

PHARMACEUTICAL INORGANIC CHEMISTRY- BP104T

UNIT: 2 (ACIDS, BASES AND BUFFERS)

CLASS: 4

TOPIC: DENTAL PRODUCTS: DENTIFRICES, ROLE OF FLUORIDES IN THE TREATMENT OF DENTAL CARIES

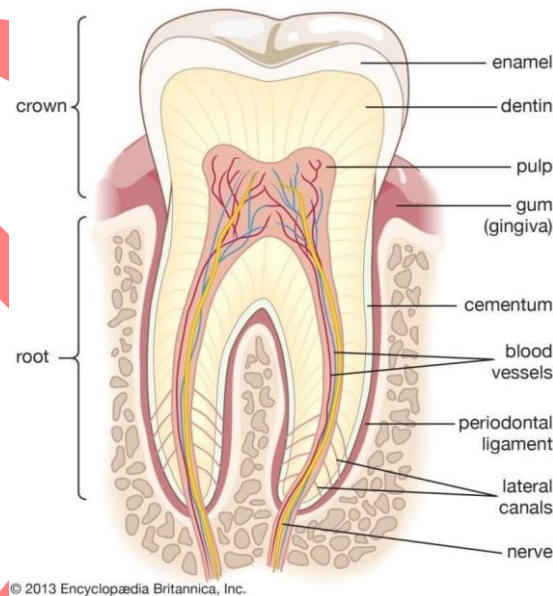
Tooth consists of three layers of calcified tissue:

1. **Enamel:** a white, hard calcified (consists primarily of Calcium phosphate & calcium carbonate) tissue covering dentin to cover the tooth projecting above the gum.
2. **Cementum:** A layer covering the portion of tooth lying buried in the gum.
3. **Dentin:** That part of the tooth that is beneath Enamel and Cementum and surrounds the pulp cavity.

Dentine consisting 75% of mineral is hard and dense. Enamel consisting of 98% mineral, is even denser. It is the hardest substance in the body. As in the case of bone, Vitamin A, C and D are all necessary for the proper tooth formation.

- Vitamin A deficiency causes hypoplastic enamel (imperfectly calcified)
- Vitamin C deficiency affects calcification of dentine.
- Vitamin D not only helps the absorption of Calcium from GIT, but also for proper deposition of Calcium and Phosphate in tooth.

Other ions like Mg^{2+} , Cl^- , CO_3^{2-} and citrate are also present in tooth



COMMON DENTAL TERMS

1. **Abscess:** A serious infection sometimes caused by severe decay. Symptoms include pain and swelling. Root canal therapy is often required.
2. **Bleaching:** A process of applying hydrogen peroxide solution to whiten discolored or stained tooth.
3. **Crown:** Also known as Cap. An artificial cover for a decayed or damaged tooth. Made of plastic, metal, porcelain, or a combination of metal and porcelain.

4. **Filling:** Material used to fill a cavity. Usually composed of a mixture of metals (amalgam), plastic, porcelain or gold.
5. **Orthodontic treatment:** A method of correcting the position of teeth using braces or similar devices.
6. **Root Canal therapy:** also called endodontics. The cleaning out and filling the innermost part of the tooth, known as the pulp, which has been damaged or severely decayed.
7. **Periodontitis:** Stage of gum disease and the leading cause of tooth loss among adults. Gums and tissue are inflamed, plaque gets into pockets below the gum line, tooth root become exposed and supporting bone is destroyed causing tooth loss.

INTRODUCTION TO DENTAL PRODUCTS

- Dental Products are used to maintain the dental hygiene and to prevent the decay of tooth. It is well known that the cleaner teeth keep good health and clean teeth cannot decay.
- In order to maintain dental hygiene numerous products are available in market. A large number of inorganic compounds are used in maintaining oral and dental hygiene.

CLASSIFICATION OF DENTAL PRODUCTS

Dental products include:

1. **Anticaries agents:** These are the agents which help in prevention of dental decay. e.g., Sodium fluoride, stannous fluoride, sodium monofluorophosphate.
2. **Cleaning agents (Dentifrices/ Polishing agents):** Dentifrices are agents used along with a toothbrush to clean and polish natural teeth. They must be abrasive to some degree to remove the stains from the teeth. They are supplied in paste, powder, gel or liquid form. e.g., Calcium carbonate, Dibasic calcium phosphate, calcium phosphate, sodium metaphosphate
3. **Desensitizing Agents:** These reduce sensitivity of teeth to heat and cold. Examples include Strontium chloride and zinc chloride.
4. **Cement and fillers:** used to temporarily cover or protect the area that has undergone operation in dental surgery. e.g., Zinc eugenol cement.

ANTICARIES AGENTS

Sodium fluoride, stannous fluoride, sodium monofluorophosphate

- Dental caries or tooth decay, involves a gradual demineralization (softening) of the enamel and dentin. If it is not treated then microorganisms may invade the pulp, causing inflammation and infection.

- Dental caries (tooth decay) is infectious disease, also called as dental plaque, in which acid formed by the action of oral microbial flora on carbohydrates.
- Dental plaque is a biofilm or mass of bacteria that grows on surfaces within the mouth. It is a sticky colorless deposit in starting, but it may often brown or pale yellow. It is characterized by decalcification of tooth accompanied by foul smell.
- Dental caries can be prevented and oral and dental hygiene can be maintained with the help of dentifrices. Dentifrices are the products that enhance the removal of stain and dental plaque by the toothbrush.
- The most accepted approach to prevent caries includes brushing accompanied by administration of fluoride either internally or topically to the teeth.

Mechanism of action of Fluoride:

- The deposited fluorides on the surface of teeth prevent the action of acids or enzymes in producing cavities.
- Fluoride is anticariogenic as it replaces the hydroxyl ion in hydroxyapatite with the fluoride ion to form fluorapatite in the outer surface of the enamel. Fluorapatite hardens the enamel and makes it more acid resistant.
- It is also possible that fluorides may possess some anti-bacterial activity and help in remineralization of enamel.
- A trace of amount of fluoride in drinking water is enough to prevent dental caries. Fluorapatite has also shown antibacterial activity.

Administration and Effects of over dose of Fluoride:

- Fluoride can be administered by two routes, orally and topically.
- Fluoride can be administered orally as sodium fluoride tablets or drops added in water or fruit juice. Fluoride when administered internally is readily absorbed from the gastrointestinal tract, partially deposited in the bone or developing teeth and the remainder gets excreted by the kidneys.
- A small quantity (0.5 -1 ppm) of fluoride thus becomes necessary to prevent caries. However, if more quantity of fluoride (more than 2-3 ppm) is ingested it is carried to bones and teeth and gives rise to mottled enamel known as dental fluorosis.
- Persons receiving slow continued ingestion of fluoride may suffer from mottling of teeth, increased density of bones, gastric disturbances, muscular weakness, convulsions and even heart failure.
- Topical fluoride solution, mouth washes and gels are less effective than orally administered fluoride. Sodium fluoride tablets or solution of sodium fluoride in a dose 2.2 mg/day is generally

2 MARKS QUESTION

1. Classify the dental products with suitable examples?
2. What are anti-caries agents? Give examples

5 MARKS QUESTIONS

1. Discuss the role of fluorides in dental caries?

10 MARKS QUESTIONS

1. What are anti-caries agents? Discuss the role of fluorides in dental caries?