

# **INDUSTRIAL CHEMISTRY**

## **CHAPTER- CHEMISTRY OF**

### **COSMETICS**

#### **ONLINE LECTURE**

##### **NO. 1**

**DATE:- 19, APRIL 2021**

**TIME: (9.00A.M.)**

**Introduction:** - Cosmetics are a category of health and beauty products that are used to care for the face and body, or used to change a person's appearance. Cosmetics were used for the purpose of beautifying, perfuming, cleansing, or fashion since the origin of civilization. The chemistry which deals with the use of preparations to make the things more beautiful and attractive is called as cosmetic chemistry. Since that time any material used for beautification or improvement of appearance is known as Cosmetic. The word “cosmetic” is derived from the Greek word Kosmetikos, meaning “having the power to arrange, skilled in decorating giving kosmein, “to adorn,” means to make more beautiful and attractive and kosmos, “order, harmony”. (Susanvad).

Cosmetics are a category of consumer products marketed worldwide and the purpose and functions of these are universal to people of all cultures which includes skincare, fragrance, haircare, hair dyes, lipsticks, nail polishes, eye and face makeup, deodorants, baby products, personal hygiene, and makeup products, creams, powders, lotions, sprays, etc.

Throughout the recorded history of man, cosmetics have been used with essentially the same three goals in mind, namely

- (1) To enhance personal appeal (Aavahan karane) through decoration of the body
- (2) To coverup flaws(truti) in the skin and
- (3) To alter or improve upon nature.

In the twentieth century great progress has been made in the diversification of cosmetic products and functions and in the safety and protection of the consumer. Now days, cosmetics are considered as essential components in life. They not only, attract the people towards it but also impart psychological effects. It has gained popularity in the last 3-4 decades and its use has been increased exponentially both- in males and females. Number of cosmetics has large side effects. So, go natural more often and switch to natural remedies like preparing pastes from fruits, vegetables, medicinal herbs, eating healthy and drinking plenty of water.

**Definition of Cosmetics:** - The average consumer predicts a cosmetic to be a product such as lipstick, cold cream, facial foundation powder, nail polish, and other so-called decorative personal-care items of makeup, which are all designed to enhance superficial appearance and beautify the body. Usually, the consumer will also compare the term “cosmetic” with “toiletry”. Despite the increasingly systematic and objective science associated with the art, formulation, and manufacture of cosmetics, the term “cosmetic” is defined in Section 201 (i) of the 1938 Food, Drug, and Cosmetic Act (FD&C Act) as: . . .

“The articles intended to be rubbed, poured, sprinkled, or sprayed on, introduced into, or otherwise applied to the human body or any part thereof for cleansing, beautifying, promoting attractiveness, or altering the appearance, and articles intended for use as a component of any such articles; except that such term shall not include soap are called as cosmetics”.

The U.S. Food and Drug Administration (FDA) which regulates cosmetics in the United States defined cosmetic as “Intended to be applied to the human body for cleaning, beautifying, promoting attractiveness, or altering the appearance without affecting the body’s structure or functions.” Cosmetics (Care substances) are all about changing or improving the appearance or odour of the human body.

Uses: -

- 1) Cosmetics are used as a cleansing, moisturizing and beautifying agent.
- 2) Cosmetics help in enhancing attractiveness of the body.
- 3) Cosmetics help to alter the appearance of the body without affecting its functions.
- 4) Cosmetic (suntan/sunscreen) products help to protect the body from UV rays and treating sunburns.
- 5) Acne, (rash=pural) wrinkles, dark circles under eyes and other skin imperfections are treated or repaired with cosmetic products.
- 6) Cosmetics also help in treating skin infections.

# **INDUSTRIAL CHEMISTRY**

## **CHAPTER- CHEMISTRY OF**

### **COSMETICS**

#### **ONLINE LECTURE**

##### **NO. 2**

**DATE:- 22, APRIL 2021**

**TIME: (9.00A.M.)**

## Hair Dyes: -

**Definition:** - “Hair dyes (colourants) are the cosmetic preparations which are used by men and women either to change the natural hair colour or to mask grey hair”.

A variety of hair colours are observed between the people's living in east and the west. The pigments that are responsible for variety of hair colours are pheomelanins and eumelanins. Pheomelanins impart different shades of red and yellow whereas, eumelanins impart different shades of dark brown and black. These two pigments are responsible to impart variety of hair colours in humans. Similarly their proportion, quantity, size and proper mixing is also responsible for variety of hair colours as follows:

- 1) Presence of different combination of pheomelanins and eumelanins pigments.
- 2) Presence of varied quantities of the pheomelanins and eumelanin pigments.
- 3) Variations in size of the granules of the pheomelanins and eumelanin pigments.
- 4) The proper distribution and mixing of granules of these two pigments.

