



Dental Product

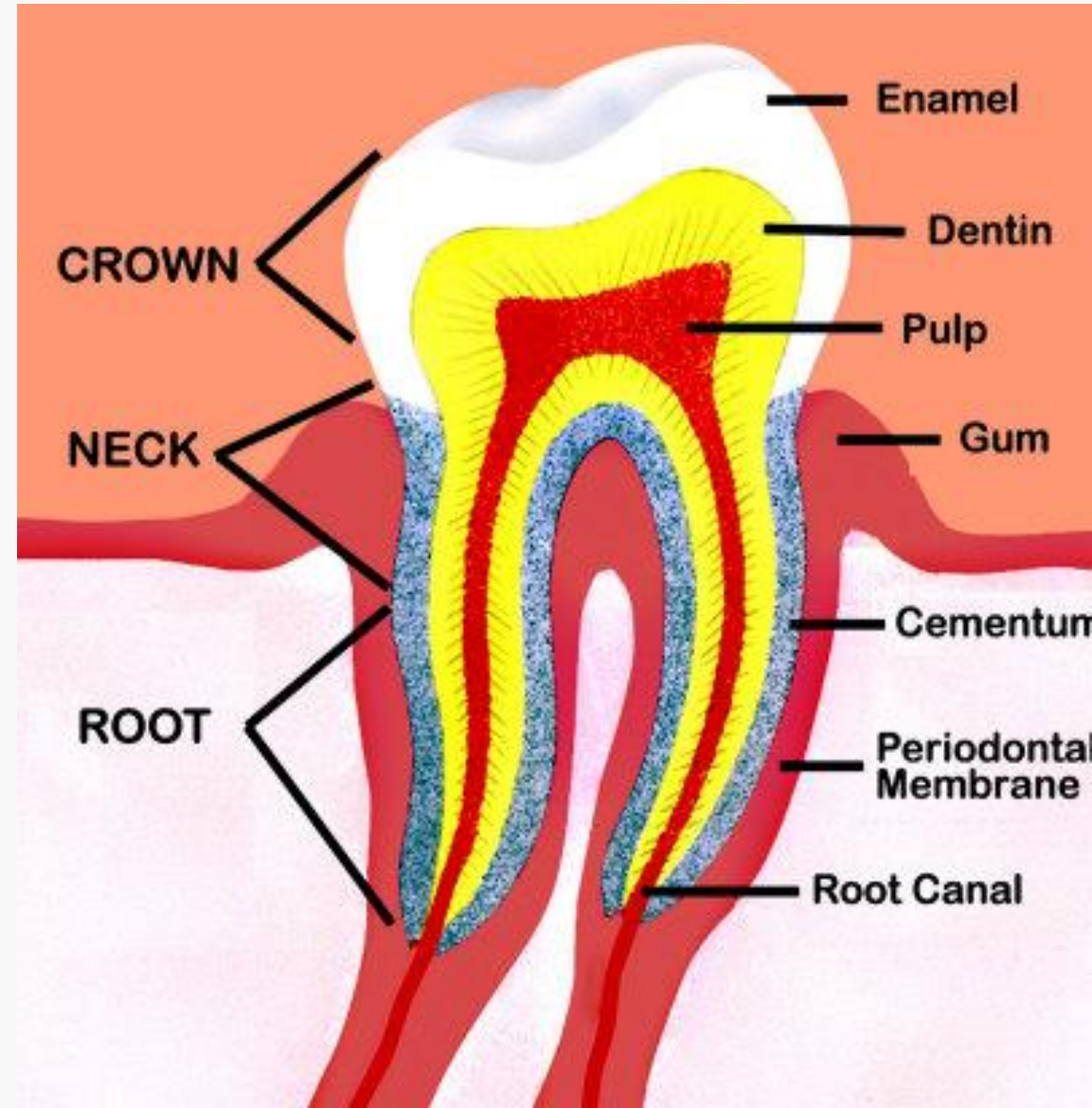
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Tooth Anatomy

Typically tooth has three major external regions: the crown, root and neck.

- **Crown:** portion above the gum line
- **Root:** embedded in the gum
- **Neck:** between the crown and neck
Interior anatomy:
 - **Pulp:** soft interior cavity
 - **Cementum:** thin bone layer covering and protecting the root
 - **Dentin:** the solid, most bulky portion of the tooth interior
 - **Enamel:** hard covering on exposed part of tooth
 - **Root canal:** narrow tunnel for blood vessels and nerves to enter pulp
 - **Gum (gingiva):** Soft tissue.



Products which are recommended for cleaning, deodorizing and to maintain proper hygiene to the teeth and oral cavities are called as **dental product**.

- A large number of inorganic chemicals and their preparations are known which find application in the practice of dental and oral disorders. As they come in contact with human body, they are regarded like other drugs and pharmaceuticals. Dental products include-
- Cleansing agent
- Desensitizing agent
- Anticaries agent
- Polishing agent
- Oral antiseptic
- Mouth washes
- Cement & films



Ideal characteristics of dental products:

For any dental product to work properly & be considered effective, it must have some certain properties listed below:

- Aid in reducing dental plaque (is a sticky film of bacteria that constantly forms on teeth.) & gingivitis (mild form of gum disease) without harming the tooth.
- Not altered dental tissue or teeth.
- Sustained release specially in case of sensitivity.
- Easy to use and cheap.
- Must not produce any stain on teeth.



