants

- Cationic: alkyl amines, alkyl imidazolines

- Anionic :alkyl sulphate,alkyl ether sulfate
- Amphoteric surfactant:acyl amino acids
- Non ionic:alkanol amides

### **Thickening agents**

- Shampoos need an optimum viscosity necessary for easy application into the hair.
- So the correct blend of different viscosity building agents is required so that the shampoo is not too thin and not too thick.
- If it is too thin it will be drained out easily during application to the hair and if it is too thick it will be difficult to apply it on hairs.
- **Cellulose derivatives** and **Polymers of acrylic acid** and **vinyl pyrrolidone** have been employed to enhance the viscosity of shampoos

### **Aesthetic additives**

- These include additives which enhance the appearance, color, and smell of the mixture.
- These additives are used to improve the hair condition so that the customer can get a good feel of the shampoo itself.
- Some additives can also control the acidity of the shampoo by obtaining a goal pH level, typically around a value of 4.
- Examples of such additives include polyquaterniums, silicone additives, proteins and amino acids, ceramides, panthenol, glutamic acid derivatives.

### **Conditioning agents**

- Conditioning agents are used to provide the strength to hairs (Mechanical and chemical both).
- Combing and brushing damages the hairs due to its mechanical stress or due to chemical treatments such as permanent hair waving and colouring.
- Examples of conditioning agents includes fatty substances such as vegetable oils, wax, lecithin and lanolin derivatives, protein hydrolysates (collagen, silk, animal proteins), quaternary ammonium compounds, silicones and dimethiconolpolyols.
- These agents greatly improve combing and antistatic properties when used in low concentrations (0.1-0.5%).

**Preservatives:**

- Preservatives are added to shampoos to protect them from bacterial contamination and any kind of decomposition.
- Organic acids and their derivatives, e.g. parahydroxybenzoic acid ester, salicylic and sorbic acid
- Parabens: Methylparaben
- Formaldehyde releasers, e.g., 1,3-Dimethylol-5,5-dimethylhydantoin.

**Pearlizers and opacifiers**

- These agents are used to give the shampoo a creamy appearance or we can say less transparent consistency.
- Pearlizers give the solution a more luxurious, rich appearance.
- Otherwise it would be dull in appearance watery, grayish and maybe a little cloudy.
- The most common pearling agent in shampoos is Glycol Stearate, also known as Glycol Monostearate or Ethylene Glycol Monostearate (EGMS).
- Chemically, Glycol Stearate is the ester of ethylene glycol and stearic acid

**Sesquestrants**

- Surfactants are liable to form complex with the metals present in water i.e calcium and magnesium
- The sequestrants prevents complex formation between surfactant and metal prevents film formation on the scalp
- Act by forming complex with metals
- Ex: EDTA, Citric acid

**Evaluation of Shampoo****Physical appearance and visual inspection involves:**

- Clarity
- Foam producing capability

- Fluidity.

### **Determination of pH**

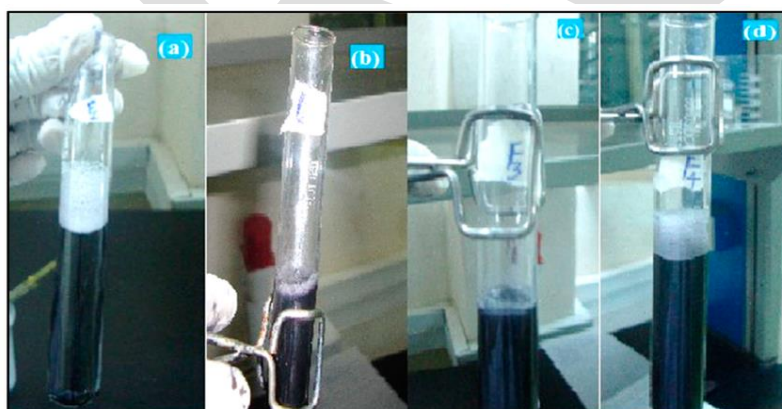
- pH is an important parameter while formulating shampoo.
- The pH is determined by making 10% shampoo solution in distilled water and then measuring pH using pH meter at room temperature (25°C).
- The acceptable limit for pH is between 4-9

### **Rheological evaluations**

- Viscosity is important while formulating shampoo.
- Too high and too low viscosity is not desired as it creates difficulty during use of shampoo.
- The viscosity of the shampoos can be determined using Brookfield Viscometer.