## The properties of typical hair dyes: -

- 1) The formulation of the hair colourant should be stable.
- 2) Should colour the hair evenly.
- 3) Should not lead to loss of the natural shine of hair.
- 4) Should not damage shaft (hair bijkosh) of the hair.
- 5) Should protect the natural moisture of the hair.
- 6) Should have properties like non-irritant and non-sensitizing.
- 7) Should be non-toxic in nature and impart stable colour to the hair.
- 8) The coloured hair should not be affected by air, water, sunlight, sweat, friction, shampoos, lotions, gels, oils etc.



**Classification of hair dyes (colorants):** - Hair dyes are roughly classified into four classes. i. e.

**1. Temporary Hair Colorants:** - These dyes impart colour to the hair for a short time and are washed off during the first shampoo. Almost any soluble colour can be used as temporary hair colourant. Basically temporary hair colorants consist of dye-stuffs and acids. The different dye stuffs are acid dyes, basic dyes, metalized dyes and disperse dyes. Penetration of these dyes to the hair shaft does not occur to any significant extent, and the overall effect is to add only a slight additional coloration to the hair. These colorants are easily removed with one wash using a shampoo because they just absorbed in to the cuticle (thin skin) and cannot enter into the cortex (bahyapatal=kavati) of the hair. The hair colourants are available in different formulations like powders, crayons, liquids and shampoos.

Chemically these are azo dyes, anthraquinone dyes, benzoquinoneimine dyes, triphenyl methane dyes, phenazanic dyes and xanthenic dyes.

## 2. Semi-Permanent Hair Colourants/Direct dyes: -

These colourants give a stronger colouration to the hairs and can withstand six to eight subsequent shampoos although some of the colour is removed during each shampoo. These colourants have a long lasting, colour retaining, ability when compared to temporary colourants and produces stronger colour as well. Dark colours are obtained with the colorants though they do not contain  $H_2O_2$ . This offers an advantage that the melanin of the hair doesn't get bleached but is only masked with the colourant. The colour obtained on the grey hair is different than the black (pigmented) hair because of which the hairs are highlighted. These colorants are easy to apply.

In practice, most semi-permanent hair dyes are based on basic dyestuffs, whose cationic character gives them a natural affinity for the hair, or on metallised dyestuffs, often in combination with nitro derivatives of aromatic diamines or aminophenols.

### 3. Permanent Hair Dyes /Colorants: -

Permanent or oxidation dyes are fundamentally different to the other classes of dyestuffs that have already been considered. The dyes are formed during the dyeing process and are not present, as such, in the solutions before application. The products consist of two parts-a dye intermediate solution and an oxidizing agent, mostly hydrogen peroxide. Dye intermediates are blends of primary intermediates and coupling agents, or modifiers, in a suitable base. During the permanent dyeing of hair, the dye intermediate solution and the oxidizing solution are mixed and applied to the hair. The primary intermediates are gradually oxidized and then undergo coupling reactions with the modifiers.

#### 4. Other Hair Dyes: -

Some hair colorants do not fall neatly into the temporary or semipermanent or permanent category of classification. These include the vegetable dyes, mostly based on henna (Mehendi a orange dye). The dried leaves of the henna plant are powdered and applied as a paste to the hair, either alone or mixed with other plants such as indigo or camomile (sugandhi vanaspati).

The paste is directly applied on hair and a warm towel is wrapped around the head to enhance the colouring effect. It gives reddish colour to the hair. Henna is non-toxic and non-sensitizing. The active constituent of henna is lawsone, which is chemically 2-hydroxy-1, 4 - naphthoquinone. It is responsible for imparting the colour. Indigo leaves (blue dye) or synthetic indigo is added to henna to alter the colour. Apart from this, pyrogallic acid and metallic salts like copper sulphate are added. An increased level of pyrogallic acid added to henna, gives darker shades.

**Manufacturing Process:** - Varied formulated products of hair dyes, in the form of powder, creams and oil or liquid mix are available in the market. The manufacturing process of each product is different. However, for the manufacture of powder, cream, oil or liquid, the formulation of specific raw material and its quality were tested first and mixed accordingly with required and aqueducts (proportion of water) conditions of temperature and pressure. Ex.

**Ingredients required and Preparation procedure of the semi-permanent hair colourants: -**

For preparation of semi-permanent hair colourants, different constituents required are (a) Dye viz. azo dyes or amino nitrophenols (b) Water (c) Organic solvent like alcohol, derivatives of glycol. (d) Fatty acid, fatty acid amide. (e) Thickener (wax). (f) Stearic acid (anionic surfactant) or (g) Perfume (h) Aliphatic primary amines which work as co-solvent and buffer. Example: 2 - amino, 2-methylpropanol.

