

# FORMULATION AND EVALUATION OF VARIOUS COSMETIC AND DENTAL PRODUCT

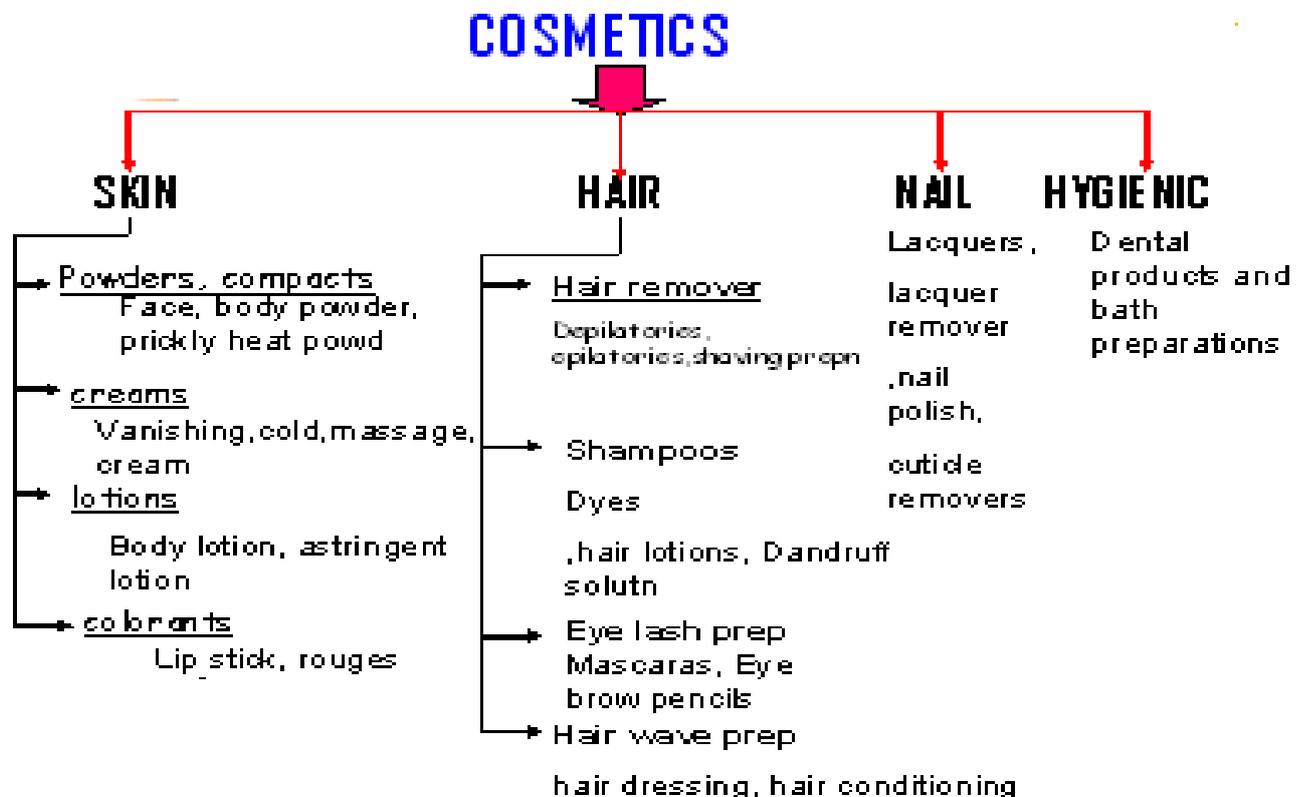
## 1) DEFINITION:-

The term cosmetics have been derived from the term "COSMETIKOS" which means the skill to decorate. Thus cosmetics is the art of decorating yourself to look beautiful.

### According to D & C Act:-

Cosmetics mean any articles meant to be rubbed, poured, sprinkled or sprayed on or introduced into or otherwise applied to any part of the human body for cleansing, beautifying, promoting attractiveness or altering appearance and include any article intended for use as a component of cosmetic. Soap is not covered under cosmetic product.

## 2) CLASSIFICATION OF COSMETICS:-



## 3) INGREDIENTS OF COSMETICS:-

1. Water
2. Oils, Fats, Waxes
3. Humectants

4. Surfactants
5. Preservatives
6. Perfumes And Colors
7. Herbal Or Plant Material
8. Functional Raw Materials

**1. WATER:-**

It is the main ingredient of cosmetics formulation. Thus stability and quality of final product is dependent on the purity of water used so pure water should be used in manufacturing of cosmetics. Pure water on large scale can be manufactured by any of the methods mentioned below.

- Ion exchange system
- Distillation
- Reverse osmosis

**2. OIL, FATS and WAXES:-**

These are used in preparation of creams, lotions, brilliantine, hair oil, lipsticks etc. The source of oil, fat & wax can be mineral source & animal source. The source and example is given below.

Source:-1) Mineral source

- mineral oil
- paraffin and petroleum jelly

2) Animal source

- wool fat
- bees wax, Spermaceti

**OILS:-**

| Name of oil (Vegetable) | Use in cosmetics  |
|-------------------------|---|
| Almond                  | Creams (emollient)  |
| Arachis                 | Hair oil, Brilliantines                                       |
| Castor                  | Lip stick, hair oil cream ,lotion                             |
| Olive                   | Bath oils ,creams lotions                                     |
| Type of mineral oil     | Use in cosmetics product                                      |
| Light liquid paraffin   | In bath oil, hair oil,lotions,creams,brilliantine             |
| Heavy liquid paraffin   | In bath oil, hair oil,lotions,creams,brilliantine (emollient) |

- **waxes:-** The commonly used waxes in preparation of cosmetics Include bees wax, spermaceti,ceresin,ozokerite wax

**3. HUMECTANTS:-**

This is added to prevent drying out of cosmetics

(e.g. o/w creams)

| Type of Humectant | Examples   |
|-------------------|--|
| 1.Inorganic       | Calcium chloride (not used now due to compatibility problems)                |
| 2.Metal organic   | Sodium lactate (used in sunscreen lotions)                                   |
| 3.Organic         | Polyethylene glycol, Propylene glycol, glycerol, sorbitol, mannitol, glucose |

#### 4. SURFACTANTS:

Surfactants lower one or more boundary tensions at interface in the system. one common feature of surfactant is that they all are amphipathic molecules containing a hydrophobic part & a hydrophilic part. Used in cosmetics to impart following functions:.

DETERGENCY, WETTING, FOAMING, EMULSIFICATION, SOLUBILIZATION

Surfactants on basis of their ionic behavior can be divided into following 4 types:-

| Type of surfactant | Examples   |
|--------------------|--|
| 1.Anionic          | Fatty acid soaps, alkyl sulphates, alkyl sulphonates, polyethylene glycol ester,alkyl ether sulphates taurines,sarcosinates etc. |
| 2.Cationic         | Alkyl trimethyl ammonium salts, Dialkyl dimethyl ammonium salts alkyl pyridinium salts, quaternised diamine salts.               |
| 3. Non ionic       | Alkanolamides,alkyl polyglycol ether, thioethers, alkyl polyethyleneimine amides.  |
| 4.Ampholytic       | Betains, alkylimidazolines, acyl peptides,etc.   |

#### 5. PRESERVATIVES:-

Used to prevent spoilage which occurs due to

1) Oxidation of oils                      2) Microbial growth

- Unused cosmetics are usually contaminated with PSEUDOMONAS but used cosmetics are contaminated with STAPHYLOCOCCI,FUNGI,YEAST

- Types of preservatives :-

- 1) Anti microbial agents:- e.g. .Benzoic acid, formaldehyde, cresol, phenol, thiomersol,phenyl mercuric salts. Etc.
- 2) Antioxidants :- Gallic acid, methyl gallate,BHA,BHT,Tocopherol, citric acid,Ethanolamine,lecithin,ascorbic acid, sodium sulphite, Sodium metabisulphite
- 3) Antioxidant synergists: - Enhance the efficacy of antioxidants. examples include:-ascorbic acid, citric acid, phosphoric acid
- 4) UV absorbers:-These are mainly used in products which are vulnerable to visible or UV light. By incorporating UV absorbers colorless containers can be used if deterioration is due to UV light only.

## 6. PERFUMES:-

The word perfume has been derived from “per” means through and “fumum” means smoke. It suggests that early perfumes were pleasant smells obtained by burning wood and grass etc.

| Source of perfume          | Example  |
|----------------------------|--|
| Natural<br>(Animal source) | Musk ,civet, Ambergris, Castoreum etc.                               |
| Natural<br>(Plant source)  | Rose ,jasmine, lemon, lavender etc.                                  |
| Aroma chemical             | Eugenol, Farnesal, Rose oxide, Citral ,Limonene                      |
| Floral base                | Rose base, Jasmine base  |
| Woody base                 | Citrus base(in colognes),spice base, oriental base, fruity base ,etc |

## 7. COLORS:-

It defined as visual sensation caused by a definite wavelength by an object by one/more phenomenon of emission, reflection, refraction, transmission.

Colors can be classified into three classes:-

- a) Natural colors:- Plant source :- e.g. Saffron, turmeric  
Animal source:-e.g. Cochineal (red)
- b) Inorganic colors:- e.g. Iron oxides, chromium oxides, carbon black, titanium dioxide, zinc oxide etc.
- c) Coal tar colors:-Tartrazine, amaranth, Erythrosine, Indigocarmine. etc.

## 8. HERBAL OR PLANT MATERIAL:-

These herbal or plant materials are used in different cosmetics preparations.

| NAME       | USE IN COSMETICS          |
|------------|---------------------------|
| Almond     | Facial and body scrubs    |
| Azadiracta | Tooth paste and skin care |
| Comfrey    | Creams and lotions        |
| Tulsi      | Skin cream and lotions    |
| Cucumber   | Masks, toner, cleanser    |
| Henna      | Dyeing of hair            |
| Amla       | Shampoo                   |
| Jasmine    | Hair oil                  |
| Lemon      | Skin tonic, cleansers     |

Apricot

Facial and body scrubs

**9. FUNCTIONAL RAW MATERIALS:-**

These agents contribute towards some functional property .

| TYPE                     | EXAMPLE & USE  |
|--------------------------|--|
| VITAMINS                 | Vit C (antioxidant in emulsion), vit A, Vit E (skin beautification)  |
| AMINO ACIDS              | AV HILL MP TT<br>(all essential amino acids)                         |
| ANTI INFLAMMATORY AGENTS | Allantoin (hand cream & lotion) Cade oil(eczema& psoriasis),Calamine |
| SUNSCREEN AGENTS         | PABA, Vitamin C, Quinine salts<br>Coumarin derivatives               |
| ANTIDANDRUFF             | Selenium, cadmium sulphide, ZPTO                                     |

**(4) FORMULATION**

❖ COSMETICS FOR SKIN

**Function:-**

- 1) To provide decoration
- 2) To supplement natural functions of skin

Type of cosmetics used for skin:-

1. Skin cream
2. Lotion
3. Face powder & Compacts
4. Skin colorants
5. Body powder
6. Face pack & Masks
7. Bath Preparations (bath salt,oil,powder,foam)
8. Astringents &Skin tonics (antiperspirants, astringent lotion, preshave & after shave lotion, colognes)

**1. CREAMS:** - These are the solid or semisolid preparation which is either a o/w or w/o type emulsion.

🟡 **TYPES OF CREAMS:**

- A. Cleansing cream
- B. Massage creams
- C. Night creams
- D. Moisturizing creams

- E. Foundation creams
- F. Vanishing creams
- G. All purpose creams

**A) CLEANSING CREAM:-** Cleansing cream is required for removal of facial make up, surface grime, oil, water and oil soluble soil efficiently mainly from the face & throat.