### **Dirt dispersion**

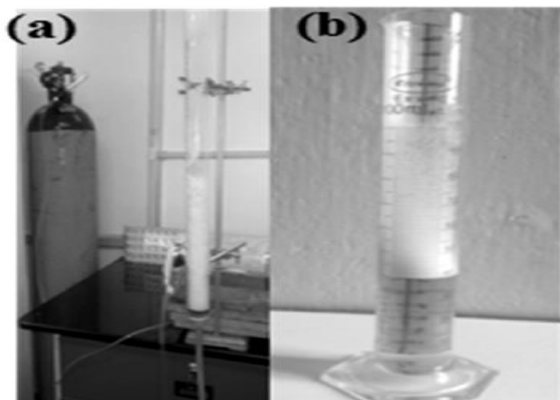
- Dispersion of dirt is determined by adding two drops of shampoo in a large test tube that is filled previously with 10 ml of distilled water.
- To this test tube, 1 drop of Indian ink is added and shaken for ten times.
- The content of ink is recorded as heavy, moderate, light or none in the form produced.



### **Foaming ability and foam stability**

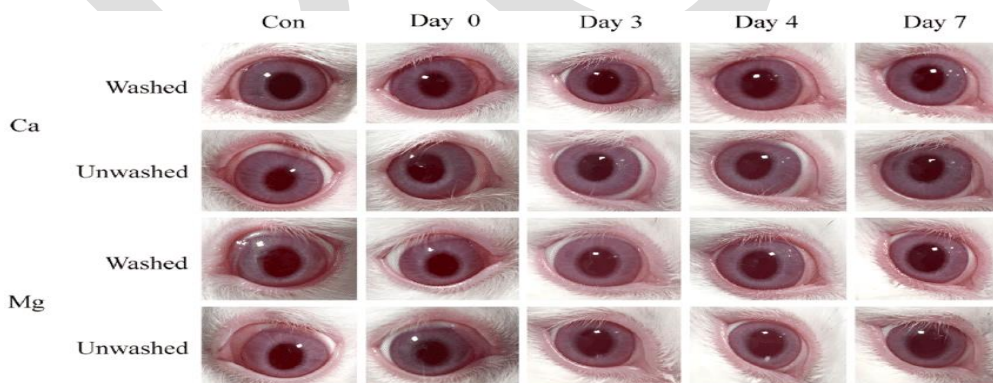
- Foaming ability of the shampoo can be determined by the cylinder shake method.
- In this method 50 ml of the 2% shampoo solution is placed into a 250 ml graduated cylinder.

- The cylinder is then covered with hand and shaken for 10 times.
- Immediately after shaking the volume of foam at 1 minute intervals for 4 minutes is recorded



### Eye irritation test:

- For eye irritation test, albino rats are preferred.
- About 1% of the shampoo solutions are instilled drop wise into the eyes of six albino rabbits.
- Further, the eyes are observed for any irritation/or damage and recorded at definite intervals over a gap of 4 seconds.



### Detergency and cleaning action

- Cleansing power is evaluated by the method of Barnet and Powers.
- 5gm sample of soiled human hair is placed at 35°C in water containing 1 gm. of shampoo.
- The flask is shaken 50 times in one minute for 4 minutes.

- Then washed once again with sufficient amount of water, then after filtration the hairs are dried and weighed.