The mixture of alkanolamide and anionic surfactant is prepared then dye is added to the above mixture and dissolved. The acid and quaternary ammonium compounds were dissolved in water then this aqueous solution is added to the former solution of dye with constant stirring. This formed dye is investigated for the effects of quaternary ammonium compound, pH, aldehydes and alcohols additions. Now the viscosity of the dye is adjusted by adding hydrophilic colloids like methylcellulose, natural gum etc. The viscosity of the colourant is increased by the addition of non-ionic thickener in its composition. Lastly the amphoteric surfactant will be added in the colourant to accompany the basic dyes.

## Shampoo: -

Shampoo is a hair care product, typically in the form of viscous liquid that is used for cleaning hair. Shampoo is the preparation used to cleans, rinse out dirt from the hair and imparts gloss and leaves hairs manageable and non-dry. The main purpose of shampoo is to remove dirt and oil from the surface of the hair fibres and the scalp, while the main purpose of conditioner is to ensure that the hair is smooth for combing.

A viscous cosmetic preparation with synthetic detergent used for washing hair is called shampoo. Its principle function is to clean the scalp (Talu in Marathi) such that it should become free from sebum (the oily secretion of the sebaceous glands; with perspiration it moistens and protects the skin) and foreign substances, should make the hair lustrous and good looking. Today shampoo has become an important hair cosmetic for both men and women. Apart from cleaning, shampoo may also be used for medicinal purpose (i.e., medicated shampoo).

**Properties of Ideal Shampoo:** - 1) It should be able to remove waste material such as skin debris, grease, soil, sebum, dead cells, salts (due to sweat) etc., from the scalp.

2) It should have optimum viscosity such that it facilitates ease during application.

3) It should have good spreading properties.

4) It should produce sufficient lather after application.

5) It should not form any kind of film on scalp.

6) It should rinse out completely after washing.

7) It should produce lather with both hot and cold water.

8) It should provide lustre to the hair.

9) It should produce good odour both before and after shampooing.

10) It should not produce any kind of irritation or itching to the scalp.

11) It should not support any microbial growth. 12) It should be economical.

13) It should be non-toxic. 14) It should be effective in small amounts.



**INDUSTRIAL CHEMISTRY**  
**CHAPTER- CHEMISTRY OF**  
**COSMETICS**  
**ONLINE LECTURE**  
**NO. 2**

**DATE:- 22, APRIL 2021**

**TIME: (9.00A.M.)**

## Hair Dyes: -

**Definition:** - “Hair dyes (colourants) are the cosmetic preparations which are used by men and women either to change the natural hair colour or to mask grey hair”.

A variety of hair colours are observed between the people's living in east and the west. The pigments that are responsible for variety of hair colours are pheomelanins and eumelanins. Pheomelanins impart different shades of red and yellow whereas, eumelanins impart different shades of dark brown and black. These two pigments are responsible to impart variety of hair colours in humans. Similarly their proportion, quantity, size and proper mixing is also responsible for variety of hair colours as follows:

- 1) Presence of different combination of pheomelanins and eumelanins pigments.
- 2) Presence of varied quantities of the pheomelanins and eumelanin pigments.
- 3) Variations in size of the granules of the pheomelanins and eumelanin pigments.
- 4) The proper distribution and mixing of granules of these two pigments.

## The properties of typical hair dyes: -

- 1) The formulation of the hair colourant should be stable.
- 2) Should colour the hair evenly.
- 3) Should not lead to loss of the natural shine of hair.
- 4) Should not damage shaft (hair bijkosh) of the hair.
- 5) Should protect the natural moisture of the hair.
- 6) Should have properties like non-irritant and non-sensitizing.
- 7) Should be non-toxic in nature and impart stable colour to the hair.
- 8) The coloured hair should not be affected by air, water, sunlight, sweat, friction, shampoos, lotions, gels, oils etc.

**Classification of hair dyes (colorants):** - Hair dyes are roughly classified into four classes. i. e.

**1. Temporary Hair Colorants:** - These dyes impart colour to the hair for a short time and are washed off during the first shampoo. Almost any soluble colour can be used as temporary hair colourant. Basically temporary hair colorants consist of dye-stuffs and acids. The different dye stuffs are acid dyes, basic dyes, metalized dyes and disperse dyes. Penetration of these dyes to the hair shaft does not occur to any significant extent, and the overall effect is to add only a slight additional coloration to the hair. These colorants are easily removed with one wash using a shampoo because they just absorbed in to the cuticle (thin skin) and cannot enter into the cortex (bahyapatal=kavati) of the hair. The hair colourants are available in different formulations like powders, crayons, liquids and shampoos.

Chemically these are azo dyes, anthraquinone dyes, benzoquinoneimine dyes, triphenyl methane dyes, phenazanic dyes and xanthenic dyes.

