

Goel Institute

of Pharmacy

And Science

Assignment : 1

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class :- B. Pharma - Ist Year

Subject :- Pharmaceutical Inorganic
Chemistry.

Subject code :- BP 104T

Topic :- Dental Product

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Dental Product

Dental Products are those substances which prevent the dental caries, dental decay and give the freshness and cleanness to the mouth and teeth. In market it is mainly available in the form of toothpaste, tooth powder, mouthwash, tooth gel, dentifrice etc.

Dentifrices

- These are powders or pastes used as hygiene aids for routine dental care during brushing
- Dentifrices facilitate cleaning of teeth and gums, improve their appearance and control bad breath
- They may be medicated to impart specific preventive and therapeutic properties.

Dentifrices Containing Fluorides :- Since fluorides are effective topically it seemed that a fluoride-containing tooth paste would be a logical way for repeated self-administration of fluoride. The compounding of a fluoride-containing tooth paste is difficult. A tooth paste not only contains the anticaries agents, but anticaries agents, but also has polishing agents,

thickening agents, surfactants and humectants, and there is a chemical incompatibility between the fluoride anion and the calcium cation of the traditional cleaning-polishing agent.

Calcium carbonate has been the traditional cleaning-polishing agents for most tooth pastes and tooth powder. However, even this water insoluble salt is soluble enough to provide enough free calcium cation to cause formation of the even more insoluble calcium (CaF_2). A similar incompatibility occurs when calcium monohydrogen phosphate is used. Furthermore, the anions of both calcium salts form insoluble stannous salt. Thus, the traditional calcium salt could be not used as cleaning-polishing agents when stannous fluoride was to be the fluoride salt. A workable solution is the use of calcium pyrophosphate ($\text{Ca}_2\text{P}_2\text{O}_7$), which is so water insoluble that concentration of calcium will be low enough that acceptable fluoride anion level will be maintained. Sodium polyphosphate ($(\text{NaPO}_3)_n$) of molecular weight high enough to have reduced aqueous solubility can also be used.

Currently, Crest is the stannous fluoride tooth paste accepted in Group A by the

Council on Dental Therapeutics. The indicated composition is

Stannous Fluoride	0.4%
Stannous pyrophosphate	1%
Calcium Pyrophosphate	39%
Glycerin	10%
Sorbitol (70% solution)	20%
Water	29.6%
Miscellaneous Formulating agents.	

Role of Fluoride in the treatment of dental caries

Today, when considering caries (tooth decay) prevention, one usually thinks of fluorides, since fluoridated water, fluoride drops, topical fluoride application to teeth, fluoride-containing vitamins, and fluoride dentifrices are now commonplace. The extra cause and mechanism of caries have still not been completely elucidated. It is probably associated with diet in the people consuming a diet high in fermentable carbohydrates have a higher incidence of dental caries than those on low carbohydrate diets.

The formation of caries is attributed to the action of acids, mostly lactic, obtained from oral bacterial metabolism of dietary

Carbohydrate. The buildup of plaque on the tooth surface usually aids the decay process by forming pockets or crevices on the tooth surface in which food particles can lodge and be degraded by the bacteria of mouth?

Oral hygiene has evolved from the simple cleaning of teeth to attempts at actually interfering with the decay process.

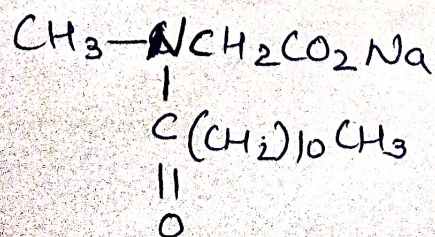
Ammoniated toothpastes were supposed either to neutralize lactic acid or to cause a drop in lactobacillus counts. There is some doubt that lactobacillus, by itself, plays a significant role in the decay process.

Antibiotic-containing dentifrices have been tried with mixed results.

There are two problems of :-

- 1) Sensitization of a significant portion of the population to the antibiotic
- 2) Development of antibiotic-resistant microorganisms.

Dentifrices which are claimed to have anti-enzyme properties have been developed. These have included sodium N-lauryl sarcosinate,



(Colgate's Bardol) which is a foaming foaming agent. The Council on Dental Therapeutics states that "the usefulness of [these] dentifrices in caries control has not been adequately established."