The amount of soil is removed under these condition is calculated

### **Packaging of Shampoos**

- Ideal requirements for packaging:
- The packaging must be able to protect the product from environmental conditions.
- The packaging material must not be reactive with the product.
- The packaging should not impart to the product odour.
- The packaging material must be nontoxic
- is one of the important determinants of its market appeal, besides its quality.
- The shampoo package should contain necessary information such as name of the product, brand, composition, usage instruction and warnings.
- Also the container should be made such that to allow the product to come out but not to go in so that any contamination is avoided.

### **Lipsticks**

- Lipstick is a cosmetic product containing pigments, oils, waxes, and emollients that apply color, texture, and protection to the lips.
- Its name suggests it is (stick) of material, within a tube type container (usually around 10mm in diameter and 50mm in length).
- Lipsticks are cosmetic products used to impart color and shine to the lips and also used to protect lips from cracking/ drying due to exposure of dust and different weather conditions



### **Ideal properties**

- It should be nontoxic & nonirritant to the lips.
- It should impart uniform color to the area of application.
- It should provide smooth appearance to the lips
- It should have stability towards environmental conditions.
- It should be completely free from grittiness
- The handling of container should be smooth and simple
- Melting point that is high enough to ensure that it does not soften during the warmer summer months;
- A pleasant taste and lasting color that will remain on the lips for a considerable period of time

### **Raw materials used in lipstick it contains-**

- Waxes
- Oils
- Pigments and dyes
- Alcohol and fragrance
- Preservatives and antioxidants

**Wax**

- Wax provides the structure to the solid lipstick.
- Lipsticks may be made from several waxes such as beeswax, ozokerite and candelilla wax.
- Ozokerite Wax is a white, crystalline, odorless and tasteless solid made-up of blends of paraffin and microcrystalline waxes
- .Ozokerite wax is a hard wax with a relatively high melt point can be used to provide structure and strength to lipstick.
- This property encourages its use in lipstick and lip care products to establish its structure and its strength

**Oil**

- It is the addition of oil that gives lipstick its shine and translucent effect.
- Different types of oils, like castor oil, vegetable oil, lanolin and mineral oil are used in lipsticks.

**Pigments and Dyes**

- These are used in lipsticks to impart the desired color or shade to the lipstick.
- The dyes used in a lipstick include bismuth oxychloride, manganese violet, titanium dioxide, D&C Red No. 6, D&C Red No. 21.

**Alcohol and Fragrances**

- Alcohol is used as a solvent for the wax and oils used in making lipsticks.

Fragrance is used for imparting a pleasant scent to the lipstick and to mask the smell of other ingredients