1. Dentifrices/ cleaning agent



Dentifrice is a material which is used for cleaning of teeth & adjacent gums.

- It is a substance used with a tooth brush for cleaning of teeth and gums. Dentifrices are available in the form of paste & powders.
- The cleaning action of dentifrice depends upon abrasive property and the rubbing force used.
- The powders and paste contain abrasive such as calcium carbonate, calcium phosphate, calcium sulphate, hydrated aluminium oxide, sodium bicarbonate & sodium chloride.
- Tooth paste contain liquids e.g. glycerine, propylene glycol, sorbitol, water

DENTIFRICES

Forms of dentifrices

Pastes

Tooth powder

Gels

Function of dentifrices

Mouth freshner

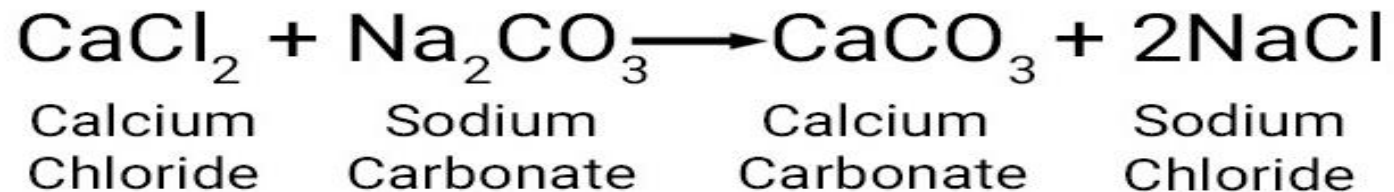
Removal of stains

Anti-caries action

Minimizing plaque build up

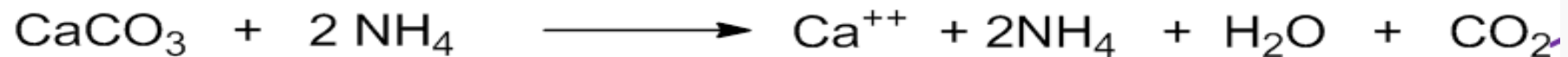
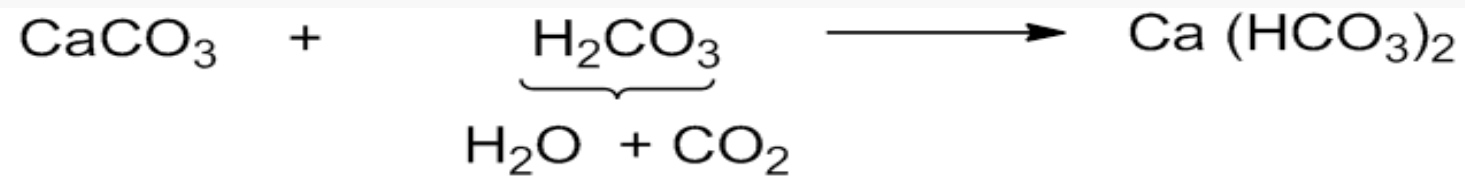
Calcium carbonate

- **Molecular formula:** CaCO₃ **Molecular weight:** 100.1 g
- **Synonym:** precipitated chalk, limestone
- **Standards:** calcium carbonate contains not less than 98.0% and not more than 100.5% of CaCO₃, calculated with reference to the dried substance.
- **Preparations:** It is prepared by boiling a mixture of solution of calcium chloride & sodium carbonate. The resulting precipitate is allowed to settle. The precipitates is filtered & washed with boiling water till free from chloride & dried.



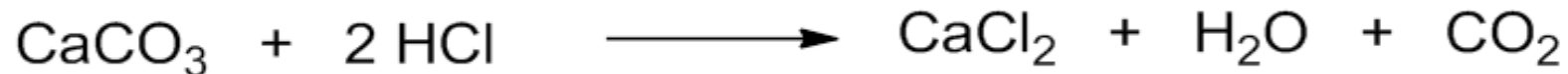
Physical properties:

- It is a fine, white, microcrystalline powder.
- It is practically insoluble in water & in ethanol (95%), slightly soluble in water containing carbon dioxide, due to formation of calcium bicarbonate, or any ammonium salt.



- It neutralize acids.

- It neutralizes acids,



- **Uses:**

- Externally it can be used as dentifrices.
- calcium carbonate is used as an antacid, usually in dose of up to about 1.5 g by mouth. It is often given with other antacids.
- Calcium carbonate is also used as a calcium supplement in deficiency state and as an adjunct in the management of osteoporosis.
- Calcium carbonate is also used as food additives.
- It is used as pharmaceutical aid.