Desensitizing Agents

Desensitizing agents are those which applied to the teeth mitigate dentine sensitivity (also called dentine hypersensitivity), i.e. shooting pain triggered from sensitive tooth by thermal (hot and cold), mechanical (touch, chewing, blast of air) or chemical (sour and sweet food) stimuli.

The desensitizing agents aim to intercept this pain-inducing process by either creating a plug in the dentinal tubules, or by sealing their mouth at the tooth surface, or by modulating the generation of painful nerve impulses. Most desensitizing agents are self applied by the patient 1-3 times daily, while some are applied by the dentist once a while.

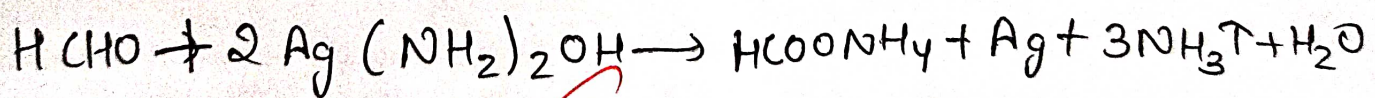
Dentifrices Containing Desensitizing Agents :- There are two dentifrices

current promoted as products that will reduce that sensitivity of the teeth to heat and cold. Sensodyne contains Strontium chloride.

The Council on Dental Therapeutics does not feel that there is enough evidence to justify the claims made for this product Thermodont contains formalin. This product is not described in Accepted Dental Therapeutics 1971/72

Other Desensitizing Agent :- Ammonical Silver Nitrate

Solution N.F. XII was official as a dental protective and desensitizing agents. It was mixed with a reducing agent such as 10% formaldehyde and then applied to exposed dentin or small lesions, with a resulting deposit of metallic silver [Ag⁰]. It is no longer an accepted produce.

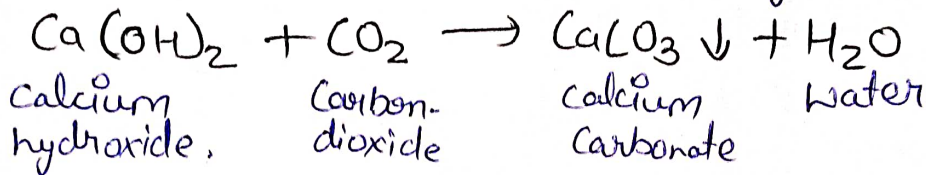
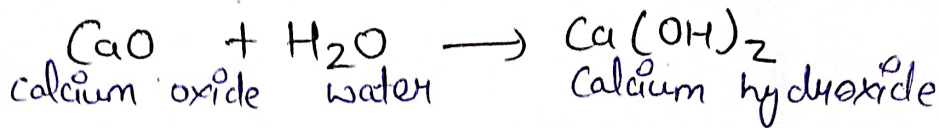


Calcium Carbonate -

Chemical formula :- CaCO_3 (100.0869 g/mol)

It is also known as aragonite, calcite and limestone. Teeth enamel is mainly made by calcium salts. Overdose of calcium cause hypocalcemia.

Reaction :-



Properties.

- It is milky whitish crystalline powder.
- It is odourless with bitter taste.
- It is insoluble in water and ethanol.

Applications / Uses :-

- It is used in water treatment, forms complexes with other harmful metals.
- It plays a vital role for growth and maturation of the body like muscles, bones, teeth and organs.

Storage Condition :- It is stored in well closed air resistance unopened container and keep away from incompatible at room temperature and also away from the light and moisture.

