

# QUALITY CONTROL OF DIFFERENT COSMETICS PRODUCTS

# 1) Physical analysis of cosmetics

## SKIN COSMETICS

### Skin Cream

- a) Make up cream
  - Vanishing
  - Foundation
- b) Cold cream
- c) Moisturizer
- d) Night cream
- e) Protective cream
- f) All purpose
- g) Cleansing cream

### Hand or Body lotion

- a) Hand cleanser
- b) Hand lotion

### Sunscreen

### Face Powders

### Special cream

- a) Anti-acne
- b) skin tonic
- c) anti-ageing
- d) For men

### Evaluation of Skin Cosmetics :

General Sensitivity test : For Primary potential irritants Draize's test use. In this test Albino rabbits are clipped and substance to be tested is applied to ,

- Intact skin,    - Abrased Skin    - Lightly scarified skin

All of them are covered with a patch for 24 hours and changes are assessed.

BIS 411:1997 suggests that if there is no reaction in any of the animals, the same test should be performed on 10 Humans volunteers applying the substances on the skin of forearm.

As per IS, this test can be carried out on 10 lab. Animals either guinea pig or rabbits.

Cosmetic is applied on 2 cm sq.( for better exposure, area for test is shaved).

*If no reaction, subjects should be observed for 3 to 5 days to ascertain any late reaction. Its advisable to find out whether material causes photo sensitization.*

*If there is reaction, further test are necessary to find out which ingredient is responsible for reaction.*

*If no reaction.....same reappplied to same place or fresh patch may be applied.....its continued till,*

- Either a reaction is produced under one or more patches*
- Or investigator is confirmed that no reaction will occur.*

# 1) PATCH TEST :

*It has two purposes*

- a) Diagnostic : To discover whether the cosmetic used has caused dermatitis.*
- b) Prophetic : To assess whether a new cosmetic should be placed on market or not.*



## GENERAL PROCEDURE :

- o 0.1 to 0.3 gm of cosmetic to be tested is applied on a piece of cotton fabric, size 2-3 cm sq. and apply this to skin of arms, thigh or back.*
- o This patch is covered with a patch of cellophane abt 5 cm sq. and sealed with adhesive plaster about 40 cm sq.*
- o Allow to remain on skin for 24-72 hours.*
- o Sites of patched are examined after 30 minutes of removal of patch by an experienced dermatologist.(observation can be done earlier but before NLT 15 min)*



- 2) *VISCOSITY*: It should be measured during manufacturing process. Viscosity of creams and lotions are non-newtonian in nature it should remain constant throughout their shelf life. A Brookfield viscometer can be used to measure viscosity of cream & lotions.
- 3) *Cooling time & total stirring time*: These factor affect the cream consistency & viscosity of lotions and stability of emulsions.
- 4) *Peroxide stability test in creams*: Place 1 gm cream in test tube & heated in constant temperature water bath 24 hrs at 95 °C. Upper surface of cream should be in level with the fluid of the bath. The contents of the tube are transferred to 250 ml flask & peroxide content is determined.
- % Stability* = ( Final  $H_2O_2$  concentration / Initial  $H_2O_2$  concentration )  $\times 100$

## FACE POWDERS

Face powder may be either of loose fine powder or compact.

### ❖ Evaluation:

#### 1) Fineness of Powder

- Sieving method, - Microscopic Method
- Air separation technique.

As per IS 3959-2004, Residue on 75  $\mu$  sieve should be NMT 2 % & on 150  $\mu$  NMT 0.5 %.

#### 2) Apparent Density

#### 3) Shade & Uniformity of shade

- Comparison with standard shade kept for this purpose.
- Commonly std and sample both are placed between two glass plates and compared Observed in natural light.