## 2. Semi-Permanent Hair Colourants/Direct dyes: -

These colourants give a stronger colouration to the hairs and can withstand six to eight subsequent shampoos although some of the colour is removed during each shampoo. These colourants have a long lasting, colour retaining, ability when compared to temporary colourants and produces stronger colour as well. Dark colours are obtained with the colorants though they do not contain  $H_2O_2$ . This offers an advantage that the melanin of the hair doesn't get bleached but is only masked with the colourant. The colour obtained on the grey hair is different than the black (pigmented) hair because of which the hairs are highlighted. These colorants are easy to apply.

In practice, most semi-permanent hair dyes are based on basic dyestuffs, whose cationic character gives them a natural affinity for the hair, or on metallised dyestuffs, often in combination with nitro derivatives of aromatic diamines or aminophenols.

### 3. Permanent Hair Dyes /Colorants: -

Permanent or oxidation dyes are fundamentally different to the other classes of dyestuffs that have already been considered. The dyes are formed during the dyeing process and are not present, as such, in the solutions before application. The products consist of two parts-a dye intermediate solution and an oxidizing agent, mostly hydrogen peroxide. Dye intermediates are blends of primary intermediates and coupling agents, or modifiers, in a suitable base. During the permanent dyeing of hair, the dye intermediate solution and the oxidizing solution are mixed and applied to the hair. The primary intermediates are gradually oxidized and then undergo coupling reactions with the modifiers.

#### 4. Other Hair Dyes: -

Some hair colorants do not fall neatly into the temporary or semipermanent or permanent category of classification. These include the vegetable dyes, mostly based on henna (Mehendi a orange dye). The dried leaves of the henna plant are powdered and applied as a paste to the hair, either alone or mixed with other plants such as indigo or camomile (sugandhi vanaspati).

The paste is directly applied on hair and a warm towel is wrapped around the head to enhance the colouring effect. It gives reddish colour to the hair. Henna is non-toxic and non-sensitizing. The active constituent of henna is lawsone, which is chemically 2-hydroxy-1, 4 - naphthoquinone. It is responsible for imparting the colour. Indigo leaves (blue dye) or synthetic indigo is added to henna to alter the colour. Apart from this, pyrogallic acid and metallic salts like copper sulphate are added. An increased level of pyrogallic acid added to henna, gives darker shades.

**Manufacturing Process:** - Varied formulated products of hair dyes, in the form of powder, creams and oil or liquid mix are available in the market. The manufacturing process of each product is different. However, for the manufacture of powder, cream, oil or liquid, the formulation of specific raw material and its quality were tested first and mixed accordingly with required and aqueducts (proportion of water) conditions of temperature and pressure. Ex.

**Ingredients required and Preparation procedure of the semi-permanent hair colourants: -**

For preparation of semi-permanent hair colourants, different constituents required are (a) Dye viz. azo dyes or amino nitrophenols (b) Water (c) Organic solvent like alcohol, derivatives of glycol. (d) Fatty acid, fatty acid amide. (e) Thickener (wax). (f) Stearic acid (anionic surfactant) or (g) Perfume (h) Aliphatic primary amines which work as co-solvent and buffer. Example: 2 - amino, 2-methylpropanol.



The mixture of alkanolamide and anionic surfactant is prepared then dye is added to the above mixture and dissolved. The acid and quaternary ammonium compounds were dissolved in water then this aqueous solution is added to the former solution of dye with constant stirring. This formed dye is investigated for the effects of quaternary ammonium compound, pH, aldehydes and alcohols additions. Now the viscosity of the dye is adjusted by adding hydrophilic colloids like methylcellulose, natural gum etc. The viscosity of the colourant is increased by the addition of non-ionic thickener in its composition. Lastly the amphoteric surfactant will be added in the colourant to accompany the basic dyes.

## Shampoo: -

Shampoo is a hair care product, typically in the form of viscous liquid that is used for cleaning hair. Shampoo is the preparation used to cleans, rinse out dirt from the hair and imparts gloss and leaves hairs manageable and non-dry. The main purpose of shampoo is to remove dirt and oil from the surface of the hair fibres and the scalp, while the main purpose of conditioner is to ensure that the hair is smooth for combing.

A viscous cosmetic preparation with synthetic detergent used for washing hair is called shampoo. Its principle function is to clean the scalp (Talu in Marathi) such that it should become free from sebum (the oily secretion of the sebaceous glands; with perspiration it moistens and protects the skin) and foreign substances, should make the hair lustrous and good looking. Today shampoo has become an important hair cosmetic for both men and women. Apart from cleaning, shampoo may also be used for medicinal purpose (i.e., medicated shampoo).

**Properties of Ideal Shampoo:** - 1) It should be able to remove waste material such as skin debris, grease, soil, sebum, dead cells, salts (due to sweat) etc., from the scalp.

2) It should have optimum viscosity such that it facilitates ease during application.

3) It should have good spreading properties.

4) It should produce sufficient lather after application.