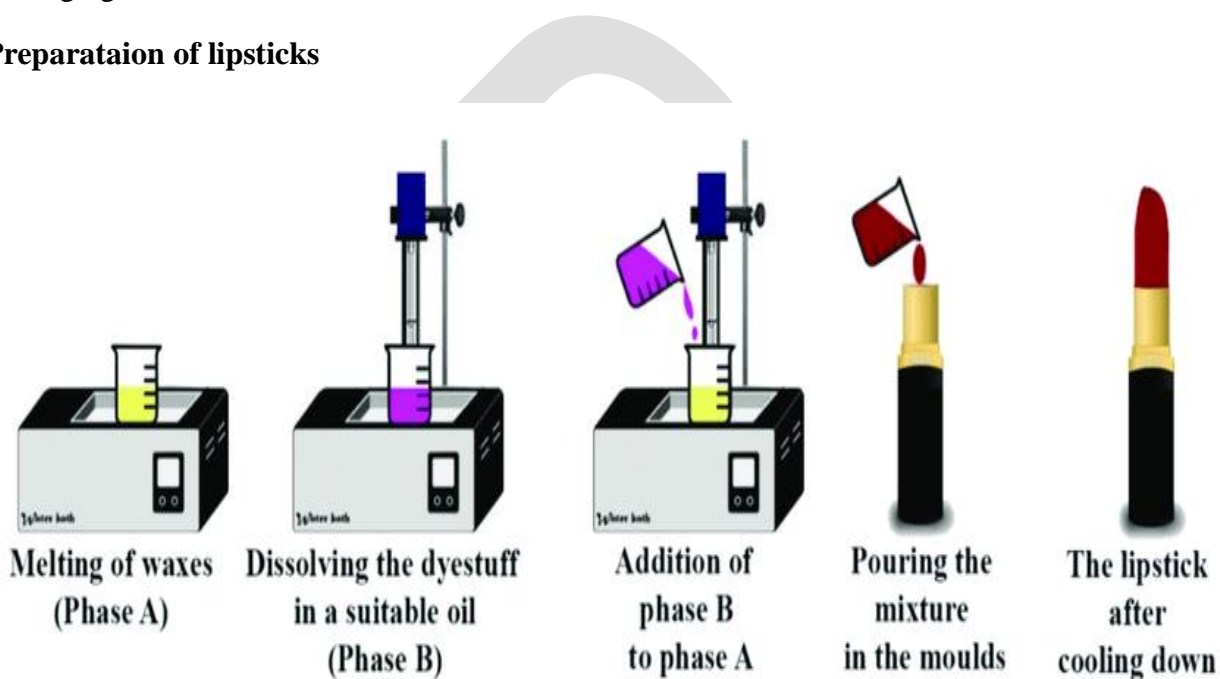
**Preservatives and Antioxidants**

- These are added to the lipstick to increase its shelf life and to prevent it from becoming stale or rancid.
- Preservatives: Methyl paraben, propyl paraben
- Antioxidants : Gallic acid, propyl galate, BHA,BHT are few examples of antioxidants.

## Manufacturing process of lipsticks

- Color Grinding
- Melting & Mixing
- Molding
- Flaming
- Packaging

## Preparation of lipsticks



## Color Grinding

- Color Grinding Pigments and dyes are available in amorphous form.
- so we have to convert into powder form. Equipment used for grinding are
- 1. Roller mill
- 2. Colloidal mill

## Mixing and melting

- First the raw materials like solvents, oils and waxy material are melted in separate stainless steel container.

- The solvents and oils are mixed with color pigments.
- Then the mixture is passed through roller mill grinding the pigments to avoid grainy feel in lipsticks.
- After the pigment mass is grounded and mixed it is added to hot wax until uniform color and consistency is obtained.

### **Molding**

- Once the lipstick mass is mixed and free of air, it is ready to be poured in tubes.
- The melted mass is dispensed into a mold, which consists of bottom portion of metal and a shaping tube.
- Lipstick is poured upside down so that bottom of tube is at top of mold.
- Any excess material is scrapped out.
- The lipstick is cooled and separated from mold and bottom of tube is sealed.
- The lipstick is passed through flaming test to seal the pinholes and to give finish to the product.

### **Labelling and packaging**

- The lipstick is retracted and tube is capped .The lipstick is ready for labeling and packaging

### **Evaluation of finished products**

**Color control** -Colorimetric equipment is used to control the colors.

- This equipment gives a numerical reading of the shades.
- When mixed so that it can be matched with the previous batch.

**Determination of melting point** Standard melting point apparatus is used.

**Softening point:** Ideal lipstick should be resistant to varying temp so that it can be used in all weather conditions it is done by ring and ball method.

**Microbial testing:** Microbial testing is done by plating a known mass of sample on two selected culture media suitable for growth of bacteria.

- Sample is incubated for specified time and observed for any growth of bacteria (Results should be within the specified limits as per the compendial requirements).

**Breaking load test** The protruded lipstick is subjected to a number of weights hanging from it; the weight at which lipstick breaks is its breaking load.

**Rancidity** is decomposition of fat/oil and other lipids by hydrolysis of oxidation and it may lead to development of bad odor and taste.

- The lipstick may be sticky or there may be change in color of the product. It is tested by determining the peroxide numbers.