**Characteristic of a good cleansing cream:-**

- 1) Be able to effectively remove oil soluble & water soluble soil, surface oil from skin.
- 2) Should be stable & have good appearance.
- 3) Should melt or soften on application to the skin
- 4) Should spread easily without too much of drag.
- 5) Its physical action on skin & pore openings should be that of flushing rather than absorption

**Type of cleansing cream:-**

I.) **Anhydrous type:-** It contains mixture of hydrocarbon, oils and waxes. It also contains cetyl alcohol, spermaceti, cocoa butter, fatty acid esters etc. Not popular.

|                     |                                |
|---------------------|--------------------------------|
| Mineral oil-80 gm,  | Petroleum jelly- 15gm          |
| Ozokerite wax -5 gm | Preservative and perfumes -q.s |

**Note :-** Formation crusty surface is avoided by adding Ozokerite & petrolatum (prevent bleeding of mineral oils.)  
Opaque character obtained by adding Zno, mg.stearate, Tio<sub>2</sub>

II.) **Emulsified type:-** They can be either o/w or w/o type.

Common Ingredients:-

Oil phase.....Spread easily

Waxes.....Give appropriate thixotropy

Emollient material.....likes cetyl alcohol, spermaceti, lanolin

Water phase with preservative

**Different types:-**

(1) **Cold Cream:-** Cooling effect is produced due to slow evaporation of the water contained in the formulation. These are w/o type.

(2) **Beeswax Borax type:-** These contain high percentage of mineral oil. These are o/w type. This cream contains high amount of mineral oil for cleansing action. Basically these are o/w type emulsion. After the cream is being rubbed into the skin sufficient quantity of water evaporates to impart a phase inversion to the w/o type. The solvent action of the oil as external phase imparts cleansing property. In this type of cream borax reacts with free fatty acids present in the bees wax and produces soft soap which acts as the emulsifying agent and emulsifies the oil phase .

**A typical formulation:-**

|                   |                               |
|-------------------|-------------------------------|
| Bees wax -2 gm    | Borax-2 gm                    |
| Almond oil -50 gm | Rose water 35.5 gm            |
| Lanolin- 0.5gm    | preservative and perfume -q.s |

### **B) NIGHT & MASSAGE CREAM:-**

These are generally applied on the skin and left for several hours say overnight and assist in the repair of skin which has been damaged by exposure to various elements or exposure to detergent solution or soap. The mostly have a moisturizing & a nourishing effect of affected skin. These also contain vitamins and hormones basing on the application. This cream give better look to the skin and prevent dryness.

#### **A typical formulation**

- Mineral oil-38gm                      Borax 1gm
- Petroleum jelly-8gm                Water 35gm
- White bees wax-15gm            Perfume & preservative q.s
- Paraffin wax – 1.0gm
- Lanolin 2gm

### **C) VANISHING CREAM:-**

These are named so as they seem to vanish when applied to the skin. High quantity of stearic acid as oil phase used. This provides an oil phase which melts above body temp, and crystallises in a suitable form, so as to invisible in use and give a non greasy film.

- Main component is emollient esters ,stearic acids
- Part of stearic acid is saponified with an alkali & rest of stearic acid is emulsified this soap in large quantity of water.
- The quality of cream depends on the amount of acid saponified & nature of alkali used.
- NaOH makes harder cream than KOH.
- Borax makes cream very white but product has tendency to grain.
- Pearliness can be attained using liq.paraffin, cocoa butter, starch, castor oil, almond oil.
- Ammonia solution has a tendency to discolor creams made with it after some time.
- Cetyl alcohol improves texture and stability at low temperature without affecting sheen.

#### **A typical formulation**

- Stearic acid 15gm                      Glycerin 5gm
- KOH 0.5 gm                            water 75.82 gm
- NaOH 0.18 gm                        preservative & perfume q.s
- Cetyl alcohol 0.50 gm
- Propylene glycol 3.0gm

Stearic acid has whiteness like snow so some times the preparation is called as SNOW.

### **D) FOUNDATION CREAM:-**

- Applied to skin to provide a smooth emollient base or foundation for the application of face powder & other make up preparations. They help the powder to adhere to skin. They are almost o/w type.

#### **Types:**

- 1) Pigmented
- 2) Unpigmented

#### **A typical formulation**

- Lanolin 2 gm    Propylene glycol 8gm

- Cetyl alcohol 0.50 gm                      water 79.10 gm
- Stearic acid 10gm                              Perfume & preservative q.s
- KoH 0.40 gm

### **E) HAND & BODY CREAM:-**

- The repeated or constant contact with soap and detergent damages & removes film of sebum thus this cream is used to impart following functions to the skin.
- The function of these creams are
  - Replace/reduce water loss.
  - Provide oily film to protect the skin.
  - Keep the skin soft, smooth but not greasy.

#### **Type:-**

- a) Liquid cream:- consistency is of liquid nature
- b) Solid creams:- Consistency is higher
- c) Nonaqueous type:- Not containing any aqueous medium.

#### **A typical formulation**

- a.) Isopropyl myristate - 4 gm  
 Mineral oil -- 2 gm  
 Stearic acid – 3.gm  
 Emulsifying wax - .275 gm  
 Lanolin - 2.5 gm
  
- b.) Glycerin -3.0 gm  
 Triethanolamine – 1 gm  
 Water -84.225 gm  
 Perfume and Preservative -q.s

### **(F) ALL PURPOSE CREAMS:-**

All purpose means it is suitable for hands, face and body. They are w/o types.

#### **Formula:- Oil phase**

- Mineral oil 18%
- Lanolin 2%
- Petroleum jelly 2%
- Ozokerite 7%
- Paraffin wax 3%

#### **Water phase**

- Water 61.3%
- Glycerol 5%
- Magnesium sulphate 0.2%
- Perfume, preservative q.s

## **2) LOTIONS:-**

### **(I) Cleansing lotion**

#### **A typical formulation**

- Mineral oil 38%,
- Bees wax 2%,
- Triethanolamine stearate 8%,
- Water to make 100%
- Preservative & Perfumes –q.s

**Note:** - Triethanolamine discolors on standing so it should be made in situ using calculated amount of stearic acid and Triethanolamine. O/W lotion have tendency to increase in viscosity with ageing (this is prevented by using ethoxylated cholesterol)

**(II) Sunscreen lotions:-**

These lotions have property of protecting the skin from sun burning.

An ideal sunscreen agent should have following properties.

- Absorb light over the range of 200-400 nm.
- Be stable to heat, light & perspiration
- Be nontoxic & nonirritant
- Not be rapidly absorbed
- Be neutral
- Be readily soluble in suitable vehicles.

**US dept of health** has recommended following ingredients to be used as sunscreen agents. They absorb U.V radiation.

- CYCLOFORM
- MONOGLYCERYL PARA AMINO BENZOATE
- DIGALLOYL TRIOLEATE
- BENZYL SALICYLATE
- BENZYL CINNAMATE

And few others are PABA, cinnamic acid derivatives, coumarin derivatives, Quinine salts, uric acid derivatives.

**A typical formulation**

|                           |       |
|---------------------------|-------|
| Glyceryl p-amino benzoate | 3.0 % |
| Glycerin                  | 5.0 % |
| Alcohol                   | 10 %  |
| Methyl cellulose          | 0.5 % |
| Perfume                   | q.s   |
| Water to make             | 100 % |

**3. POWDERS:-**

These are categorized as face powder, body powder, and Compacts.

**The powders should have following properties:-**

- Must have good covering power so can hide skin blemishes.
- Should adhere perfectly to the skin & not blow off easily.
- Must have absorbent property.
- Must have sufficient slip to enable the powder to spread on the skin by the puff .
- The finish given to the skin must be preferably of a matt or peach like character.

The raw materials used to manufacture of various powders are classified with example as follows:-

| RAW MATERIAL FOR POWDER IMPARTING | EXAMPLE  |
|-----------------------------------|--|
| Covering prop                     | Titanium dioxide,zno,kaolin,zn stearate        |
| Adhesion prop                     | Mg.stearate,talc,mg & ca salt of myristic acid |

|                   |   |
|-------------------|---|
| Slip & Softness   | Zn/mg undecanate,aluminium hydrosilicate      |
| Absorbency prop   | Starch, colloidal kaolin,bentonite,pptd chalk |
| Peach like finish | Rice starch,silica,powdered silk              |
| Frosted look      | Guanine, bismuth oxychloride,mica,Zn,Al       |
| Color & perfumes  | Iron oxides                                   |

### FACE POWDER:-

Types of Face Powders:-

- A. Loose face powder
- B. Compact face powder
- C. Talcum powder
- D. Baby powder

#### A) LOOSE FACE POWDER :-

The essential feature of a good face powder includes Covering power, slip, Adhesiveness, Absorbency, Bloom, Coloring, Perfuming.

#### Type:-

- b) Light type
- c) Medium type
- d) Heavy type

| Type of face powder | purpose & composition  |
|---------------------|--|
| LIGHT               | Dry skin, contains large amount of talc                        |
| MEDIUM              | Normal or moderately oily skins, lesser talc & zinc oxide      |
| HEAVY               | Extremely oily skins ,low talc but higher amount of Zinc oxide |

#### TYPICAL FORMULATION OF FACE POWDERS:-

| LIGHT POWDER               | MEDIUM POWDER              | HEAVY POWDER                |
|----------------------------|----------------------------|-----------------------------|
| Talc -----63gm             | Talc-----39.7gm            | Talc-----20.0gm             |
| Kaolin -----20 gm          | Kaolin-----39.5 gm         | Kaolin(light)-20 0gm        |
| Cal. carbonate(l) 5 gm     | Cal. carbonate(l) 5 gm     | . Cal. carbonate(l) 39 g    |
| <b>Zinc oxide ---5.0gm</b> | <b>Zinc oxide ---7.0gm</b> | <b>Zinc oxide ---15.0gm</b> |
| Zinc stearate-5.0gm        | Zinc stearate-7.0gm        | Mg.stearate—5.0gm           |
| Mg.carbonate—1.0gm         | Mg.carbonate—1.0gm         | Color -----0.5gm            |



- Should have high retention of color intensity without any change in shade.
- Should be completely free from grittiness & free from drying.
- Nonirritating to the lips.
- Desirable degree of plasticity & have a pleasant odor and flavor.