5) It should not form any kind of film on scalp.

6) It should rinse out completely after washing.

7) It should produce lather with both hot and cold water.

8) It should provide lustre to the hair.

9) It should produce good odour both before and after shampooing.

10) It should not produce any kind of irritation or itching to the scalp.

11) It should not support any microbial growth. 12) It should be economical.

13) It should be non-toxic. 14) It should be effective in small amounts.

# **INDUSTRIAL CHEMISTRY**

## **CHAPTER- CHEMISTRY OF**

### **COSMETICS**

#### **ONLINE LECTURE**

##### **NO. 4**

**DATE:- 25, APRIL 2021**

**TIME: (10.00A.M.)**

**Suntan Lotions: - Definition: -** The substance or product which helps to protect the skin from the sun's harmful rays by reflecting, absorbing and scattering both UVA and UVB radiations and provides protection to the skin against radiations is called as Suntan product .

Sunscreen, is also known as sunblock or suntan lotion, that is a lotion, spray, gel, foam stick or other topical product which absorbs or reflects some of the harmful radiations of sun i.e. UVA and UVB and helps to protect skin against sunburn.

**Introduction: -** Sunscreen products form an important subclass of skin-care products. Skin damage, and the development of products that help to prevent it, require an understanding of the ultraviolet spectrum of light. The ultraviolet spectrum of concern is between 200 and 400 nanometers (nm) and, in practice between 280 and 400 nm. UV light is divided into three ranges i.e. UVA radiation is in the range of 320-400 nm, UVB radiation is in the range of 290-320 nm and UVC is radiation in the range of 100-290 nm. UVC is totally blocked by the ozone layer in the upper atmosphere of the Earth. The ozone layer blocks some of the UVB and all of the UVA

Human skin exposure to UV radiations from sunlight can cause many adverse effects. These involve both UVB (290–320 nm) and UVA (320–400 nm). UVB rays are mainly responsible for the most severe damage being acute such as sunburn, and long term skin cancer. They directly impact DNA and proteins. Unlike UVB, the UVA rays are not directly absorbed by biologic targets but can still dramatically damage cell and tissue functions:

- UVA radiations penetrate deeper into the skin than UVB. They particularly affect connective tissue inducing the production of harmful reactive oxygen species (ROS) which in turn damage DNA, cells, vessels, and tissues.
- UVAs are potent inducers of immunosuppression and their contribution to the development of malignant melanoma and squamous tumours is a serious concerns.
- Photosensitivity reactions and photodermatitis are primarily mediated by UVAs.

It is important to note that under all weather conditions, the UVA irradiance is at least 17 times higher than the UVB irradiance. For all these reasons, sunscreens must evidently contain both UVA and UVB filters to protect skin from these two associated harmful rays.

### **Classification of Sunscreen Products According to their Purpose: -**

- 1. Primary Sunscreens:** - Products directly intending to protect skin from the effects of the sun, such as beach sunscreens and products used for outdoor activities.
- 2. Secondary Sunscreens:** - Products that have a primary use other than skin protection, such as daily moisturizing creams, antiwrinkle/antiaging creams, whitening skin products and makeup products. For this category of products, Sun protection is an additional claim, i.e. not their main objective, despite becoming essential for daily exposed areas.

## Critical Requirements of Ideal Sunscreen Products: -

- 1) Must provide efficient protection against UVB and UVA radiation.
- 2) Must be stable to heat and UV Radiations. (photo-stable).
- 3) Must be user-friendly to encourage frequent application and provide reliable protection.
- 4) Must go on easily and spread uniformly.
- 5) Should be waterproof if required, and is cosmetically attractive.
- 6) Should be Cost-effective.

In order to protect against both UVB and UVA, the sunscreen product must contain a combination of active ingredients within a complex vehicle matrix. Active ingredients can be either organic or inorganic UV filters. According to their chemical nature and their physical properties, they can act by absorbing, reflecting, or diffusing UV radiations.



## Sunscreen Chemicals and Sunscreen formulations: -

Sunscreen products are simply vehicles for materials that prevent meaningful amounts of UV radiation from reaching to the skin. These materials are usually classified as chemical absorbers, or physical blockers and scatterers of UV radiation.

There are many forms available, including the common lotions (generally O/W emulsions), oils (solutions of sunscreens in mineral oil, vegetable oil, volatile silicones or esters), gels of water or water/alcohol character, sprays, and sticks for special applications. Many modern sunscreens are formulated with combinations of raw materials that have absorbance in both the UV-A and UV-B ranges, as well as physical blocks to expand protection.

Generally, there has been a steady increase in SPF values and now it is common for sunscreen products to have SPFs greater than 15, with some having SPFs approaching 50.