#### 4) Odor - No physical measure for odor.

#### 5) Pressure applied on compact powder : by penetrometer,

#### 6) Breaking point. Cake is dropped on wooden (8-10 in) or thick rubber mat (6 feet),

#### 7) Matter insoluble in water : Boil 1 gm. with 200ml, filter, dry residue & find out.

#### 8) Moisture & volatile matter : By drying powder at 105 C to constant weight.

#### 9) pH of aqueous solution : By making suspension in water of 10 % or filtrate may be used.



10) Pay-off: the pay-off character, i.e. adhesion with the puff of compact or pressed powder should be tested on the skin



**Figure :Pay off**



## SUNSCREEN PRODUCTS

Post sweating SPF determined

1. 1000-4000 Å Ultraviolet zone.

- 2200-3200 Å Therapeutic UV Zone

i.e. Vitamin D & anti rachitic vitamin are found.

- 2500-3020 Å close to rays that cause sunburn

- 2800-3100 Å cause sunburn and are screen out

with sunscreen products. (UVB) so the longer

rays of 3000-3200 cause reddening of skin

or erythema, Tan producing rays.

- Sunscreen may be Preventive i.e. sunburn prevention by shading of body surface simulatory & therapeutic i.e. use of chemicals that screen out certain rays of sun



### ❖ Evaluation of Sunscreen products

1) Sun Protection Factor :: work of **R.Schulze** who defined a "Light Protection Factor" or "Protective Index" PI

SPF is defined as the ratio between the time needed to achieve erythema on protected skin divided by the time needed to get it on unprotected skin.

Three methods a) Human Methods

b) FDA Method

c) Animal Method

### ❖ Determination of Sweating Resistance.

- Minimum erythema Dose & SPF is determined. After application of sample, subjects are exposed to an 35 to 38 C & 70-80 % RH.

#### Product Category Designation (PCD)

As per FDA :	Minimal	SPF 2 to 4
	Moderate	4 to 6
	Extra	6 to 8
	Maximal	8 to 15
	Ultra	More than 15

2) Kumler's Sunscreen Index.

- He proposed to compute  $E_{0.1\text{ cm}}^{1\%}$  at 3080 Å to obtain SI

#### ... SUNSCREEN PRODUCTS.....

- This index can be used to calculate the % of a compound which should be incorporated to screen out a certain percentage of sunrays that cause sunburn.

$$x = 8 / \text{S.I.}$$

#### 3) Diluted Solution Transmittance Method.(DSTM)

- Can be used for preliminary assessment of sunscreens.

#### 4) Thin Film Transmittance Method.

- Slightly better than DSTM
- Thin film of sample is applied to quartz plate.
- Transmittance spectrum of plate is analyzed.

#### 5) Removed Epidermis Transmittance Method.

- It shows good correspondence to SPF.
- A portion of epidermis is removed from mouse and sample is applied.
- Then exposed to UV light and transmitted light is measured to assess degree of protection.



## Lipsticks

### 1) Melting point:

Determination of melting point is important as it is an indication of the limit of safe storage.

Determined by capillary tube method the capillary was filled, kept in the capillary apparatus and firstly observed the product was slowly-melted. After sometimes was observed the product was completely melted.

The above procedure was done in 3 times and the melting point ratio was observed in different-different formulation.

### 2) Softening point:

it gives indication whether lipsticks will be able to withstand variation in climate or not.

### 3) Color Match

IS 9875 : 1990 also prescribes tests like

- Pay off Test
- Particle Size determination of undispersed pigments.
- Test for Heavy metals

### 4) Solubility test:

The formulation herbal lipstick was dissolved in various solvents to observe the solubility.



5) Breaking point:

Breaking point is done to determine the strength of lipstick. The lipstick is held horizontally in a socket 1/4 inch away from the edge of support. The weight is gradually increased by a specific value (10 gm) at specific interval of 30 second and weight at which breaks is considered as the breaking point.

6) Skin irritation test: It is carried out by applying product on the skin for 10 min.

7) Aging stability:

The product is stored at 40° c and periodical observation of oil bleed, crystallization of wax on surface, and application characteristics is made.



**Melted  
lipstick**

8) Perfume stability:

The formulation herbal lipstick was tested after 30 days, to record the fragrance. Some raw materials have the ability to make fragrances adhere to the skin longer before the fragrance is volatilized. This capability is measured using a gas chromatography.

9) Oxidative stability: it is predicted by determination of peroxide value after exposure to oxygen under given conditions.