▪ **Classification of raw materials:-**

- 1) Wax mixtures (bees, candeilla, carnauba, ceresin, Ozokerite wax)
- 2) Oil mixtures (castor, paraffin, THFA, isopropyl myristate)
- 3) Bromo mixture
- 4) Colors
- 5) Preservatives

**Types of lipsticks**

- 1) Transparent lipstick
- 2) Liquid lipstick
- 3) Lip rouge
- 4) Lip jelly
- 5) Lip salve
- 6) Lip glosses

**A typical formulation of lipstick.**

|                     |       |
|---------------------|-------|
| Castor oil          | 54 gm |
| Lanolin (anhydrous) | 11 gm |
| Candeilla wax       | 9 gm  |
| Isopropyl myristate | 8 gm  |
| White beeswax       | 5 gm  |
| Carnauba wax        | 3 gm  |
| Ozokerite wax       | 3 gm  |
| Eosin               | 2 gm  |
| Lakes               | 5 gm  |
| Rose flavor         | q.s   |
| Antioxidant         | q.s   |
| Preservative        | q.s   |

**b) SKIN ROUGE:** - These are the cosmetics preparations used to apply a color to the cheeks. The color may vary from the palest of pinks to the deep blue reds .The tint or color may be achieved using water insoluble colors such as iron oxides and certain organic pigments or by using water soluble organic colors which actually stain the skin.

**Types :-**

- Powder rouges
- Wax based rouges (Stick rouge)
- Emulsion cream rouges
- Liquid rouges
- 

| <b>Powder Rouges</b> | <b>Stick rouge</b> |
|----------------------|--------------------|
| Talc.....40          | Carnauba wax.....3 |
| Zinc oxide.....10    | Candelilla.....6   |

|                            |                           |
|----------------------------|---------------------------|
| Magnesium carbonate.....20 | Ozokerite.....1.5         |
| Pigment.....14             | Bees wax.....1.5          |
| Lanolin.....30             | Hexadecyl stearate.....10 |
| Perfume.....2              | Isopropyl myristate.....8 |
|                            | Castor oil.....65         |
|                            | BHA.....0.02              |
|                            | Color.....5               |

| Emulsion cream rouge (vanishing type) | Liquid rouge                  |
|---------------------------------------|-------------------------------|
| Stearic acid.....15                   | (A) Iso stearic acid.....0.02 |
| Potassium hydroxide.....0.5           | Mineral oil.....30            |
| Sod. Hydroxide.....0.18               | Iso propyl myristate.....5    |
| Glycerin.....8                        | Colloidal silica.....1        |
| Water.....76                          | Color.....3                   |
| Pigment, Perfume &                    | (B) Water.....48.3            |
| Preserative.....q.s                   | Triethanolamine.....4         |
|                                       | Perfume.....0.2               |

#### (4) ANTIPERSPIRANTS & DEODORANTS:-

**Anti perspirants:-** Aluminium chlorhydrate used which has antibacterial and astringent action. Aluminium chloride and Zirconium compounds are also used as antiperspirants.

**Deodorants:-**11 ( Hexachlorophene)

- TMTD (Tetra methyl triuram disulphide)
- Bithionol
- Bromosalicylanilide
- Diaphene
- Neomycin ( Antibiotic)
- Ion-exchange resin used like Amberlite
- Metal chelates like 1,3 Diketones used which chelate copper, aluminium, Mg compounds.

#### ❖ **COSMETICS FOR HAIR:-**

Includes following type of preparations:-

1. Shampoo
2. Hair tonics & Conditioners
3. Hair colorants and hair color remover
4. Hair grooming preparations
5. Depilatory & Epilatory
6. Shaving soaps & creams
7. Hair wave sets & lacquers ,rinses

##### 1. **SHAMPOO**

**Ideal characters of a shampoo:-**

- Should effectively and completely remove the dust, excessive sebum.
- Should effectively wash hair.

- Should produce a good amount of foam
- The shampoo should be easily removed by rinsing with water.
- Should leave the hair non dry ,soft, lustrous with good, manageability.
- Should impart a pleasant fragrance to the hair,.
- Should not make the hand rough and chapped.
- Should not have any side effects or cause irritation to skin or eye.

**Composition of shampoo:-**

- 1) Principal surfactant (anionic type)  
Non ionic surfactant has sufficient cleansing property but have low foaming power. Cationic are toxic. So anionic are preferred.
- 2) Secondary surfactant (anionic or ampholytic detergent)  
They modify detergent and surfactant properties of principal surfactant.
- 3) Antidandruff agents (selenium, cadmium sulfide, ZPTO)
- 4) Conditioning agent (lanolin, oil, herbal extract, egg, amino acids)
- 5) Pearlescent agents (substituted 4 methyl coumarins)
- 6) Sequestrants (EDTA)  
Added because Ca, Mg salts are present in hard water. Soaps cause dullness by deposition of Ca, Mg soaps on hair shaft. This prevented by EDTA.
- 7) Thickening agents (alginates, PVA, MC)
- 8) Colors, perfumes and preservatives

**Types of shampoo:-**

- 1) Liquid cream shampoo
- 2) Solid cream and gel shampoo
- 3) Powder shampoo
- 4) Antidandruff shampoo
- 5) Aerosol foam shampoo

**Formulation of shampoo:-**

| <b>Liquid Cream shampoo</b>  | <b>Solid cream and Gel Shampoo</b> |
|--|------------------------------------|
| SLS 30%  | SLS.....20%                        |
| PEG 400 Distearate   | Coconut monoethanolamide....1%     |
| Mag. Stearate  | Propylene glycol monostearate..2%  |
| Dist. Water  | Stearic acid.....5%                |
| Ninol AB 21  | Sodium hydroxide.....0.75%         |
| Oleyl alcohol  | Water, perfume, Colour.....100     |
| Perfume  |                                    |
| PEG 400 distearate and Mg stearate used to convert clear liquid shampoo to liquid cream shampoo. |                                    |
| Ninol AB 21- Thickening agent  |                                    |
| Oleyl alcohol- Conditioning agent  |                                    |

| <b>1) Powder shampoo</b> | <b>2) Antidandruff shampoo</b>  |
|--------------------------|---------------------------------|
| Henna powder ..... 5 gm  | Selenium disulphide..... 2.5 gm |
| Borax .....15 gm         | Bentonite ..... 5 gm            |

|                      |       |                           |         |
|----------------------|-------|---------------------------|---------|
| Sod. carbonate ..... | 25 gm | Sod. Lauryl Sulphates ... | 40 g    |
| Pot. Carbonate ..... | 5 gm  | Water .....               | 52.5 gm |
| Soap powder.....     | 50 gm | Perfume.....              | q.s.    |
| Perfume .....        | q.s.  |                           |         |

**Aerosol Shampoo:-** SLS.....30%  
Triethanolamine lauryl stearate.....5%  
Polyethylene glycol stearate.....3%  
Perfume.....0.3%  
Water.....100

90 parts of above packed with 2 parts of propellant 12 and 8 parts of propellant 14.

**2) CONDITIONERS:-** These are the preparations used after shampooing to render the hair more lustrous, easy to comb, and free from static electricity when dry. Conditioners are usually based on cationic detergents and fatty materials like lanolin, or mineral oil.

**3) HAIR COLORANTS:-** These are used either to hide gray hair or to change the color of the hair

An ideal hair dye should have following properties:-

- Should be nontoxic to the skin or hair, should not impair natural gloss and texture.
- Should not be a dermatitic sensitizer.
- The color imparted must be stable to air, light, water, shampoo.
- Should be easy to apply.

Hair dyes are divided into

1) Vegetable

Example is Henna

2) Metallic

Example:- Lead dyes, Bismuth dyes, Silver dyes, Copper, nickel, cobalt salts

Formula:- (Lead dyes)

Precipitated sulphur.....1.3%  
Lead acetate.....1.6%  
Glycerine.....9.6%  
Rose water.....87.5%

3) Synthetic organic dyes

They are of two types.

a) Semipermanent dye.

b) Permanent dyes

Thyoglycolic acid.....50%

Paraphenylene diamne dye

NH<sub>3</sub> solution(P<sup>H</sup> 9.2)...100%

**HAIR DYE REMOVER:-**

Formula:- Formamidine sulfinic acid.....1.5%

PVP.....5%

Ethylene glycol monobutyl ether.....5%

Ammonium carbonate.....1%

Ammonia.....0.5%

CMC.....2.5%

Water up to .....100

Formamidine sulfinic acid is acting as hair dye remover.

**4) HAIR GROOMING AIDS** :-These are important group of cosmetics which are used both by men and women to keep their hair in order for good looking, &enhance overall appearance.

Types:-

1. Brilliantines & Hair oils
2. Hair setting lotions
3. Hair creams
4. Hair lacquers or sprays

**5) DEPILATORIES:-**

- These are the preparations that remove superfluous hair by chemical breakdown. This removes hair at the neck of the hair follicle and thus has advantage over razor shaver which removes hair on a level with the surface of epidermis.
- **Desirable Characters of an ideal depilatory preparation are:-**
  - Selective in action
  - Efficient and rapid action in few minutes.
  - Non toxic and non allergic to the skin.
  - Odorless
  - Easy to apply
  - Stable
  - Non staining
- **INGREDIENTS :-**
  1. Inorganic sulphates (Sod,calcium,barium sulphide,Strontium sulphide)
  2. Thioglycollates: - (Calcium.thioglycollate & Lithium thioglycollate)
  3. Stannites: - sodium stannite
  4. Enzymes:-Keratinase (3-4%)
  5. Humectant: - Glycerol,Sorbitol ,Propylene glycol

**FORMULATION**

| Name of ingredient   | Amount  |
|----------------------|---------|
| 1.Strontium sulphide | 20.0 gm |
| 2.Talc               | 20.0gm  |
| 3.Methyl cellulose   | 3.0 gm  |
| 4.Glycerin           | 15.0 gm |
| 5.Water              | 42.0 gm |
| 6.Perfume            | q.s     |
| 7. Preservative      | q.s     |

**6) EPILATORIES:-**

Epilation is longer lasting or even can be of permanent nature. This is achieved by plucking the hair out and removing the root either by tweezers, threading,or by waxing.

- it is a permanent or long lasting effect (done by plucking the hair out, removing the root)
- Camphor-impart cooling effect to reduce discomfort of hair pulling.
- Local Anaesthetics:- overcomes discomfort and pain

**FORMULATION**

|           |       |
|-----------|-------|
| Rosin     | 70 gm |
| Bees wax  | 20 gm |
| Ozokerite | 10 gm |
| Perfume   | q.s   |

**7) SHAVING PREPARATIONS:** - These are preparations used to carryout shaving.

Types:-

- a) Used before shaving
- b) Used after shaving

Preparations before shaving includes

- 1) Lather shaving creams
  - 2) Brushless shaving cream
  - 3) Shaving soaps (solid, cream)
  - 4) Aerosol preparation
- Aftershave lotion

**SOAP BAR**

**SOAP CREAM**

| <i>I Ingredients</i>           | <i>A amount</i> | <i>I Ingredients</i> | <i>A Amount</i> |
|--------------------------------|-----------------|----------------------|-----------------|
| Stearic acid                   | 49 gm           | A. A.                | 漱               |
| Coconut oil                    | 1 13 gm         | 1. Stearic acid      | 30 gm           |
| Caustic potash                 | 22 gm           | 2. Coconut oil       | 10 gm           |
| Caustic soda                   | 12 gm           | 3. Palm kernel oil   | 05 gm           |
| Water                          | 1.25 gm         | B. B.                |                 |
| Sodium dioxy<br>stearate (50%) | o.75 gm         | 1. Pot. hydroxide    | 07 gm           |
| Sorbital liquid                | 1.25 gm         | 2. Sod. hydroxide    | 1.5 gm          |
| Glycerol                       | 0.75 gm         | 3. Water             | 36.5 gm         |
| Perfume                        | q.s             | 4. Perfume           | q.s             |
| Preservative                   | q.s             | 5. Preservative      | q.s             |

**1) BRUSHLESS SHAVING CREAM –**

Here Lathering with shaving brush is avoided.