These are generally O/W emulsions containing levels of UV absorber or physical blocks to give a desired SPF. Their formulation may differ from that of conventional moisturizing lotions, in that significant amounts of oil phase are replaced by oil-based UV absorbers. In addition, if suntan lotions are required to be waterproof, they require addition of a water-repellent film former or some other means of ensuring adherence of the active to the skin.

The formulation of a low SPF non-waterproof suntan lotion is given in following table....

Typical formulation of an SPF 4 non-waterproof suntan lotion is shown table

<b>Part of formulation</b>	<b>Raw Material(Ingredient)</b>	<b>Wt. %</b>
A	Ethylhexyl p-methoxycinnamate	2.0
	Oxybenzone	1.0
	Isopropyl palmitate	6.0
	Stearic acid	3.0
	Cetyl alcohol	1.0
	Glycerol monostearate	1.0
B	Deionized water	71.0
	Sorbitol	3.0
	Carbomer 934 (2% dispersion)	10.0
	Triethanolamine, 99%	1.2
C	Fragrance and preservative	Quantum sufficient

**Preparation Procedure:** - Heat parts A and B separately to 70°C. Add part A to part B with good agitation. Mix to 35°C and add part C. Continue mixing until dispersion is complete.

### **Suntan Oils: -**

Suntan oils are typically used by individuals who are seeking a tan, rather than by individuals who are seeking protection. They usually have a low SPF and are used not only to afford some protection for a longer exposure, but also to give a glistening (Shining) appearance to pigmented skins. They are seldom waterproof and incorporate oil-soluble sunscreens into mineral oil, vegetable oils and derivatives, fatty esters, and combinations of the above, at times with volatile silicone added to decrease oiliness.

Typical formulation of suntan oil is shown in table

<b>Raw Material (Ingredient )</b>	<b>Wt. %</b>
Cyclomethicone	64.9
Octyl dimethyl PABA	6.0
Capric/caprylic triglyceride	5.0
Fragrance	0.1
Isopropyl palmitate	24.0

**Preparation Procedure:** - Blend all ingredients at room temperature.

## Lipsticks: -

Lipstick is a cosmetic that applies color, texture, and protection to the lips.

Lipstick is a cosmetic product containing pigments, oils, waxes, and emollients (softening agents) that applies color, texture, and protection to the lips. Many colors and types of lipstick exist. Some lipsticks are also lip balms, to add both color and hydration.

Lipstick may be basically defined as dispersion of the colouring matter in a base consisting of a suitable blend of oils, fats and waxes with suitable perfumes and flavours moulded in the form of sticks to impart attractive gloss and colour, when applied on lips. Lipsticks provide moist appearance to the lips highlighting them and cover up their defects.

## Properties of Good Lipsticks: -

The ideal characteristics of a good lipstick are as follows...

- 1) It should efficiently cover lips with colour and must impart a long lasting gloss on lips.
- 2) It should be able to maintain the intensity of colour without any alteration in the shade.
- 3) It should be able to adhere firmly on the lips and should not leave any greasy appearance.
- 4) It should possess good thixotropic property (property of becoming less viscous when subjected to an applied stress) in order to deposit the colour with minimum pressure.
- 5) It should show a smear (spot) proof colouring effect.
- 6) Should have required plasticity and able to retain all the properties during the storage.

7) It should be easily dried.

8) Should have even firmness and able to maintain strength at varying temperatures up to 55°C.

9) The lipstick should possess a pleasant fragrance and a good flavour.

10) Should be safe and non-irritating to the lips.



The lipstick base is made by mixing the oils and waxes in varying proportions in order to obtain a desirable viscosity and melting point. The raw materials involved in the formulation of the lipsticks are shown

### **Raw Materials (Ingredients)**

### **Examples**

The solid components / waxes :

(a) The hydrocarbon waxes

White bees wax

(b) The mineral waxes

Ozokerite wax, ceresin wax

(c) Hard waxes

Carnauba wax,

(d) Micro crystalline waxes

candelilla wax, hard paraffin

The liquid components

Mineral oils, vegetable oils, castor oils, butylstearate,

Glycol, water, silicon-fluids, IPM (isopropyl maleate)

The softening components

Anhydrous lanoline, lanolin cocoa butter, lecithin, petrolatum

The colouring agents

Carmine, dyestuff stain, pigmented stain, lakes etc.

Pearlescent pigments

Guanine crystals, bismuth oxychloride

Opacifying agents

Titanium dioxide

Perfumeries

Rose oil, cinnamon oil, lavender oil etc.

Miscellaneous agents :

(a) Preservatives

Parabens (Esters of parahydroxy benzoic acid)

(b) Antioxidants

BHA (Beta hydroxy acid), , BHT (Butylated hydroxy toluene), tocopherol etc.

(c) Flavouring agents

Cinnamonal, spearmint oil etc.