Sodium Fluoride

Chemical formula :- NaF

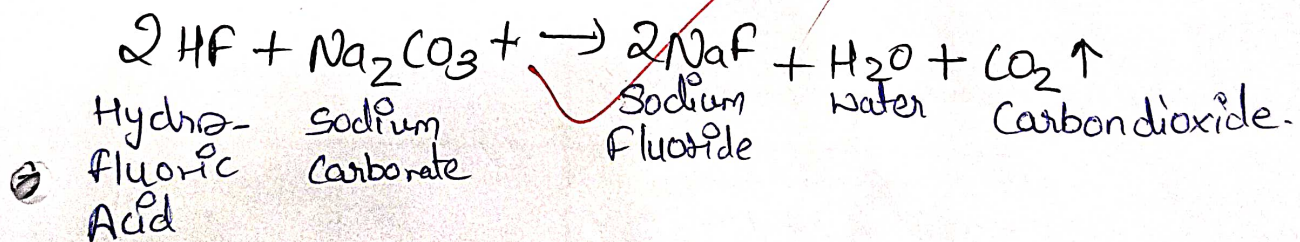
Molecular Weight :- 42.0

Molar Mass :- 41.99 g/mol

Introduction :-

Inorganic chemical is used for fluoride ion in dental products. It protects teeth from acid demineralization, provides strength for teeth enamel and prevents tooth decay.

Reaction :-



Properties :-

- It is colourless crystalline powder
- It is odorless with salty taste.
- It is readily soluble in water but insoluble in alcohol

Application / Use :-

- 1) Ingredient of various dental preparations used to prevent dental caries.
- 2) It is also used in water treatment.

Zinc Eugenol Cement

Introduction :- These cements have been used extensively, in dentistry since the 1890s depending on their use they vary widely in their properties. In general they are cements of low strength. They are least irritating of all dental cements and are known to have an obtundant (sedative) effect on exposed dentin.

Composition :-

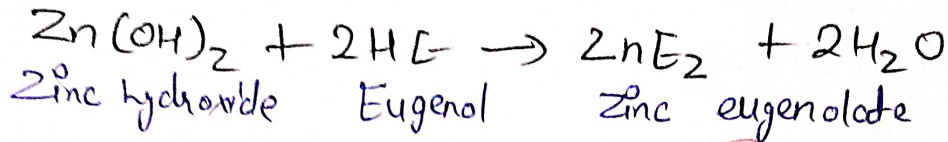
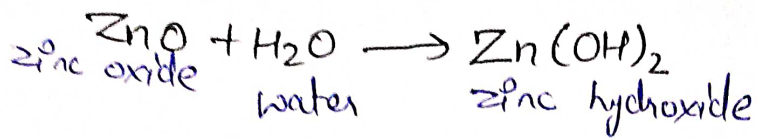
Powder

Ingredient	Weight (%)	Function
Zinc oxide	69.0	Principal ingredient
White resin	24.3	To reduce brittleness of set cement
Zinc acetate	0.7	Accelerator, plasticizer improve strength
Magnesium oxide		is added in some powders, act with eugenol in similar manner as zinc oxide.

Liquid.

Ingredient	Weight (%)	Function.
Eugenol	80.5	Reacts with zinc oxide
olive oil	19.5	Plasticizer

Reaction :-



Properties :-

- 1) Thermal properties :- Their thermal insulating properties are excellent and are approximately the same as for human dentin. The thermal conductivity of zinc oxide eugenol is in the range of insulators like cork and asbestos.
- 2) Solubility and disintegration :- The solubility of the set cement is highest among the cements (0.4 to 1.5% wt) They disintegrate in oral fluids. This break down due to hydrolysis of the zinc eugenolate matrix to form zinc hydroxide and eugenol.
- 3) Adhesion :- They do not adhere well to enamel or dentin. This is one reason why they are not often used for final cementation of crowns and other fixed dental prostheses.
- 4) Biological Properties :-
 - pH and effect on pulp (pH is 6.6 to 8.0): They are the least irritating of all cements. Pulpal response - classified as mild.
 - Bacteriostatic and obtundent properties: They inhibit the growth of bacteria and have an anodyne or soothing effect (obtundent) on the pulp in deep cavities, reducing pain.
 - Eugenol is irritating to skin and eyes. Repeated contact may cause allergic dermatitis.
- 5) Optical properties :- The set cement is opaque

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- 2) Mohammad , A ; "Test Book of Pharmaceutical chemistry (inorganic)" , first edition , CBS Publishers & Distributors Pvt Ltd , New Delhi , 2018 , Page no - 135
- 3) Block , J-H , Roche , E-B ; "Inorganic Medical and pharmaceutical chemistry" , first edition , Veerghese ptr publishing House , Mumbai , 1986 , Page no - 356-371.

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On Topic Dental Products

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