**Formulation of brushless shaving cream**

| <i>INGREDIENTS</i>       | <i>AMOUNT</i> |
|--------------------------|---------------|
| 1. Stearic acid          | 16 gm         |
| 2. Mineral oil           | 14 gm         |
| 3. Spermaceti            | 2 gm          |
| 4. Glycerin              | 6 gm          |
| 5. Dil .ammonia solution | 2 gm          |
| 6. Water                 | 6 gm          |
| 7. Perfume               | q.s           |
| 8. Preservative          | q.s           |

## 2) LATHER SHAVING CREAM:-

Lathering with shaving brush is required.

| INGREDIENTS    | A AMOUNT (%) |
|----------------|--------------|
| Stearic acid   | 28           |
| Coconut oil    | 12           |
| Palm oil       | 5            |
| Pot. hydroxide | 6.5          |
| Sod. hydroxide | 1.5          |
| Glycerin       | 10           |
| Perfume        | q.s          |
| Preservative   | q.s          |
| Water to make  | 100          |

### AFTER SHAVE PREPARATION:-

Main purpose of shave preparation is to confer a pleasant feeling of comfort and well being after shaving. This is achieved by giving slight coolness, anaesthesia, tautness or emolliency to skin. At the same time it should be aseptic also.

#### Formula:- (Antiseptic after shave lotion)

|                 |        |
|-----------------|--------|
| Hyamine.....    | 0.25%  |
| Alcohol.....    | 40%    |
| Menthol.....    | 0.005% |
| Benzocaine..... | 0.025% |
| Water.....      | 59.72% |
| Perfume.....    | q.s    |

### ❖ COSMETICS FOR NAILS:-

Includes

1. Nail polishes
2. Nail lacquers & removers
3. Nail bleaches & Stain removers
4. Cuticle remover & softener
5. Fingernail elongations

#### 1 ) NAIL POLISHES:-

A distinction between nail polishes and lacquer is that in nail polish exert the abrasive action. Due to friction it draw the blood to numerous capillaries of nail bed and increasing blood supply, and exert stimulating effect to growth of nail. Examples are stannic oxide, talc, precipitated chalk. Silica exert abrasive action.

Formula:-

|                        |       |
|------------------------|-------|
| Stannic oxide.....     | 90%   |
| Powdered silica.....   | 8%    |
| Butyl stearate.....    | 2%    |
| Pigment & Perfume..... | ..q.s |

#### 2) NAIL LACQUERS :-

- These are the preparations that cover the nail with a water and air impermeable layer which normally remains for days.
- A good Nail lacquer should fulfill the following characters:-

- 1) Must be innocuous to the nail & the skin
- 2) Must be easy and inconvenient to apply
- 3) Product should be stable on storage
- 4) The product should produce a good & satisfactory film.

▪ **COMPOSITION:-**

- 1) Film former:- Nitro cellulose, Cellulose nitrate (mostly used), Cellulose acetate, cellulose acetobutyrate, Ethyl. Cellulose.
- 2) Resins :- Give film more body, gloss, depth, adhesion  
 Natural - Gum damar, Benzoic acid, Gum copal, Shellac  
 Synthetic - Sulphonamide –Formaldehyde Resins
- 3) Solvents:- Mix of solvent is preferred, Mixing middle b.p solvents like alcohols, acetates, and aromatic solvents rate of evaporation can be retarded.
- 4) Diluents:-
- 5) Plasticizers :- Dibutyl phthalate, Castor oil ,n-butyl stearate, castor oil
- 6) pearlescent material :-Guanine crystals  
 (R.I-1.8), mica flakes, TiO<sub>2</sub>, Platelets coated with bismuth oxychloride.
- 7) colors and perfumes

**Formulation (Nail Lacquer)**

| INGREDIENT     | AMOUNT  |
|----------------|---------|
| Nitrocellulose | 16 gm   |
| Resin          | 9 gm    |
| plasticizer    | 4.8 gm  |
| Solvent        | 60.5 gm |
| Color          | 0.5 gm  |
| Perfume        | q.s     |

**b) LACQUER REMOVERS:-**

These are also called as nail cleansers which is applied to remove nail lacquers.

**FORMULATION OF LACQUER REMOVERS**

| Ingredients                     | Amount |
|---------------------------------|--------|
| Butyl acetate                   | 15 gm  |
| Ethylene glycol monoethyl ether | 80 gm  |
| Propylene glycol ricinoleate    | 05 gm  |
| Perfume                         | q.s    |

**c) CUTICLE REMOVERS AND SOFTENERS:-**

Cuticle preparations either soften or remove the cuticles.

❖ **COSMETICS FOR EYES:-**

Includes following preparations

1. Eye shadow
2. Mascara

3. Eyebrow pencil
4. Eye cream
5. Eye liners
6. Kajal

1) EYE SHADOW:-

- Give a back ground of color to the eye
- Formulated as cream, liquid, powder or stick.
- Ultramarine(20 part)& TiO<sub>2</sub> --- **(BLUE)**
- Iron oxide(30 part) &TiO<sub>2</sub> (5 part)-- **(BROWN)**

| Ingredients           | Amount  |
|-----------------------|---------|
| petroleum jelly       | 47.5 gm |
| Liquid lanolin        | 4.5 gm  |
| Bees wax              | 4.5 gm  |
| Micro crystalline wax | 8.5 gm  |
| Isopropyl myristate   | 35 gm   |

2) EYE LINER:-

Types

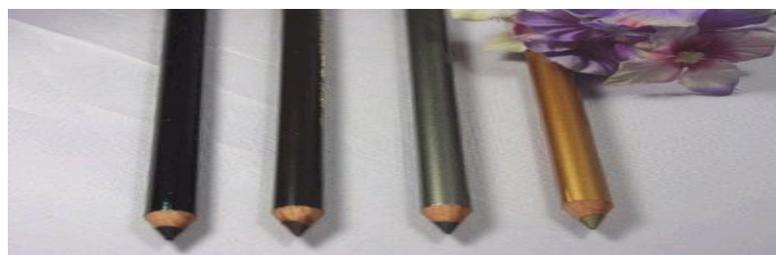
- 1) Pencil type
- 2) Liquid type (suspension in a base containing film forming material)
- 3) Cake eye liners

**Formulation of Cake type eyeliner**

|                         |       |
|-------------------------|-------|
| Kaolin                  | 5%    |
| Zn Stearate             | 12%   |
| Ppted Caco <sub>3</sub> | 7 %   |
| Pigment                 | 10%   |
| Talc to make            | 100 % |

3) EYE BROW PENCIL:-

- Contain high proportion of wax to increase M.P so that these can be moulded into sticks.



| Ingredient     | Amount |
|----------------|--------|
| Bees wax       | 25%    |
| Ozokerite      | 25%    |
| Butyl stearate | 8%     |
| Lanolin        | 2%     |
| Castor oil     | 25%    |
| Mineral oil    | 15%    |
| Perfume        | q.s    |

|             |     |
|-------------|-----|
| Antioxidant | q.s |
|-------------|-----|

#### 4) MASCARA:-

- Black pigmented preparation for applying to eye lashes or eye brows ,it darkens the eye lashes & gives an illusion of their density and length.
- Type:- Cake , Cream , Liquid

#### Formulation:-

|                         |       |
|-------------------------|-------|
| Carbon black            | 55 %  |
| Coconut oil sodium soap | 25%   |
| Palm oil –sodium soap   | 22.5% |



#### 7) QUALITY CONTROL OF COSMETICS :-

We all know that “Price of a product is quickly forgotten but the quality is remembered” so quality control plays a vital role regarding monitoring different parameters that may affect quality &also helps in producing quality product every time.

Includes :-

- 1) RAW MATERIAL CONTROL
- 2) INTERMEDIATE PRODUCT CONTROL
- 3) FINISHED PRODUCT CONTROL
- 4) PACKAGING MATERIAL CONTROL

##### 1) Q.C OF RAW MATERIAL:-

- Done by determination of **Bioburden**  
The bacterias that are monitored in raw materials include:-
  - Enterobacteriaceae
  - E.Coli
  - Salmonella
  - Pseudomonas aeruginosa
  - Staphylococcus aureus

##### 2) Q.C OF INTERMEDIATES AND BULK FINISHED PRODUCT:-

Basing on the type of product few typical processing parameters are continuously to ensure quality final product. few of them have been enlisted here.

###### a) CREAMS & LOTIONS:-

- Mechanics,
- perfume addition temp
- addition of phases
- Viscosity
- Temp of filling
- rate of cooling

###### b) FACE POWDER

- Uniformity of mixing
- Apparent density
- Shade ,color

- Compression pressure (compacts)

**c) LIPSTICKS**

- Color match
- Texture
- Softening point
- Breaking point test

**d) SHAMPOO:-**

- -Foam & foam stability
- -Detergency & coloring action
- -Wetting action
- -Eye irritation
- -Oral toxicity

**e) NAIL LACQUER:-**

- Color match, Drying rate,
- Non volatile content,
- Smoothness,
- Gloss, Hardness, abrasion resistance, adhesion etc.

**Sampling size for final Q.C:-**

| No of packaging | No of packing selected |
|-----------------|------------------------|
| Up to 3         | Each                   |
| 4-50            | 03                     |
| 51-150          | 04                     |
| 151-300         | 05                     |
| 301-500         | 06                     |
| >500            | 07                     |

**8) COSMOCEUTICALS: -** These are cosmetics with therapeutic & disease fighting property



The following substances are now recognized having cosmeceutical potentials

- 1) Polysaccharides** :-Fom Tamarind extract and skin beneficial acids from Coriander extract provide moisture-lipid balance preventing dryness and itching 2
- 2) Wheat Germ Oil** guard skin against free radical damage.
- 3) Moringa Extract** protects your skin against dust and harmful pollutants.