Other examples of dentifrices:

- Dibasic calcium phosphate, I.P.
- Calcium phosphate, I.P.
- Sodium Metaphosphate
- Strontium chloride
- pumices



Dental caries



- **Dental caries** or tooth decay is a disease of the teeth caused by acids produced by the action of microorganism on carbohydrates.
- It starts from surface of the mouth.
- The cavity may be different color from yellow to black.
- The food particles lodged between the teeth undergo decay because of bacterial action and produce acids.
- This disease is characterized by decalcification of tooth with mouth odour.
- Symptoms: may include pain & difficulty while eating.
- Complication may include inflammation of the tissue around the tooth, infection.
- The bacteria break down the hard tissue of the teeth (enamel, dentine & cementum) by making acid from food debris on the tooth surface .

Healthy
tooth



Tooth decay
(Caries)



Cavity
(Deep caries)



Causes: there are following main criteria required for dental caries formation-

- A tooth surface (enamel or dentine) or demineralization (softening).
- Caries- causing bacteria (Streptococcus mutant & lactobacillus)
- Fermentable carbohydrates

FLOURIDES

Role of fluoride

- it is able to help in reducing and preventing dental caries
- a small quantity (1 ppm) of fluoride necessary to prevent caries
- addition of fluoride to the the municipal water supply known as *fluoridation*
- Topical fluoride can also provide antimicrobial action
- ❖ However, excessive fluoride intake during the period of tooth development can cause dental *fluorosis*.

Routes of administration

- i) Orally
- ii) Topically

- Public water supply containing 0.5 to 1 ppm (should not more than 1 ppm)
- For topical application 2 percent solution is generally used on teeth.

Mechanism of action of fluoride:

- **Fluoride prevent demineralization**

(Demineralization happens when the mineral content on your teeth begins to wear away. It is the first sign of tooth decay and may be caused by a variety of factors)

- **Fluoride enhance remineralization**

(Remineralization is a natural tooth repair process. our body takes calcium and phosphate minerals from your saliva and deposits them in your enamel. Enamel is the protective outer layer of your teeth.)

- **Fluoride alter the action of plaque bacteria.**

- **Fluoride reduces enamel solubility.**

DESENSITIZING AGENTS

Teeth are somewhat sensitive to hot and cold
Especially during teeth decay or in toothache

Therefore, some desensitizing agents are used in dental preparations so as to reduce sensitivity of teeth to hot and cold.

Mechanism of action

Exact mechanism of action of desensitizing agent is not known with certainty.

However they act probably like local anaesthetic.

Examples: Strontium chloride and Zinc chloride



SODIUM FLUORIDE

NaF

Mol. Wt 41.99

Physical Properties:

- White powder or colourless crystals
- Soluble in water, insoluble in alcohol

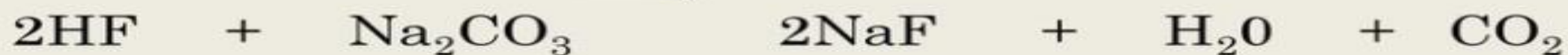
Chemical properties:

- Hydrofluoric acid is produced upon addition of mineral acid



Preparation:

A) Neutralizing hydrofluoric acid with sod. Carbonate



B) Double decomposition of calcium fluoride with sod. carbonate



Zinc oxide eugenol cement

- Zinc oxide-eugenol cement is a **low-strength base used as a temporary cement filling** in the event that the patient will return at a later date for a semi-permanent restoration. The powder is mainly zinc oxide and the liquid is eugenol with olive oil as a plasticizer.

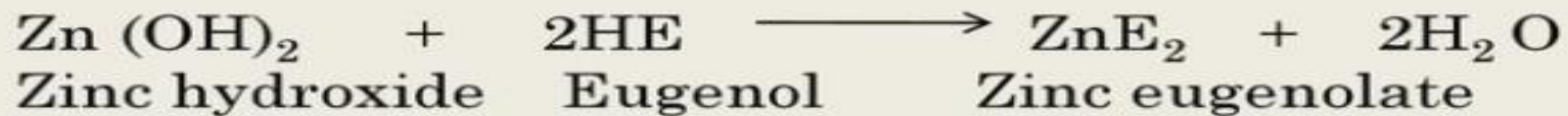
ZINC OXIDE EUGENOL CEMENT

SETTING REACTION:

A) Hydrolysis of Zinc Oxide to its hydroxide takes place. Water is essential for the reaction (dehydrated zinc oxide will not react with eugenol)



Reaction proceeds as typical acid-base reaction



The chelate formed is an amorphous gel that tends to crystallize imparting strength to the set mass.

Structure of set cement: The set cement consist of particles of zinc oxide embedded in a matrix of zinc eugenolate.

Setting time is around 4 to 10 min.

Uses

- For temporary & permanent cementation.
- For temporary filling.
- Cavity lines & bases
- Pulp capping agent.

ZINC OXIDE EUGENOL CEMENT

Classification :

Type I ZOE – For temporary cementation

Type II ZOE – Permanent cementation

Type III ZOE – Temporary filling, Thermal insulation

Type IV ZOE – Cavity liners