10) Thixotrophy character:

It is indication of thixotropic quality and is done by using penetrometer.

A standard needle of specific diameter is allowed to penetrate for 5 seconds under a 50 gm load at 25 °C. The depth of penetration is a measurement of the thixotropic structure of lipstick.



Figure : Microprocessor-Based Digital Penetrometer from Koehler

11) Force of application:

It is test for comparative measurement of the force to be applied for application. A piece of coarse brown paper can be kept on a shadow graph balance and lipstick can be applied at 45° angle to cover a 1 sq. inch area until fully covered. The pressure reading is an indication of force of application.

12) Surface anomalies:

This is studied by the surface defects, such as no formation crystals on surfaces, no contamination by moulds, fungi etc.



## ***Nail lacquers and removers***

- 1) Non-volatile content: this can be done by taking defining amount of lacquers and applying on plate of flat surface. Weight of the residual film after evaporation of solvent will indicate the non volatile content. The indian standards (IS :9245-1994)prescribes a minimum limit of 20% by mass.
- 2) Hardness : after application of the film on a flat surface the hardness is measured by applying pressure mechanically.
- 3) Water resistance: this is the measurement of the resistance towards water permeability of the film. This is done by applying a continuous film on a surface and immersing it in water.

The weights before and after immersion are noted and increase in weight is calculated higher the increases in weight lower the water resistance.

- 3) Viscosity : this is also an important character and can be measured by viscometer.

**Figure :**  
**Brookfield**  
**viscometer**





- 5) Smoothness : the film is applied on surface and surface characteristics of film studied microscopically.
- 6) Drying rate: this can be done by taking the product on a flat surface and touching the product with tip of finger at short interval of time.  
Time taken for disappearance of tackiness is noted. The Indian standards for nail lacquer (IS: 9245-2994) prescribes maximum drying time of 6 minute.
- 7) Application : For evaluation of these properties nail enamel is applied to nail & attention is paid to the following.  
flow  
even ness of application  
drag on brush  
formation of air bubble in the film

8) Abrasive resistance

Trabe abrader

it consists of turn table carrying a coated panel on which dual wheels of specified abrasiveness act.

when tested with apparatus, the loss of weight of coating is in specified no of revolution is taken as measure of resistance to abrasion



# Shampoo

- 1) Foaming ability and foam stability: Cylinder shake method was used for determining foaming ability. 50 ml of the 1% shampoo solution was put into a 250 ml graduated cylinder and covered the cylinder with hand and shaken for 10 times. The total volumes of the foam contents after 1 minute shaking were recorded.

The foam volume was calculated only. Immediately after shaking the volume of foam at 1 minute intervals for 4 minutes were recorded.



Figure : Ross-miles foam column

- 2) Viscosity: this is also an important character and can be measured by viscometer
- 3) Effect on hair : this can be studied by half-head technique. In which half of the hair is shampooed and the other half is used as control
- 4) Effect on skin and eyes: this can be measured by applying it on animals
- 5) pH: the pH of shampoo can be measured by pH meter and it should be between 6.0-9.0
- 6) Stability studies:  
The thermal stability of formulations was studied by placing in glass tubes and they were placed in a humidity chamber at 45 C and 75% relative humidity. Their appearance and physical stability were inspected for a period of 3 months at interval of one month.





## Tooth paste & tooth powders

- Particle size : this can be determined by microscopic study of the particles or by other means.
- Abrastiveness : the teeth are mechanically brushed with paste or powders using tooth brush. The effect are studied by observation, mechanical (measurement with micrometer gauge sensitive to 0.001 inch ) or other means (radioactive tracer techniques).
- The pH of the aqueous solution : the pH of dispersion of 10% of the product in water is determined by pH meter.
- Consistency : it is important that the product, paste, should maintain the consistency to enable the product press out from the container study of viscosity is essential for this. Rheology of powder is also important for proper flow of the powders from the container.
- Volatile matters and moisture : a specific amount of product is taken in a dish and drying is done till constant weight. Loss of weight will indicate amount of moisture present in product.