- 4) **Galanga Oil** \* protects skin from harmful UV rays and fights pimple in acne prone skin. Skin beneficial fatty acids from **Coriander** boost the deposition of skin proteins, enhancing tissue repair
- 5) **Cococin** provides wholesome freshness and nourishment of natural tender coconut water. Natural growth promoters like kinetin and amino acids in Cococin® impart natural conditioning, suppleness and glow to the skin.
- 6) **Ubiquinone(CO.Q.10)** rejuvenates and increases the oxygen uptake into the cells.
- 7) **Tetrahydrocurcuminoids**, patented molecule from turmeric in combination with potent antioxidants - Alpha lipolic acid and Ubiquinone reduces fine lines, wrinkles, crow's feet, minimizes the UV induced signs of photo aging and pigmentation, leaving behind blemish-free, youthful skin.
- 8) **Isoflavons** from Soy impart luster and brightness to the skin by improving skin thickness, skin blood circulation, increased desquamation resulting in excellent surface texture and softness.
- 9) **Tetrahydropiperine** as Cosmoperine from Pepper improves the dermal penetration of the actives,

#### MISCELLANEOUS ISSUES:-

##### SKIN TESTING:-

| Type of cosmetic Preparation | Suspected agent to cause harm               |
|------------------------------|---|
| CREAMS                       | Mercurial & Salicylic acid                  |
| DEODORANT                    | Phenolic antimicrobials, Aluminium.chloride |
| DEPILATORIES                 | Sulphides of alkali (R.A)                   |
| HAIR DYE                     | Ammonia solution                            |
| COLD WAVE LOTIONS            | Thioglycollates                             |
| LIPSTICK                     | Bromofluorescein dye (cause Cheilitis)      |
| HAIR & BATH Prep             | Agent which cause eye irritation            |

#### 4) TEN SYNTHETIC COSMETIC INGREDIENTS TO AVOID:-

Organic consumers association has given the following list of chemicals that are to be avoided in preparation of cosmetics.

1. Imidazolidinyl Urea and Diazolidinyl Urea
2. Methyl and Propyl and Butyl and Ethyl Paraben
3. Petrolatum
4. Propylene Glycol
5. PVP/VA Copolymer
6. Sodium Lauryl Sulfate
7. Stearalkonium Chloride
8. Synthetic Colors  
Example: FD&C Red No. 6 / D&C Green No. 6
9. Synthetic Fragrances
10. Triethanolamine

#### Newer approaches

- Hair Growth-accelerating preparation containing chlorogenic acid or its isomer for treating androgenic alopecia and its formulation.
- Cosmetic composition contain in caffeine, acetic acid and sodium hyaluronate for preventing alopecia.

## DENTAL PRODUCTS

### LIST OF CONTENTS

- 1) Introduction
- 2) The teeth and common problem
- 3) Causes of oral health problems
- 4) Classification
- 5) Formulation of dentifrices
- 6) Type of dentifrices
  1. Tooth pastes
  2. Tooth powders
  3. Solid blocks
  4. Liquid preparations
  5. Mouth wash
- 7) Topical anesthetics
- 8) Tartar reducing product
- 9) Mechanical method for plaque control
- 10) Safety
- 11) Dental care product
- 12) Newer approaches

### INTRODUCTION

**Dentifrice** a preparation for cleansing and polishing the teeth; it may contain a therapeutic agent, such as fluoride, to inhibit dental caries.

A substance, such as a paste or powder, for cleaning the teeth.

Eymology: L, *dens* + *fricare*, to rub

a pharmaceutical compound used with a toothbrush for cleaning and polishing the teeth. It typically contains a mild abrasive, detergent, flavoring agent, fluoride, and binder. Other common ingredients are deodorants, humectants, desensitizers, and various medications to prevent dental caries. Also called toothpaste.

#### **Dentifrice (toothpaste)**

A pharmaceutical compound used in conjunction with the toothbrush to clean and polish the teeth. Contains a mild abrasive, a detergent, a flavoring agent, a binder, and occasionally deodorants and various medicaments designed as caries preventives (e.g., antiseptics).

Two type of Dentifrice

1. **Simple cleansing dentifrices**
2. **Therapeutics dentifrices:** Therapeutic dentifrices may contain the bactericidal, bacteriostatic, enzyme inhibiting or acid neutralizing qualities of the drugs or chemicals.

### The teeth and common problem

### **1. Bad Breath**

If you suffer from bad breath, you are not alone. Bad breath, also called halitosis, can be downright embarrassing. According to dental studies, about 85% of people with persistent bad breath have a dental condition that is to blame. Gum disease, cavities, oral cancer, dry mouth and bacteria on the tongue are some of the dental problems that can cause bad breath. Using mouthwash to cover up bad breath when a dental problem is present will only mask the odor and not cure it. If you suffer from chronic bad breath, visit your dentist to rule out any of these problems.

### **2. Tooth Decay**

Did you know tooth decay, also known as cavities, is the second most prevalent disease in the United States (the common cold is first). Tooth decay occurs when plaque, the sticky substance that forms on teeth, combines with the sugars and / or starches of the food we eat. This combination produces acids that attack tooth enamel. The best way to prevent tooth decay is by brushing twice a day, flossing daily and going to your regular dental check ups. Eating healthy foods and avoiding snacks and drinks that are high in sugar are also ways to prevent decay.

### **3. Gum (Periodontal) Disease**

Studies have shown that periodontal disease, also known as gum disease, is linked to heart attacks and strokes. Gum disease is an infection in the gums surrounding the teeth. Gum disease is also one of the main causes of tooth loss among adults. There are two major stages of gum disease: gingivitis and periodontitis. Regular dental check ups along with brushing at least twice a day and flossing daily play an important role in preventing gum disease.

### **4. Oral Cancer**

Oral cancer is a serious and deadly disease that affects millions of people. In fact, the Oral Cancer Foundation estimates that someone in the United States dies every hour of every day from oral cancer. Over 300,000 new cases of oral cancer are diagnosed every year, worldwide. This serious dental disease, which pertains to the mouth, lips or throat, is often highly curable if diagnosed and treated in the early stages.

### **5. Mouth Sores**

There are several different types of mouth sores and they can be pesky and bothersome. Unless a mouth sore lasts more than two weeks, it is usually nothing to worry about and will disappear on its own. Common mouth sores are canker sores, fever blisters, cold sores, ulcers and thrush.

### **6. Tooth Erosion**

Tooth erosion is the loss of tooth structure and is caused by acid attacking the enamel. Tooth erosion signs and symptoms can range from sensitivity to more severe problems such as cracking. Tooth erosion is more common than people might think, but it can also be easily prevented.

### **7. Tooth Sensitivity**

Tooth sensitivity is a common problem that affects millions of people. Basically, tooth sensitivity means experiencing pain or discomfort to your teeth from sweets, cold air, hot drinks, cold drinks or ice cream. Some people with sensitive teeth even experience discomfort from brushing and flossing. The good news is that sensitive teeth can be treated.

## **8. Toothaches and Dental Emergencies**

I can't think of much worse than suffering from a toothache. While many toothaches and dental emergencies can be easily avoided just by regular visits to the dentist, we all know that accidents can and do happen. Having a dental emergency can be very painful and scary. Fortunately, you can do several things until you are able to see your dentist.

## **9. Unattractive Smile**

While an unattractive smile is not technically a "dental problem," it is considered a dental problem by people who are unhappy with their smile and it's also a major reason that many patients seek dental treatment. An unattractive smile can really lower a person's self-esteem. Luckily, with today's technologies and developments, anyone can have a beautiful smile. Whether it's teeth whitening, dental implants, orthodontics or other cosmetic dental work, chances are that your dentist can give you the smile of your dreams.

### **Causes of oral health problems**

#### **1)Pellicle**

The pellicle is rapidly formed on all freshly cleaned tooth surfaces by the deposition and absorption of some salivary proteins. It is less than 0.1 mm thick and is invisible to the naked eye.

#### **2)Plaque**

Following the deposition of pellicle on a freshly cleaned tooth surface, plaque forms rapidly. Plaque is an invisible sticky film of bacteria, salivary proteins, and polysaccharides that accumulates on everyone's teeth. It is not washed away by the saliva, and the composition of bacteria depends upon the host, the site in the mouth and the age of the plaque layer. In the event of poor oral hygiene, plaque ages and there is a shift in bacterial population to more harmful organisms as the plaque age.

#### **3)Dental calculus (tartar)**

Dental plaque may itself become mineralized and this hard deposit is called calculus. It accumulates on the tooth surface mainly at the gingival margin opposite the salivary ducts. It is a hard mineral deposit, containing predominantly calcium and phosphate, very tightly bound to the tooth surface. Once it has formed, it is virtually impossible to remove it except by a dental hygienist.

### **CLASSIFICATION OF DENTAL PRODUCTS**

Classification depending on Dental Problems.

#### **I. Products for carries control.**

- a. Systemic fluoride
- b. Topical fluoride
  - i. Dentifrices
  - ii. Gel
  - iii. Rinses
  - iv. Miscellaneous

#### **II. Products for plaque control.**

- a. Chemical agents
  - i. Dentifrices

- ii. Mouth washes
- b. Mechanical products
  - i. Tooth brushes
  - ii. Dental floss
  - iii. Other aids to plaque removal.

**III. Products for tooth surface hypersensitivity.**

**IV. Topical anesthetic.**

**V. Halitosis**

**TOOTHPASTE INGREDIENTS AND MANUFACTURE**

**Requirements of a toothpaste/dentifrice**

The major requirements of oral preparations, especially toothpastes, have been summarized on many occasions in the past. For a toothpaste, these requirements were:

1. When used properly, with an efficient toothbrush, it should clean the teeth adequately, that is, remove food debris, plaque and stains.
2. It should leave the mouth with a fresh, clean sensation.
3. Its cost should be such as to encourage regular and frequent use by all.
4. It should be harmless, pleasant and convenient to use. (It should conform to the EC Cosmetics Directive in that it is 'not liable to cause damage to human health when applied under normal usage conditions'.)
5. It should be capable of being packed economically and should be stable in storage during its commercial shelf-life.
6. It should conform to accepted standards in terms of its abrasivity to enamel and dentine.
7. Claims should be substantiated by properly conducted clinical trials.

These requirements remain valid today, with perhaps only the priority and emphasis placed on any individual point being changed.

- ✚ To achieve this it is necessary to have a high solid suspension in a stable viscous form and therefore gelling agents or thickening polymers have to be incorporated.
- ✚ To prevent it from drying out it also becomes necessary to add humectants to the system. Finally, colours (if desired), and preservatives (if necessary), are also added, creating a complex matrix of ingredients which can be classified as a 'simple' cosmetic toothpaste, i.e.
  1. Cleaning and polishing agents (abrasives).
  2. Surfactant (cleaning and foaming).
  3. Humectants.
  4. Binding (gelling) agents.
  5. Sweetener.
  6. Flavouring agents.
  7. Minor ingredients (colours, whitening agents, preservatives).

- ✚ In such a complex system many interactions can take place depending upon internal and external factors. Even the 'simple' formulations require extensive stability testing, over a range of temperatures and time, in order to be confident that the product quality does not change upon storage. Only in this way can the manufacturer have a high degree of confidence that the product seen by the consumer is of premium quality.

'A dentifrice should be no more abrasive than is necessary to keep the teeth clean - that is free of accessible plaque, debris and superficial stain'. Thus, considerable performance testing on the final formulation is necessary.

## ❖ Ingredients used in toothpastes

All ingredients generally have specifications approved for use in foodstuffs or are special grades available for dental preparations, especially abrasives.

### 1. Cleaning and polishing agents (abrasives)

Clearly the main purpose of the cleaning and polishing agent is to remove any adherent layer on the teeth, and the materials normally considered are given below.

#### **(a) Dental grade silicas (SiO<sub>2</sub>)<sub>n</sub>.**

- ✚ In a relatively short period of time silica has generally become the abrasive of choice because it offers great flexibility to the formulator.
- ✚ It can be produced to a high state of purity giving excellent compatibility with therapeutic additives and flavours.
- ✚ Varying the particle size can alter the finished product abrasivity.
- ✚ Clear gels can be formulated by carefully matching the refractive indices of silica used with the liquid phase of the toothpaste.
- ✚ Silica can also give additional thickening properties to the dental cream if extremely fine particle sizes are used (silica thickeners).
- ✚ When used in toothpastes, silica is generally incorporated at levels between 10 and 30%.

