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**Subject: Dental Material-II**  Instructor: Mr. Usman

Final term Assignment 50 Marks

Department AHS DT 4thSemester

# Answer the following questions.

**Q1.** Explain uses of calcium hydroxide cement

**Q2.** Write a detail note on properties of Mineral trioxide aggregate and also explain Manipulation and setting reaction of MTA.

**Q3.** Discus manipulation of amalgam, write indication and contraindication of amalgam.

**Q4.** Discus composition of calcium hydroxide with advantage and disadvantages

**Q5.** Write component of composite resin and also discus uses of composite resin.

**Q1. Explain uses of calcium hydroxide cement.**

**ANS#1.**

**Uses Of Calcium Hydroxide Ca(OH)2:**

 Calcium hydroxide is used in both the preservation of the vital pulp and the disinfection of the prepared root canal system. To achieve success in direct pulp capping a strict aseptic regime must be followed. Various forms of root resorption, their aetiology and treatment, are considered.

1. **Intracanal medicament:** Calcium Hydroxide (CH) is one of the most commonly used intracanal medicaments which can be used with various vehicles. It also plays a major role as an inter-visit dressing in the disinfection of the root canal system. It is a broad spectrum anti-microbial agent. Calcium hydroxide is a slowly working antiseptic. Direct contact experiments in vitro require a 24 hour contact period for complete kill of entero-cocci. Calcium hydroxide not only kills bacteria, but it also reduces the effect of the remaining cell wall material lipo-polysaccharide. It has a wide range of antimicrobial activity against common endodontic pathogens, but is less effective against Enterococcus faecalis and Candida albicans.
2. **Endodontic sealer**: Calcium hydroxide ,ust be dissociated imto Ca++ and OH-. Therefore to be effective, an endodontic sealer based on calcium hydroxide must dissolve and the solid consequently lose content. Thus one major concern is that the calcium hydroxide content dissolve, leaving obturation voids. This would ruin the function of the sealer, because it would disintegrate in the tissue. Recently introduced several calcium hydroxide sealers are sealapex(kerr), apexkit(vivadent).
3. **Pulp Cappimg agent**: Calcium hydroxide is generally as the material of choice for pulp capping. Histologically there is a complete dentinal bridging with healthy radicular pulp under calcium hydroxide dressings. When calcium hydroxide is applied directly to pulp tissue there is necrosis of adjacent pulp tissue and an inflammation of contiguous tissue. Three main calcium hydroxide products are: Pulpadent, Dycal, Hydrex(MPC).
4. **Ca(OH)2 in Apexification:** in apexification tech canal is cleaned and disinfected, when tooth is free of signs and symptoms of infection, the canal is dried and filled with stiff mix of calcium hydroxide and CMCP. Commercial paste of calcium hydroxide (eg. Calasept, Pulpdent, Hypocal, Calyxl) may be used to fill the canals.

**Q#2) Write a detail note on properties of Mineral trioxide aggregate and also explain Manipulation and setting reaction of MTA.**

**ANS#2)**

**Properties of Mineral trioxide aggregate** (MTA):

1. Biocompatible with periradicular tissues
2. Non cytotoxic, but antimicrobial to bacteria
3. Non-resorbable
4. Minimal leakage around the margins.
5. Very basic AKA alkaline (high pH when mixed with water).
6. As a root-end filling material MTA shows less leakage than other root-end filling materials, which means bacterial migration to the apex is diminished.
7. Treated area needs to be infection free when applying MTA, because an acidic environment will prevent MTA from setting.
8. Compressive strength develops over a period of 28 days, similar to Portland cement. Strengths of more than 50 MPa are achieved when mixed in a powder-to-liquid ratio of more than 3 to 1.
9. Originally, MTA products required a few hours for the initial and final setting, which is uncommon in dental materials. Newer materials are available that set more quickly.
10. MTA Plus is washout resistant.

