

# UNIT V

## COSMETIC PREPARATIONS FOR NAILS

**V.MANIMARAN**  
**LECTURER**  
**DEPARTMENT OF PHARMACEUTICS**  
**SRM COLLEGE OF PHARMACY**

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# INTRODUCTION :

- Nails are transparent protective coverings on finger tips and toes of feet.
- The care of nails is referred to as Manicuring .

Manicure preparations include:

- Nail lacquer/enamel/paint/varnish
- Enamel remover
- Powder polish
- Nail cream
- Nail bleach
- Cuticle remover
- Cuticle softener



# NAIL LACQUERS :

## Definition :

- “Nail lacquers are viscous preparations intended to decorate nails for fingers and toes”.

## Ideal Characteristics:

- It should have proper viscosity wetting and flow properties.
- It should have uniform colour .
- It should have good gloss and good adhesive properties.
- It should have sufficient flexibility so that it does not crack or become brittle.
- It should have sufficient hard surface which is resistant to impact and scratch.
- It should have reasonable drying time (1-2 minutes) without developing bloom.
- It should be able to maintain the above mentioned properties for a reasonable time (about 1 week ).





## Classification :

### Pearled nail lacquers:

Made up of lacquer base, colourants, pearl essence.



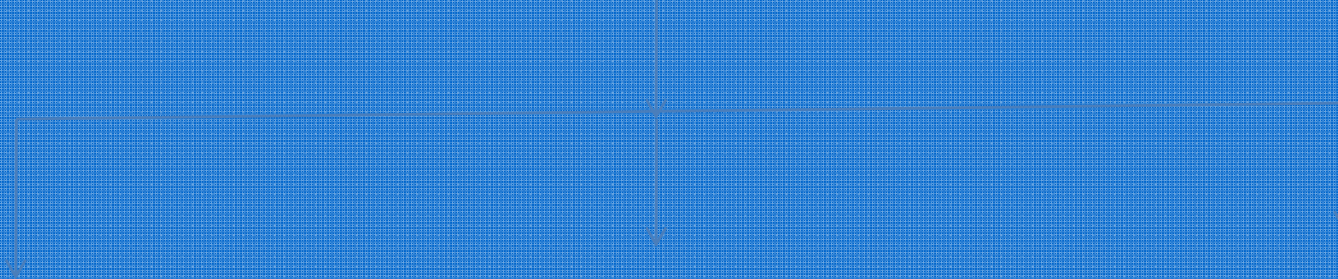
### Creamy nail lacquers:

Made up of a lacquer base, organic and inorganic pigments.



# Formulation:

## Nail lacquer system



### Lacquer base

- Film former
- Resin
- Solvent
- Plasticizer

### Colouring agents

Dyes  
Lakes  
Pigments  
Pearl essence

### Other Formulating agent

Suspending agents  
Opacifying agents  
UV absorbers  
Perfume



### Film formers:

- Impart hardness, toughness, resistance to abrasion , viscosity to some extent.

Nitrocellulose-widely used , based on viscosity ,

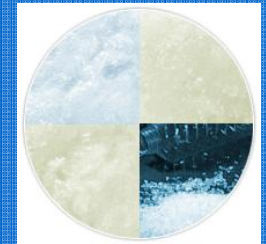
- ✓ SR nitrocellulose :10.7 to 11.2%  $N_2$
- ✓ RR nitrocellulose :11.2 to 12.8%  $N_2$

Other examples include cellulose acetate , cellulose acetate butylate, ethyl cellulose, vinyl polymers and various polymers of methacrylate.



### Resins:

- It impart adhesion and improve gloss , help in dispersing insoluble pigments and lakes.
- Natural resins :Shellac, benzoin, gum dammar, sandarac, ester gums.
- Synthetic resins: Sulphonamide-formaldehyde resins (poly aryl sulphonamides).



Commercial resins :

- ✓ Santolite MHP : Claimed to Increase hardness of nitrocellulose and impart gloss to it.
- ✓ Santolite MS 80% : Claimed to increase moisture resistance.



## Solvents:

- Solvents are volatile organic liquids that combine all the ingredients of lacquer formulation and make a homogeneous viscous preparation.
- Impart brushability and for regulating its drying time , viscosity of the preparation.
- High BP-gives a brighter film .
- Low BP-Lowers viscosity and covering power.
- Solvents are in 3 inter-related categories:
- 1. Active solvents: True solvents
- Eg., esters, ketones and glycol ethers for Nitrocellulose.
- 2. Couplers: Not solvents but in conjugation increase the strength of other solvents.
- 3. Diluents: Diluents are non-solvents for nitrocellulose . These are used to stabilize viscosity, to carry resins in solution and to reduce the effect of subsequent applications on the coat of enamel already applied, to lower the overall cost of the product.
- Eg., Aromatic and aliphatic hydrocarbons and alcohols like Toulene, benzene, xylene, hexane, heptanes, naphthas, light petroleum ether.