## Preparation of lipsticks: -

Successful preparations of lipsticks of different shades depend upon the adequate dispersion of the lake colours (lake color or lake pigment is basically insoluble in nature and colors through dispersion). It is advisable to prepare the dispersion of 25 % concentration of lake colours in castor oil.

### General Method of Preparation: -

If commercial colour pastes are not being used, then lake colours are first dispersed by mixing with suitable quantity of castor oil. The colour paste obtained is passed through a triple roller mill until it becomes smooth and free from agglomerates (accumulation of large blocks) and coarse-grained particles. The colour mixture is then mixed with the bromo acid mixture (consists of dyestuffs). All the ingredients of the base are identified and arranged in the increasing order of their melting points. This mixture is remilled until it is perfectly smooth. Preservatives and anti-oxidants are dissolved in remaining oil and are added to the mixture. Finally, the perfume is added and the mass is stirred thoroughly, but gently to avoid entrapment of air.

Automatic ejection mould is preferred for the large scale production. The mould is lubricated with liquid paraffin or isopropyl myristate before pouring the mass into the mould. It is important to prevent settling down of the colouring mass when the moulds are chilled. Lubrication facilitates easy removal of sticks.

# **INDUSTRIAL CHEMISTRY**

## **CHAPTER- CHEMISTRY OF**

### **COSMETICS**

#### **ONLINE LECTURE**

##### **NO. 5**

**DATE:- 26, APRIL 2021**

**TIME: (10.00A.M.)**

**Powders:** - Powders are considered as one of the most important products of skin care preparations and used widely by both men and women for face and body care. Various types of powder products are available in market includes body powder, face powders, compacts and medicated powders used for preventing microbial growth on the surface of the skin, deodorant powders are used for antiperspirant.

Generally three different types of powder products used in cosmetics are as follows....

1. Face powders
2. Talcum Powders / Body powders / Dusting powders.
3. Compacts (Lightweight powdery texture and come in a pressed form).

**Talcum Powder / Body powder / Dust powders:** - These powders are most widely used as multiple purposes. They contain covering materials, adhesives, absorbent material, antiseptics and perfumes. The antiseptics are incorporated in the formulation in order to prevent the growth of microorganism which are responsible for the development of perspiration (sweat) and odour.

The main function of body powder is absorption of perspiration (sweat).

**Properties:** -

- 1) Should able to provide good slip character to the skin.
- 2) Should able to provide cooling and lubrication effect to the skin.
- 3) Should be able to prevent irritation of the skin.

**Raw Materials (Ingredients):** - Various types of raw materials (Ingredients) which are used in the formulation of body powders are given in table 1.5

## Raw Materials (Ingredients)

Metallic compound

## Examples

zinc stearate, aluminium stearate,  
magnesium carbonate(light), precipitate  
calcium carbonate (chalk)

Antiseptic materials

Boric acid, chlorhexidine diacetate,  
bithional

Adsorbent material

Kaolin (China clay), magnesium  
carbonate, precipitate chalk, starch

Slip character

Talc (Clay mineral), zinc stearate

Adhesive materials

Kaolin, zinc oxide, magnesium stearate

**Method of Preparation:** - Initially perfume is mixed with magnesium carbonate (absorbent) properly. This is mixture **A** and kept aside for some time. Talc, colloidal kaolin, colloidal silica, aluminium stearate and boric acid are mixed together and this is mixture **B**. Then mixture **A** is added to mixture **B** and then mixing is carried out properly. At last the preparation is passed through a sieve and finally product is packed in a suitable container.



## **Nails Enamel (Nail Paints): -**

Nail enamel or nail paints may be defined as “The viscous or semi-liquid preparations that are intended for the decoration of the nails of the fingers and toes”. Nail enamel form is the most popular and commonly used type of manicure (Filling and Shaping nails) preparations.

Nail polishes are quite distinct from those of nail lacquers and are regarded as a type of manicure preparations that produce a gloss by means of buffing action. The action is mainly by causing abrasion on the surface of the nail and secondly by drawing more blood into the capillaries of the nail.

**Good Properties of Nail Enamel:** - The ideal properties of a nail lacquer are as follows...

- 1) Must be safe for the skin and nails and should not lead to any harmful effects.
- 2) Must be easy to apply and easy to remove.
- 3) Must retain its properties during long storage should possess consistent stability.
- 4) Must be able to form a uniform and satisfactory film on the nails.
- 5) Should have good wetting and flow properties and should be viscous in nature in order to form an appropriate film.
- 6) Should provide a good shine on the nail on application.
- 7) Should possess sufficient adhesive property so that it may uniformly adhere to the nail without slipping.
- 8) Should have the adequate flexibility so that it may not become brittle and crack upon application.

9) The drying time of the film should not be too rapid or too slow; say about - minutes without forming any bloom.

10) It should be able to preserve all these properties at least for a week after its application.