#### **(b) Dicalcium phosphate dihydrate (DCPD) CaHPO<sub>4</sub>·2H<sub>2</sub>O.**

- ✚ DCPD is one of the most commonly used dental cream abrasives, perhaps because it gives good flavour stability.
- ✚ It is normally white in colour and gives toothpaste which generally does not require additional whitening agents.
- ✚ The main drawback is that it is only fully compatible with sodium monofluorophosphate as the fluoride source because of the presence of free calcium ions. Formulating with other therapeutic fluoride sources does not appear to have been successful.
- ✚ The abrasive is usually formulated at levels between 40% and 50% to give relatively dense toothpaste.

#### **(c) Calcium carbonate CaCO<sub>3</sub>.**

- ✚ Calcium carbonate is probably one of the most commonly used dental cream abrasives.
- ✚ Precipitated calcium carbonate (chalk) is available with a white or off-white colour and both particle size and crystalline form can be varied, depending upon its conditions of manufacture.
- ✚ As a result of its structure and calcium content, precipitated calcium carbonate is incompatible with sodium fluoride, but is stable with the less reactive sodium monofluorophosphate.
- ✚ Calcium carbonate is also used at levels between 30% and 50% to give a relatively dense paste.

#### **(d) Sodium bicarbonate (or baking soda NaHCO<sub>3</sub>).**

- ✚ Sodium bicarbonate has a unique 'salty' mouth-feel that tends to polarize consumers, many finding it attractive possibly due to its heritage as a cleaner/deodorizer.
- ✚ It is a very mild abrasive, usually used at a 5-30% level, in combination with other abrasives such as silica or calcium carbonate to achieve the required cleaning action.

#### **(e) Hydrated alumina Al<sub>2</sub>O<sub>3</sub> · 3H<sub>2</sub>O or Al(OH)<sub>3</sub>.**

- ✚ Hydrated alumina is relatively inert, cost-effective, and available as a white amorphous solid.
- ✚ It has good compatibility with sodium monofluorophosphate and other ingredients added to give a therapeutic benefit.
- ✚ The abrasive is usually formulated at levels between 40% and 50% to give a relatively dense paste.

#### (f) Other abrasives.

- ✚ Insoluble sodium metaphosphate (IMP) ( $\text{NaPO}_3$ )<sub>x</sub>, is available as a free-flowing white powder, with moderate abrasivity and good compatibility with flavour oils, sodium monofluorophosphate and ionic fluoride sources (stannous and sodium fluorides).
- ✚ it is now only used in extremely limited amounts.
- ✚ Calcium pyrophosphate (CPP),  $\text{Ca}_2\text{P}_2\text{O}_7$ , was the original abrasive purposely developed for its compatibility with stannous fluoride to give the first commercially available therapeutic dentifrice containing fluoride.

### 2. Surfactants

- ✚ Surfactants are used in the toothpaste to aid in the penetration of the surface film on the tooth by lowering the surface tension.
- ✚ They also provide the secondary benefits of providing foam to suspend and remove the debris, and the subjective perception of toothpaste performance.
- ✚ They often have better foaming properties, and are more compatible with other ingredients since their pH range is essentially neutral.
- ✚ They are also available with a higher degree of purity that can eliminate some of the bitter flavour components that affect taste.
- ✚ In general, surfactants are used at a concentration of around 1-2% by weight in the dental cream.

#### (a) Sodium lauryl sulphate (SLS)

- ✚ This has been the main surfactant of choice, used in nearly all toothpaste brands.
- ✚ However, while alternative surfactants have been considered, and will continue to be looked at and developed, none is in widespread use since all have some disadvantages compared to SLS.

### 3. Humectants

- ✚ Humectants are used to prevent the paste from drying out and hardening to an unacceptable level.
- ✚ At the same time they give shine and some plasticity to the paste.
- ✚ Generally only two major humectants are considered for use in toothpaste, often in combination with small amounts of additional minor humectants.

#### (a) Glycerin, $\text{CH}_2\text{OHCHOHCH}_2\text{OH}$ .

- ✚ Glycerin is still the humectant used in greatest bulk quantity in toothpaste. It is one of the best humectants, producing a shiny, glossy product.
- ✚ It is stable, non-toxic, available from both synthetic and natural sources, and provides a useful sweetening function to the paste.

#### (b) Sorbitol, $\text{CH}_2\text{OH}(\text{CHOH})_4\text{CH}_2\text{OH}$ .

- ✚ Sorbitol syrup (approximately 70%) is also extensively used throughout the industry and is sometimes considered superior to glycerin depending upon the formulation.
- ✚ It also imparts sweetness, and is a stable humectant.

#### (c) Propylene Glycol, $\text{CH}_3\text{CHOHCH}_2\text{OH}$ and Polyethylene Glycol, $\text{CH}_2\text{OH}(\text{CHOH})_n\text{CH}_2\text{OH}$ .

- ✚ Propylene glycol and polyethylene glycol are not normally used as the sole humectant in a paste since they are more expensive and, in the case of propylene glycol, can impart a slightly bitter taste.

- ✚ They are more generally used in relatively small amounts in combination with either glycerin or sorbitol.
- ✚ The amount of humectant in any formula obviously has to be adjusted depending upon the other constituents of the formula (especially abrasive nature), but generally the total humectant loading is in the range 10-30% by weight.

**(d) Xylitol (CH<sub>2</sub>OH(CHOH)<sub>3</sub>CH<sub>2</sub>OH).**

- ✚ Xylitol is a polyol equivalent of sorbitol, but with a five-carbon chain instead of six. Like sorbitol it is a naturally occurring material with a relative sweetness equal to sugar.
- ✚ Currently its high cost and limited availability restrict its use.

**4. Gelling agents**

- ✚ Gelling or binding agents are hydrophilic (water-loving) colloids which disperse and swell in the water phase of the toothpaste and are necessary to maintain the integral stability of the paste and prevent separation into component phases.
- ✚ They are probably the most widely variable components of toothpaste and the choice of gelling agent can greatly influence the dispersibility of the paste in the mouth, the generation of foam and, above all, the release of the flavor components.
- ✚ Some formulations have combinations of gelling agents in order to achieve the desired consumer preferences.

**(a) Sodium Carboxymethyl Cellulose CMC.**

- ✚ Carboxymethyl cellulose is one of the preferred gelling agents for use in toothpaste.
- ✚ It can be manufactured to a high state of purity, and tailor-made for an individual requirement by varying the degree of substitution on the cellulose chain.
- ✚ This can give flexibility in terms of solubility, elasticity and some increased stability in the presence of electrolytes.

**(b) Carrageenan.**

- ✚ It is a purified colloid, consisting of a mixture of sulfated polysaccharides and, as with all natural products, it can be of variable quality, which could cause a problem for any formulator.
- ✚ Therefore, it is standardized either by repeated blending, or dilution with variable amounts of inert material.
- ✚ Some flexibility in the gelling properties of carrageenan can be achieved by controlling the cations present by ion exchange.

**(c) Miscellaneous gelling agents**

**Xanthan** - This is a polysaccharide produced by fermentation technology. It offers excellent properties for use in toothpaste since it gives a highly structured gel, relatively easily broken down when sheared, but which recovers rapidly. It is relatively insensitive to electrolytes and heat, but unfortunately it is generally incompatible with cellulosic materials because of contaminating enzymes that degrade cellulose.

**Hydroxy ethyl cellulose HEC** - This is occasionally used as an alternative to carboxymethyl cellulose (CMC), especially when a greater electrolyte tolerance is required.

**Synthetic polymers** – Cross linked acrylic acid polymers have become more intensively used in the past decade because of their useful thickening and suspending properties combined with their inertness and their stability to heat and ageing.

**Clays** - Colloidal clays, either natural processed bentonites or synthetic clays, have been used as binding agents because of their thixotropic properties. Depending upon the rest of the formula components (e.g. abrasive, amount of free water), the level of gelling agent added to a paste can vary from 0.5% to 2.0% by weight.

## 5. Sweetening agents

- ✚ These are important for product acceptance, since the final product must be neither too sweet nor too bitter.
- ✚ These ingredients must always be considered in partnership with the flavour because of their combined impact.

### (a) Sodium saccharin.

- ✚ This is the sweetening agent in widest commercial use, and is generally used at a level between 0.05% and 0.5% by weight.

## 6. Flavours

- ✚ Flavours are probably the most crucial part of toothpaste because of consumer preferences.
- ✚ The flavour is a blend of many suitable oils, with peppermint and spearmint being the major base components. These are nearly always fortified with other components such as thymol, anethole, menthol (to give a pleasant cooling effect), eugenol (clove oil), cinnamon, eucalyptol, aniseed, and wintergreen (to give a medicinal effect).
- ✚ In addition, because the flavour is a mixture of sparingly soluble organic oils, its interactions with the other dentifrice components are often unpredictable and unexpected.
- ✚ Taste and stability can be influenced greatly by both the other components of the dental cream, e.g. free water content, or absorption by the abrasive (perhaps to the surface), and also by the physical properties of the dental cream, e.g. pH, viscosity etc.,
- ✚ Depending upon the formulation, e.g. the abrasive nature and level, the gelling agent used and the presence of therapeutic ingredients which may impact taste perception, the flavour level may vary from around 0.5% to 1.5% by weight.

## 7. Minor ingredients

**(a) Titanium Dioxide TiO<sub>2</sub>**- Titanium dioxide may be added to give additional whiteness and brilliance to the paste.

**(b) Colours.** Colours can be an integral part of the aspect of any toothpaste that may influence consumer preference and purchase intent. The EEC Cosmetics Directive (Annex IV) lists the permitted colours and only a small amount is necessary to create a large impact, <0.01% by weight.

**(c) pH regulators.** Occasionally buffering systems need to be added to the dental cream to adjust the pH of the final finished product.

**(d) Sparkles.** A recent introduction in the marketplace is the addition of small reflective mica particles to coloured transparent gel products. This gives toothpaste the appearance of containing 'sparkles' and is especially aimed at younger children.

### 8. Fluoride and other 'active' ingredients

- ✚ The earliest fluoride dentifrices contained sodium fluoride.
- ✚ However, the fluoride was biologically unavailable because the calcium in the dentifrice abrasive bound the fluoride and thus inactivated it.
- ✚ Although a number of dentifrices containing fluoride are on the market, not all provide available fluoride because the abrasive systems that some dentifrices contain inactivate the fluoride.
- ✚ Therefore, the product may contain as much fluoride as any other dentifrice but it is not available.
- ✚ Also, if the product has a short shelf life, it will be ineffective if poor marketing gets it to the consumer too late.

For these reasons, only dentifrices approved by the Council on Scientific Affairs of the American Dental.