## Plasticizer:

- They impart flexibility and adhesiveness to the film , and also effect viscosity and the volatility or rate of drying .

Two types of plasticizers:

- Solvent plasticizers: Act as solvents and are of high molecular weight.
- Eg., Butyl acetyl ricenoleate.
- Non-Solvents plasticizers: Act as a softener.
- Eg., Castor oil.



## Colouring agents:

- Impart acceptable shade to the lacquer base .
- The colouring agents must comply with the terms of Drug and Cosmetic act , should disperse well , be resistant to light , acids and alkali found in detergents , be non-staining and produce a good gloss.
- Dyes: Soluble dyes alone normally cannot impart sufficient depth of colour ,abandoned due to staining the surface & surroundings of the nail. Eg., Eosin, erythrosine, carmosine, rhodamine
- Lakes: Insoluble lakes are incorporated to produce suitable shades.
- Eg., Colour lakes mentioned in Schedule Q to Drug and Cosmetics Act rules.



- Pigments: Insoluble in lacquers.  
Eg., Titanium dioxide, iron oxide, Ultramarine blue, Chrome oxide green.
- Pearl essence: Pearl essence is a suspension of crystalline guanine ( 2-amino-6-hydroxy purine) in nitrocellulose and solvents.
- Bismuth oxychloride, mica coated with titanium dioxide, pure aluminium and silver powder are also used.

#### Other formulating agents:

- Suspending agents: Suspending properties have been achieved by developing thixotropic system using pre-heated colloidal clays.
- Eg., Benzyl dimethyl hydrogenated tallow  
Ammonium montmorillonite (Bentone 27)  
Dimethyl dioctadecyl ammonium bentonite (Bentone 34)
- Opacifying agents: These are whitening agents which help to develop shades which will reflect the same colour on the nails as they are in the bottle. Eg., Titanium dioxide, Zinc oxide.
- UV absorbers: To prevent deterioration of ingredients due to UV light .
- Eg., Benzophenones and its derivatives.
- Perfume: used mainly to counteract the unpleasant odour of the solvents .
- Eg., Synthetic perfumes are preferred.



## MANUFACTURE OF NAIL LACQUERS:

The manufacture of nail enamels involves following distinct processes:

- Grinding of pigments:
- Manufacture of Nail lacquers
- Mixing of pigments with lacquer
- Safety aspects





# Manufacture of Nail lacquers (Continuation)

Add 75% of the solvent and whole of the diluent in a mixer. Mix well with agitation



Nitrocellulose is then added with stirrer on



Solvent is added



Plasticizer is added



Resin is added



Continued....



↓

Mixing is continued for several hours  
until solution of all ingredients is complete