The formation of an efficient nail polish may be based on the selection of a proper and an essential ingredient. The ingredients involved in the formation of a good variety of nail polish are as shown in table 1.6

Sr. No.	Raw Materials (Ingredients)	Examples
1	Film forming agents	Nitro cellulose, ethyl cellulose, vinyl polymers
2	Resinous substances	Aryl sulphonamide-formaldehyde
3	Dissolving solvent	Ether, ethyl acetate, amyl acetate, butyl acetate
4	Dissolving solvent/co-solvent	Ethyl alcohol, butyl alcohol
5	Plasticizing agents	d-butyl phthalate, n-butyl stearate
6	Colouring agent	5% titanium dioxide (TiO <sub>2</sub> )
7	Nacreous/pearly pigments	Guanine crystal
8	Miscellaneous substances	(1) suspending agent (2) perfumeries

**The preparation of nail polishes:** - The film forming material i.e., nitrocellulose is dissolved in a suitable solvent. Resins and plasticizers can be added directly or after dissolving them in small amounts of solvent. The finely divided pigments are added by forming dispersion of the pigment as they form aggregates. The dispersion can be formed by milling the pigments in a ball mill or a triple roller mill. The dispersion of the pigments, nitrocellulose and plasticizer are ground together in a solvent in order to form a plastic mass. The final mixing of the ingredients for the manufacture of nail polishes is carried out in stainless steel tanks with a stirrer. Initially, the tank is charged with the diluent and nitrocellulose (suitably wetted the diluent) is added to it. The plasticizer and the resin are added next and the mixing process continues. The mixing process is carried out till sufficiently uniform solution is formed. The clear lacquer is then subjected to filtration and centrifugation in order to remove any particles.

# **INDUSTRIAL CHEMISTRY**

## **CHAPTER- CHEMISTRY OF**

### **COSMETICS**

#### **ONLINE LECTURE**

##### **NO. 6**

**DATE:- 28, APRIL 2021**

**TIME: (4.00P.M.)**

## Creams: -

Creams are semi-solid emulsions which contain mixtures of oil and water. Their consistency varies between liquids and solids. Salve (medical ointment for soothing purpose) and unguent (soothing products) preparations in earlier days led to the development of cleansing and cold creams.

Creams are classified according to their functions....

- 1) Cleansing and Cold Creams.
- 2) Foundation and Vanishing Creams.
- 3) Night and Message Creams.
- 4) Hand and Body Creams.
- 5) All-purpose Creams

## Properties: -

- 1) Must be easy to apply.
- 2) Must spread easily on the skin.
- 3) Must be pleasant in appearance.
- 4) Should not cause irritation to the skin.
- 5) Should provide protective film to the skin.
- 6) Should melt or liquefy when applied on the skin.
- 7) Should make the rough surface of the cream smooth.
- 8) Should produce flushing action on skin and its pore openings.
- 9) They should form an emollient (oily) film on the skin after application.
- 10) Should not make skin dry which happens in case, when the skin is washed with water and soap.



**Cold Creams:** - These types of creams are water-in-oil type of emulsion. They produce cooling sensation by the evaporation of water, after application of cream to the skin. Hence, they are known as cold creams. They should possess emollient action and the layer left on the skin after application should be non-occlusive and shown in table 1.7.

<b>Raw Materials (Ingredients)</b>	<b>Roll (use)</b>
White beeswax	Emollient
Mineral oil	Lubricant
Distilled water	Vehicle
Borax	Buffer
Perfume	Odour

## Preparation of Cold Cream: -

Beeswax is melted in a container by using water bath to a temperature of about 70° C. Then mineral oil is added to the melted beeswax. This is mixture **A**. In another container, water is heated to a temperature of about 70° C and borax is dissolved in it and this is mixture **B**. Mixture **B** (aqueous phase) is added slowly to mixture **A** (oily phase) along with stirring. Stirring is carried out until a creamy emulsion is formed. At last, perfume is added to the preparation when it attains a temperature of about 40°C. Finally the product will be packed in suitable container.

## Shaving Creams: -

These are prepared by saponifying a mixture of best quality tallow and Cochin coconut oil with caustic potash and soda. Shaving soap contains considerable proportion of potassium soap and excess of stearic acid this combination give slower drying leather. Small amount of white paraffin and glycerine are added during milling process to improve smoothing and emollient properties. This soap is perfectly neutral in order to prevent irritation.

Shaving creams are formulated by saponifying a mixture of Cochin coconut oil, stearic acid with mixed solution of caustic potash and soda. About 5-10 % glycerol is added and 4 -8 % stearic acid is left un neutralized & have the pearly creamy and lasting leather. The brushless shaving creams contains stearic acid and fats with much less soap. Shaving soaps and creams may contain antiseptic and menthol.

**Thank You.**

**STAY HOME,  
STAY SAFE**