**Various topical fluoride preparations are available as given in the table.**

| Form of fluoride              | Preparations     | Concentration of fluoride     |
|-------------------------------|------------------|-------------------------------|
| Acidulated phosphate fluoride | Topical solution | 1.23 % in 1 % phosphoric acid |
|                               | Topical gel      | 1.23 % in 1 % phosphoric acid |
|                               | Mouth rinse      | 0.02-0.04 %                   |
|                               | Paste            | 1.2 %                         |
| Amine fluoride                | Dentifrices      | 1.6 %                         |
|                               | Mouth rinse      | 2.5 %                         |
| Sodium fluoride               | Topical solution | 2 %                           |
|                               | Mouth rinse      | 2.5 %                         |
|                               | Dentifrice       | 0.2 % (weekly)                |
| Sodium monofluorophosphate    | Dentifrices      | 0.76 – 0.8 %                  |
| Stannous fluoride             | Topical solution | 8 %                           |
|                               | Mouth rinse      | 0.1 %                         |
|                               | Paste            | 8 %                           |
|                               | Gel              | 0.4 %                         |
|                               | Dentifrices      | 0.4 %                         |

Currently accepted dentifrices contain sodium monofluorophosphate, sodium fluoride, or, less frequently, stannous fluoride, all of which reduce caries by approximately 25% when used daily.

**The composition of some popular tooth pastes is given in table.**

| Brand            | Fluoride     | Abrasive   | Sweetener     | Foaming agent |
|------------------|--------------|--|---------------|---------------|
| <b>Aim</b>       | 0.8 % Na.MFP | 10 % Hydrated silica xerogel<br>19 % Hydrated silica | 67 % sorbitol | 1.5 % SLS     |
| <b>Aim extra</b> | 1.2 % Na.MFP |  |               |               |

| strength          |               |   |                 |            |
|-------------------|---------------|---|-----------------|------------|
| <b>Aqua fresh</b> | 0.76 % Na.MFP | 12.6 % calcium carbonate<br>12 % silica | 52.8 % sorbitol | 1.15 % SLS |
| <b>Colgate</b>    | 0.76 % Na.MFP | 48.76 % dicalcium phosphate             | 22 % glycerin   | 1.2 % SLS  |

### \* **Stannous fluoride**

- Dentifrices stained teeth, particularly in pits and fissures.
- This stain is related to the tin in this compound, which adheres to plaque.
- The significance of this staining and its esthetic problems have resulted in a decreased usage in dentifrices.
- Stannous fluoride dentifrices are marketed in a plastic container because a reaction of stannous ions at an acid pH occurs when conventional soft metal tubes are used.
- Dentifrices containing stannous fluoride as an active ingredient are no longer widely marketed; however, these formulations were the first to be evaluated for caries-reducing properties.
- Effectiveness in caries reduction varied from 23 to 34%.

### \* **Amine fluoride**

- Amine fluorides also have strong plaque-reducing properties.
- However, although the amine fluorides may be more effective for caries reduction than other forms of fluoride, the FDA has not allowed these products to be extensively tested in this country.

### \* **Sodium fluoride**

- Recent studies of sodium fluoride dentifrices formulated to ensure ready availability of fluoride ions have shown anticaries benefits similar to those obtained in clinical caries trials with dentifrices containing stannous fluoride and sodium monofluorophosphate.
- Clinical caries trials conducted under well controlled, daily supervised brushing conditions have reported reductions in dental caries of approximately 25–48%.

### \* **Sodium monofluorophosphate**

- A number of clinical studies have been conducted with dentifrices containing 0.76% monofluorophosphate (MFP).
- The data from these controlled clinical studies of sodium MFP dentifrices have indicated reductions in dental caries ranging from approximately 17–42%.

## **Therapeutic effects of fluoride**

### \* **Caries control**

**M/A:** fluoride ion can replace the hydroxyl ion in hydroxyapatite the major crystalline structure of enamel.

- ◆ The substituted crystals called fluorapatite is more resistant to acid, such as those produced by plaque bacteria.
- ◆ As fluoride is also an antienzyme. It may inhibit enzymatic acid production by plaque bacteria.

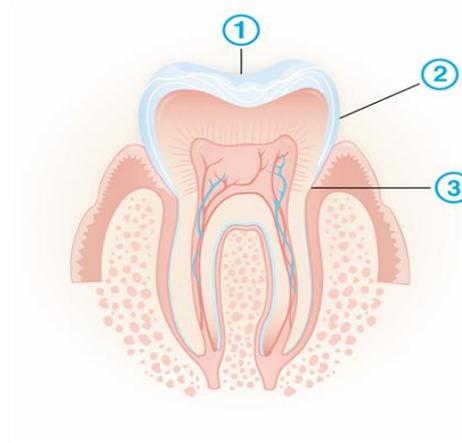
### \* **Dental plaque control**

◆ Mainly stannous fluoride is used for this purpose.

**M/A:** related to an alteration of bacterial aggregation and metabolism.

### Caries sites

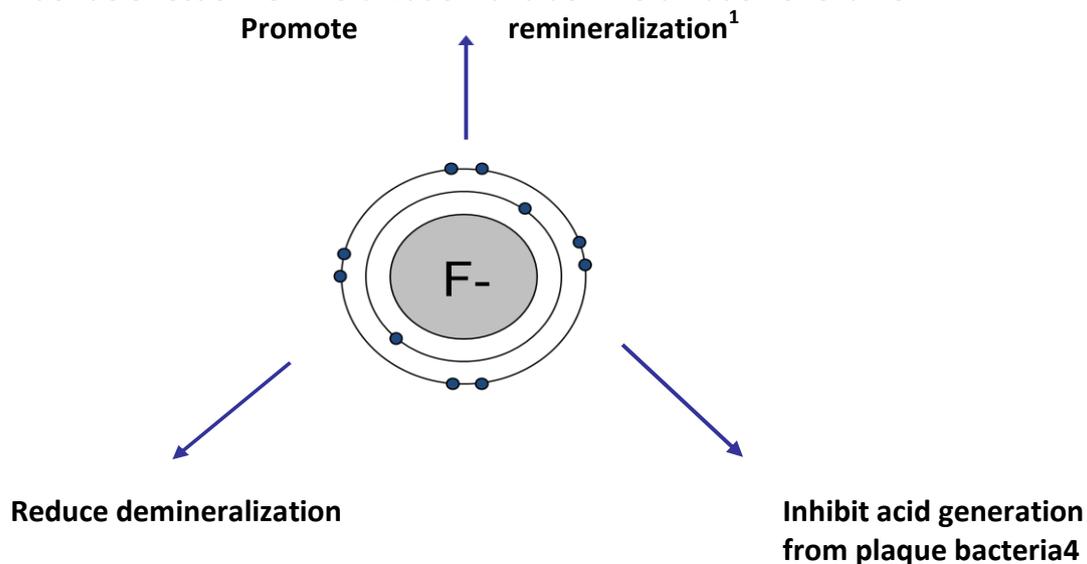
1. **Pit-and-fissure caries** develop initially in the fissures of the teeth, but can spread into the dentine
2. **Smooth-surface caries** are most common on interdental surfaces, but can occur on any smooth surface of the tooth
3. **Root caries** attack the cementum and dentine, which becomes exposed as gums recede



### Sources of fluoride

- Topical agents
- Fluoridated water
- Other ingested source

### ■ Fluoride effect on remineralization and demineralization of enamel



### MECHANICAL PRODUCTS FOR PLAQUE CONTROL

- Toothbrush
- Toothpaste
- Dental Floss

- Tongue Scraper

### **1. Toothbrush**

The toothbrush is the primary dental hygiene product you need to take care of your teeth. First, the regular toothbrush alone provides a plethora of options. Toothbrushes come in various sizes and styles. Various brushes differ from the handle to the bristles. That's why buying a toothbrush can be a confusing task.

In choosing a brush, most dentists recommend soft-bristled brushes more because these can best remove plaque and traces of food that gets stuck in the teeth. You should also choose a brush that does not have a big head. Small-headed brushes can reach the back areas of the mouth for thorough and complete mouth cleaning. You can also choose from squared heads or tapered ones.

As for the handle, you should go for brushes that provide good grip. The shape of the handles themselves differs a lot. But the most important part of the brush is the bristles. There are many forms of bristles, such as rippled, flat, trimmed, or domed ones. All these different types of bristles provide specific benefits that may help meet your needs.

Aside from regular brushes, however, you can also use power brushes, which is very popular among younger users. These powered brushes help clean the teeth better than children usually can.

### **2. Toothpaste**

Another important choice you have to make is what toothpaste to use to go with that perfect brush. The toothpaste aisle in the supermarket is highly congested, and the different brands and kinds often differ in ways that are vague to consumers. That's why it is even harder to choose toothpaste than a toothbrush. The trick, however, is to follow the fluoride arrow. Look for toothpaste that contains fluoride, and the brand usually doesn't matter much. Fluoride is an essential ingredient that can provide strengthening for your teeth. Fluoride works by keeping cavities away and also by polishing tooth enamel.

Another clue to look for is the seal of approval by the American Dental Association, which will help lead you to safe and effective products that have passed clinical scrutiny. You can also consider your specific tastes, such as desensitizing toothpaste for sensitive teeth, whitening toothpaste for yellowing teeth, and tar-tar control toothpaste for those dealing with tar-tar problems.

### **3. Dental Floss**

Another important dental hygiene product is dental floss, which is often neglected by a lot of people. Flossing should be done at least once daily, and benefits are far ranging. Flossing can help clean teeth and in between teeth to make sure no food debris are left. It can help you easily get rid of the food stuck irritatingly between your teeth, which can lead to tooth decay, gum disease, and accumulation of bacteria in the long run. Also, bacteria can lead to bad breath, so dental floss can help keep bad breath away.

### **4. Tongue Scraper**

Another less popular product is the tongue scraper or tongue cleaner, which cleans the surface of the tongue to remove bacteria, food debris, fungi, and dead cells. The tongue is vulnerable to bacteria and fungi that can cause bad breath, oral problems and even medical conditions. Tongue cleaners come in a general form, but one thing to note is that it should be

used before brushing your teeth, since brushing might cause the stuff on your tongue to recede into the throat.

### **Tartar (Calculus)-Reducing Products**

- A number of products, both dentifrices and mouthrinses, are available for reduction of supragingival calculus (tartar) in dental patients. Calculus reduction has been shown with dentifrices containing pyrophosphates, zinc salts, triclosan, and papain.
- The incidence of calculus formation ranges from 45 to 66%, with some variation between males and females and different age groups. Although supragingival calculus is not a major etiologic agent for gingivitis or periodontitis, its surface porosity provides an environment for plaque formation.
- In addition, it serves as a plaque-delivery system by holding plaque against gingival tissues. Although plaque formation has been well correlated with gingivitis and periodontitis, a similar correlation for calculus has not been reported.
- For this reason, the ADA does not offer an acceptance program for products that reduce calculus formation because this is considered to be a cosmetic issue, rather than an issue of disease.
- The mechanism of action of the calculus-reducing chemicals is related to the latter's ability to inhibit crystal growth and interrupt the transformation of calcium phosphate (found in foods and saliva) into dental calculus.

This effect may occur as follows:

1. The agents complex on the tooth surface to block receptor sites for calcium phosphate that precipitates from saliva and chemically absorbs to initiate calculus formation.
2. This same receptor site blockage also occurs in the calculus matrix as it begins to form.
3. The pyrophosphate complexes combine with free calcium in saliva to inhibit the attachment at the tooth surface (probably a secondary mechanism).