↓

Clear lacquer is formed

↓

Passed through filter press or  
centrifuged

↓

Pigmented chips or concentrated tinters are  
added and mixing is continued

↓

Nail lacquer product is formed

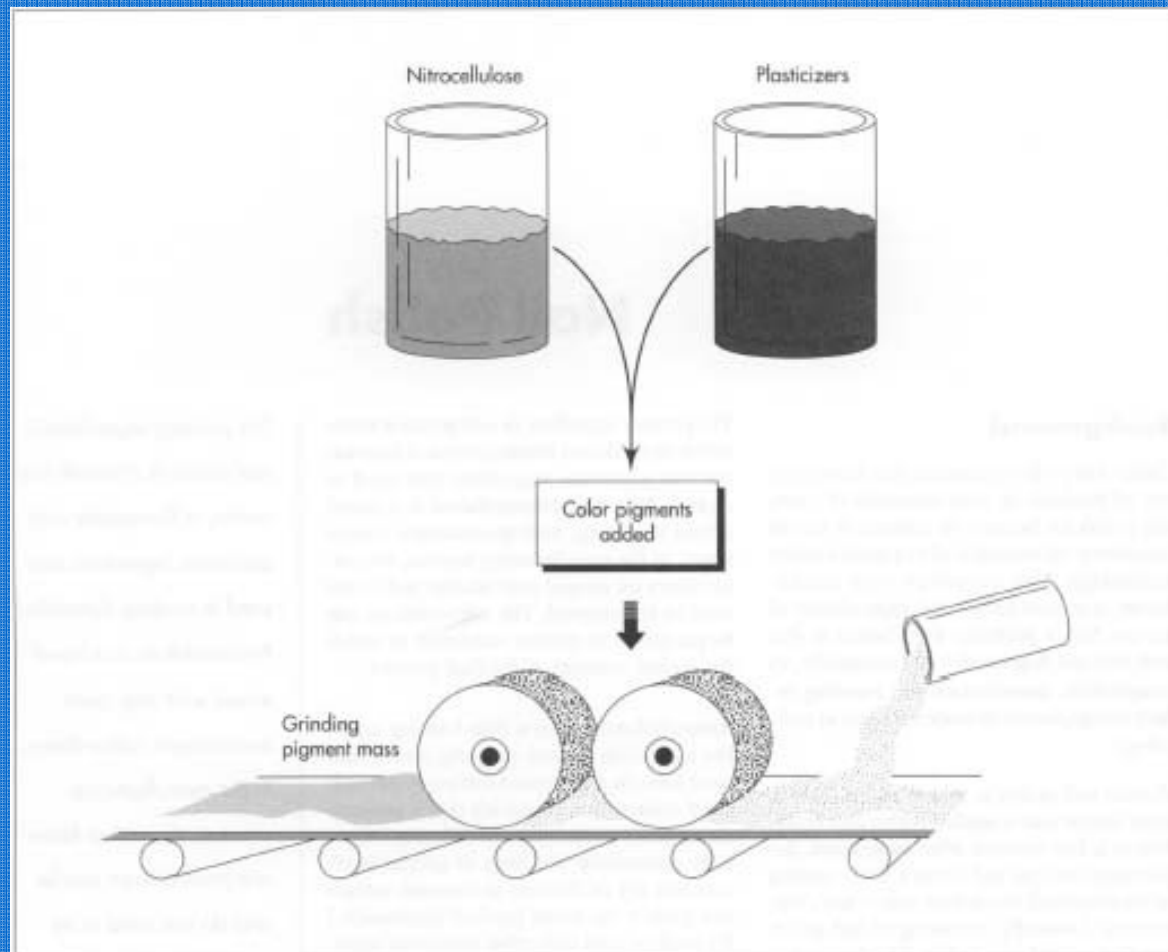


# Formulation of a Pearlescent Nail lacquer:

Ingredients	%
Nitrocellulose	14.90
Butyl acetate	34.04
Toulene	30.00
Toulene sulphonamide formaldehyde resin	7.10
Dibutyl phthalate	4.80
Camphor	2.40
Stearyl konium hectorite	1.20
Benzophenone - 1	0.20
D & C Red No. 7 , Calcium lake	0.08
D & C , No. Red . No.34 , Calcium Lake	0.05
FD&C, No.5, Aluminium lake	0.08
Bismuth oxychloride (25%)	5.00
Iron oxides	14 0.15



# Manufacture of Nail lacquers (Continuation)

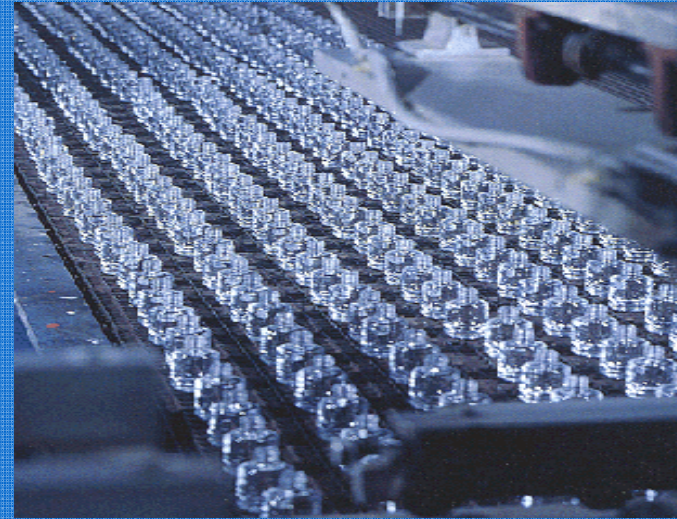




## FILLING:

- Since nail lacquers are highly inflammable, filling, capping and packing must be carried out under fire-proof and explosion-proof conditions.

- Proper care and precautions should be followed, for example, good ventilation, proper electrical wiring and prohibition of cigarette smoking in the working area.





# PACKING & LABELLING:

- Glass bottles with a brush applicator is the most conventional container which is used for the packaging of nail lacquers.
- The capacity varies from 8ml to 18ml.
- The applicator consists of an air-tight aluminium canister with an acrylic fiber tip or nib which applies polish directly to nails.





# Top Brands of Nail lacquers

## OPI Nail Colour



## Essie Nail Polish



## Zoya Nail Polish





## Evaluation :

Before nail lacquer is packed , the following testssould be carried out as a measure of quality control :

- Colour matching
- Drying rate
- Non-volatile content
- Smoothness
- Gloss
- Hardness
- Application properties
- Abrasion resistance
- Adhesion
- Water resistance
- Viscosity
- Stability



# ENAMEL REMOVERS:

## Definition :

- Nail removers / nail cleansers are defined as the mixture of solvents containing small amounts of fat intended to remove the nail enamel.

## Ideal Characteristics:

An ideal lacquer remover should have the following characteristics :

- It should not be too volatile to evaporate during application.
- It should not be non-irritating to surrounding skin.
- It should not leave the nails fatty or sticky.
- It should not have strong degreasing effect to leave nails brittle.
- It should not have unpleasant and obstrusive odour.



# Types and formulation of Enamel Removers:

- Type I contains solvent blends and a small percentage of oily materials.
- Formula :

Ingredients	%
Castor oil	2.5
Diethylene glycol mono ethyl ether	14.5
Acetone	83.0





- Type 2 (Non smearing enamel) contains Water and water miscible solvents.

- Formula :

Ingredients	%
Water	10.0
Ethyl acetate	90.0



- Method of preparation :

A simple remover prepared by mixing water and ethyl acetate.



- Type 3 ( Cream type enamel remover) contains solvent, waxes and soap.

- Formula :

Ingredients	%
Bees wax	3.0
Micro-crystalline wax	1.0
Acetylated monoglycerides	10.0
Diethylene glycol monoethyl ether	52.0
Ethyl acetate	15.0
Stearic acid	15.0
Triethanolamine	4.0

Method of preparation :

Melt all ingredients except triethanolamine , add triethanolamine to the mixture with stirring and allow to cool.





- Type 4 (Gel type varnish remover) contains hydroxy propyl cellulose.
- Formula :

Ingredients	%
Hydroxy propyl cellulose	1.0
Butyrol acetone	75.0
PPG-12-PEG-50 lanolin	1.0
Pigment (in Butyrol acetone)	0.1
Sodium hydroxide (5% aqueous)	qs
Water	To make 100.0





- Type 5 ( Conditioning nail polish remover) contains Malleated Soyabean oil and acetone.

- Formula :

Ingredients	%
Malleated Soyabean oil	10.0
Acetone	90.0

Method of preparation : Simple mixing of oil in the solvent.





# Evaluation of nail enamel remover:

- Subjects were given a supply of the test nail polish remover, nail enamel and cotton pads, along with instructions for use and a diary.
- Subjects were instructed to remove their nail enamel using the test product provided, 3 times per week for 4 weeks for a total of 12 uses.
- Subjects were instructed to use their usual brand of hand care products and not to introduce the use of any new hand care or nail products for the duration of the study.
- Subjects returned after 4 weeks of use for a final evaluation of the cuticles for signs of irritation. The last use of the test product was within 24 hours of the final product.



## Pharmaceutical nail lacquer:

- Fungal nail infection is an infection of the nails by a fungus and is known as Onychomycosis.
- The body normally hosts a variety of bacteria and fungi.
- Some of these are useful to the body. Others may multiply quickly and form infections.
- Fungi can live on the dead tissues of the hair, nails, and outer skin layers.
- Ciclopirox topical solution, 8%, contains a synthetic antifungal agent, ciclopirox.
- It is intended for topical use on fingernails and toenails and immediately adjacent skin.





## Recent advances:

- **Rehydrating Nail Hardener:**  
*(Miracle Nail)*  
For weak, thin, peeling, and splitting nails.
- **Free Nail Strengthener**  
Contains calcium and coffee extract to help strengthen and protect natural nails from oxidants; used for weak, thin, splitting or peeling nails, this product is Toluene, Formaldehyde, and Dibutyl Phthalate free.
- **Nail Rebuilder**  
*(Anti-Aging Nail Rebuilder)*  
For dry, cracked, yellowing and splitting nails
- **Almond Cuticle Oil with Ginseng Extract**  
Moisturizes and softens cuticles while nourishing and protecting them.





## Recent advances (Continuation)



### Mood changing nail lacquer:

- This type of nail lacquer changes its shade based on the mood of the woman.
- When her mood is normal it remains in light shade.
- When she feels anxious the shade darkens.



## Conclusion :

- Cosmetic preparations for nails are very essential for the proper maintenance of the nails.
- It is vital to maintain well hydrated and moisturised nails which is done by manicures.
- Nails even serve as defense to the fingers and toes from any mechanical injury hence nail care by using manicures is utmost important.





*Thank You!*