### **TYPE OF DENTIFRICES**

- (A) Pastes form – Tooth paste
- (B) Powder form – Tooth powder
- (C) Solid blocks
- (D) liquids

### **(A) TOOTH PASTES**

Tooth pastes are most popular valuable and widely used preparations for cleansing the teeth. It has largest share of dental cleansing and care preparations.

**Tooth pastes are preferred over other dental preparations because of following reasons.**

- ✦ Easy to take and spread on the tooth brush
- ✦ No spillage or wastage
- ✦ Attractive consistency
- ✦ Proper distribution in mouth
- ✦ Available in wide varieties

**A good tooth paste should have following characteristics**

- ✦ It must clean the dental surface properly without any scratches.

- ✦ Consistency should be such that it can be easily squeezed out of the tube to spread on the brush, but should not penetrate in to the brush.
- ✦ The consistency should remain constant in wide range of temperature during shelf life.
- ✦ It should be non toxic and should not sensitize buccal membrane.
- ✦ It should not interact with the container material.
- ✦ It should have pleasant taste and odour.
- ✦ It should have good appearance.

**Formulation:**

**Method: - 1**

The binder, prewetted with the humectant, it is disperse in liquid portion containing the saccharin and preservative and allow swelling to form a homogeneous gel. The swelling may be accelerated by heat and agitation. The solid abrasive is added slowly to homogeneous gel and mixed in mixer until a paste formed. The flavour and detergent are added last and distributed uniformly.

Excessive, aeration, particularly in the presence of detergent, should be avoided. The paste can then be milled, deaired and tubed.

**Method: - 2**

The binder is premixed with solid abrasive, which is then mixed with the liquid phase, containing humectant, preservative and sweetener into a mixer. After formation of homogeneous paste, the flavour and detergent are added, mixed, milled deaired and tubed.

**(A) TOOTH POWDERS**

Tooth powders are oldest and simplest preparations. Over the years their market share has been reduced due to popularity of pastes, but still they have a considerable market share.

The main problems encountered with powders are-

- ⊕ Floating of powder in air during manufacturing.
- ⊕ Formation of cake on storage
- ⊕ Uneven distribution in mouth

**Composition**

Tooth powders contain the following ingredients-

- Abrasives
- Surfactants or detergents
- Sweetening agents
- Flavours
- Colours

Abrasives used in manufacturing of tooth powders are similar to that of tooth pastes. Though lighter calcium carbonate is used in tooth paste but in tooth powders heavier grade calcium carbonate is used.

Other ingredients are similar to that of tooth paste.

**General procedure for manufacture**

- This is done by simple mixing
- First ingredients of small quantity are premixed and then mixed with other ingredients.
- Ribbon type or agitator type of mixer are used.
- Flavour can be sprayed on to the bulk or can be premixed with part of some abrasive.

### **(3) SOLID BLOCKS**

Solid dentifrice is like a soap preparation.

Basically they consist of tooth powder suspended in a base of soap powder, water, and humectant.

Solid detifrices provide a convenient and handy from of cleaning for the teeth.

#### **Formulation**

The soap first dissolved in a mixture of glycerin and water with the aid of heat. The powder (abrasive) is then mixed until soft mass formed. Mass is dried on trays, cut into blocks.

### **EVALUATION OF SOLID DENTAL PRODUCTS**

Identification of ingredients and estimation of their contents are essential components of overall quality control and evaluation of dental care products. The products, tooth pastes and tooth powders, can be basically classified into foam forming and non-foam forming.

**Some other special evaluation tests are as follows:**

#### **Abrasiveness**

Various tests have been designed and reported over the year, mostly on the set of extracted teeth. The teeth were mechanically brushed with pastes or powders and then the effects were studied by observation, mechanical or other means. Abrasive character normally depended on the particle size. So, study of particle size can also give such idea.

#### **Particle size**

This can be determined by microscopic study of the particles or by sieving or other means.

#### **Cleansing property**

This is studied by measuring the change in the reflectance character of a lacquer coating on the polyester film caused by brushing with a tooth cleanser (paste or powder). Also an in vivo test has been suggested in which teeth were brushed for two weeks and condition of teeth was assessed before and after use with the help of photo graphs.

#### **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 powders is also important for proper flow of the powder from the container.

#### **pH of the product**

pH of the dispersion of 10 % of the product in water is determined by P<sup>H</sup> meter.

#### **Foaming character**

This test is specially required for foam forming tooth pastes or tooth powders. Specific amount of product can be mixed with specific amount of water and to be shaken. The foam thus formed is studied for its nature, stability, washability.

#### **Limit test for arsenic and lead**

This is very important as these are highly toxic metals. Specific tests are there to estimate these two metals; products may not have excess of such metals.

## volatile matters and moisture

A specific amount of the product required to be taken in a dish and drying is to be done till constant weight. Loss of weight will indicate percentage of moisture and volatile matters.

## Effect of special ingredients

Special test should be done for the special ingredients if any, like antiseptics, enzymes, etc. for each one special and specific test are to be done.

### (4) LIQUID DENTAL PREPARATIONS

- ✳ Use of liquid dentifrices are comparatively less than solid one.
- ✳ They are basically aqueous or hydroalcoholic solutions of surfactants with additional components like
  - ✳ Thickening agent
  - ✳ Sweeteners
  - ✳ Flavours etc.
- ✳ They do not contain any abrasive as they will sediment
- ✳ Action of this preparation on dental surface is less but the cleansing effect is more.
- ✳ Manufacturing process is making solution of all ingredients.

### Formulations

| Formula :1                |         |
|---------------------------|---------|
| Sodium myristate sulphate | 4.0 gm  |
| Methyl cellulose          | 4.0 gm  |
| Saccharine sodium         | 0.1 gm  |
| Flavouring oil            | 0.3 gm  |
| Glycerin                  | 5.0 gm  |
| Alcohol                   | 10.0 gm |
| Water                     | 85.4 gm |

### HALITOSIS

- Local factors, systemic factors, or a combination of both can cause halitosis.
  - It is estimated that 80% of all mouth odors are caused by local factors within the oral cavity, and these odors are most often associated with caries, gingivitis, and periodontitis.
  - Oral malodors occur because of the action of various microorganisms on proteinaceous substances, such as, exfoliated oral epithelium, salivary proteins, food debris, and blood.
  - Studies have shown that saliva from individuals who are free of dental disease produces malodor less rapidly than saliva from patients with dental disease.
  - It has also been observed that after prolonged periods of decreased salivary flow and abstinence from food and liquid malodors tend to be most severe.
  - Various oral bacteria produce products that are degraded to a number of compounds, foremost of which are sulfides and mucoproteins.
  - These compounds have been most often associated with oral malodor.
- Specifically, it appears that oral malodor usually results from the bacterial- mediated degradative processes of methyl mercaptan and hydrogen sulfide in oral air.
- Ammonia is also produced but does not appear to contribute significantly to halitosis.
  - It has even been suggested that ammonia production may improve the odor of mouth air.

- However, for many patients, systemic or local factors cannot be identified.
- Tongue scraping has been shown to reduce malodor in some patients.
- Mouthwashes and dentifrices can serve an esthetic function by reducing halitosis. They can accomplish this by masking malodors, acting as antimicrobial agents, or both.
- There are no ADA-accepted products to reduce halitosis at this time.

### **Safety**

- While dentifrice products have a long history of safety, there is an ongoing concern associated with dental fluorosis due to fluoride ingestion in children under age six. Studies have shown that for children 1–3 years, 30–75% of the dentifrice is ingested, and for children 4–7 years 14–48% is ingested.
- As with any OTC drug product, precautions need to be taken to prevent overdose. The FDA requires labeling of all fluoride dentifrice products to include a statement "to minimize swallowing use a pea-size amount in children under six."
- Making childproof caps available on fluoride dentifrice products intended for use by children has been recommended.
- Another approach would be to provide metered dentifrice delivery systems for children under age six, which could be set to dispense the correct amount of fluoride depending on the body weight of the child.

### **Dental care products**



#### ■ **Effervescent Polident Denture Cleansers**

Non abrasive cleaning and antibacterial action in a soaking solution with oxidizing agents and detergents to remove food particles, stains and bacteria. Cleaning action is available in variants for 3 minutes, overnight and stain removing whitening and for partials.



#### ■ **Polident Fresh Cleanse Denture Foam**

Denture Cleansing foam provides non abrasive mechanical cleaning and antibacterial action and stain removal with detergents and a long lasting flavor



#### ■ **Polident Dentu-Paste and Dentu- Gel Denture Cleansers**

Mechanical cleaning with a brush using these denture cleansers containing detergents and oxidizing agents



### ■ Super Poligrip Denture Adhesive Cream

Poly (methylvinylether/maleic polymer cross linking salts to provide adhesion between denture and the alveolar ridge and the palate. The denture adhesive cream fills gaps between gum and denture for a strong hold and sealing out food particles



### ■ Super Poligrip Denture Adhesive Powder

Poly(methylvinylether/maleic polymer cross linking salts to provide adhesion between a denture and the alveolar ridge and the palate. The denture adhesive powder forms a strong, thin seal to keep out food particles



### ■ Super Poligrip Denture Adhesive Strips

Extruded strip with a Polyox/Carboxymethylcellulose system. The denture adhesive strips are pre cut to control the amount of the application.

## Texas Dental Firm Offers Novel Tooth-Whitening Product Line

- Ultra-White Products, Inc., a tooth whitening product manufacturer in Texas, now offers an attractive alternative to marginally effective over-the-counter tooth whitening product lines and costly dental treatments.
- The company's novel tooth whitening product affords users the ability to obtain custom application trays and whitening gels at a fraction of the cost normally associated with professional cosmetic dentistry and are far more effective than Over-the-counter solutions.
- The company has a worldwide following with over 30,000 clients and is owned and managed by a practicing dentist.

## NEWER FORMULATIONS OF DENTIFRICE FROM CHEMICAL ABSTRACTS

- Functional toothpaste containing nano sized silver.
- High Fluoride ion recovery dentifrice compositions.
- Stable Suspensions of composite materials for use as dentifrices containing an antimicrobial organic acid salt.
- Application of water soluble chitosan in toothpaste & mouthwash.
- Dentifrice containing silica microparticles as the sole abrasives.
- Dentifrice compositions comprising alkyl galactoside derivatives +nonionic disinfectants or +protein naturants or +vit- E gives strong coaggregation-inhibitory effect & antibacterial effect against Fusobacterial & other dental caries & periodontal disease- causing bacteria.

### QUESTIONS:-

- 1) Define cosmetics? Put some light on its origin and development through different ages.
- 2) Describe in brief the cosmetics products for skin?
- 3) Define shampoo? Write note about it?
- 4) Write a note on skin colorants?
- 5) Classify cosmetics with examples?
- 6) Define cosmoceutical? How it differs from cosmetics products? explain
- 7) Describe different nail preparations?
- 8) Write in detail about quality control of cosmetics including sampling size?
- 9) What is powder? Classify powders? Give formulation of any one type?
- 10) Classify raw materials of cosmetics? Write in brief about each with example?

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