**Manipulation and setting reaction of MTA**

Manipulation and setting reaction of MTA The MTA paste is obtained by mixing 3 parts of powder with 1 part of water to obtain putty like consistency (distilled water, local anesthesia, normal saline). Mixing can be done on paper or on a glass slab using a plastic or metal spatula. This mix is then placed in the desired location and condensed lightly with a moistened cotton pellet. MTA has a pH of 10.2 immediately after mixing and increases to 12.5 after 3 hours of setting which is almost similar to calcium hydroxide. MTA powder should be stored carefully in closed sealed containers away from moisture. The mixing time of MTA is crucial. If the mixing of MTA is prolonged, it results in dehydration of the mix. The mixing time should be less than 4 minutes.

**Q3. Discus manipulation of amalgam, write indication and contraindication of amalgam.**

**ANS#3) Manipulation Of Amalgam:**

1. Selection of alloys.
2. Proportioning and dispencing.
3. Trituration.
4. Condensation.
5. Carving.
6. Finishing and polishing.
7. **Selection of alloys:** For restorations subjected to occlusal forces, an amalgam with high resistance to marginal fractures is desirable. If strength is needed quickly the best choice is spherical or high copper alloys, but they require a fast operator.
8. **Proportioning and dispencing:** Proportioned capsules containing alloy particles and mercury in compartments separated by a disk or membrane are available.
9. **Trituration:** Trituration is the process by which mercury is allowed to react with the alloy powder. This procedure allows the rubbing of surface oxide on amalgam particle, exposing an active surface to react with mercury.
	1. **Hand trituration**
	2. **Mechanical trituration.**
10. **Condensation:** The amalgam is placed in the cavity after trituration, and condensed using suitable instrument. Proper condensation increase the strength and decrease the creep of the amalgam. Condensation must always be done within the four walls and floor.
11. **Carving:** The amalgam is overfilled into the cavity and the mercury rich surface layer is trimmed away. If the caring is started too soon, the amalgam may be so plastic that it may pull away from the margins.
12. **Finishing and polishing:** After the carving, the restoration is smoothened, by burnishing the surfaceand margins of the restoration. Polishing minimizes corroision and prevents adherence of plaque. The polishing should be delayed for atleast 24 hours after condensation.

**Indications of amalgam:**

* As a permanent restorative material in class 1, class 2, class4, caries
* Cuspal restorations
* Pin retained restorations
* As a foundation
* Post-endodontic access filling material
* Teeth with questionable prognosis
* Economic status

**Contra-Indications of amalgam:**

* Anterior teeth where asthetics is a prime concern
* Esthetically prominent areas of posterior teeth.
* Small to moderate classes 1 and 2 restoration that can be well isolated,
* Small class 6 restoration.

**Q4. Discus composition of calcium hydroxide with advantage and disadvantages.**

**ANS#4)**

**Composition of calcium hydroxide:**

**Accelerator Paste**

* Alkyl salicylate 36 – 42 %
* Inert fillers – titanium oxide 12 – 14 %
* Barium sulphate 32 – 35 %
* Calcium sulphate 14 – 15 %

**Base paste**

* Calcium hydroxide 50-60%
* Zinc oxide 10%
* Zinc stearate 0.5%
* Ethylene toluene sulphonamides and paraffin oil 39.5%.

**Advantage and disadvantages of calcium hydroxide:**

|  |  |
| --- | --- |
| **Advantages**  | **Disadvantages** |
| Initially bactericidal then bacteriostatic | Does not exclusively stimulate dentinogenesis.  |
| Promotes healing and repair.  | Associated with primary tooth resorption |
| High pH stimulates fibroblasts | May degrade during acid etching |
| Neutralizes low pH of acids | Degrades upon tooth flexure.  |
| Stops internal resorption | Marginal failure with amalgam condensation |
| Inexpensive and easy to use | Does not adhere to dentin or resin restoration |

**Q5. Write component of composite resin and also discus uses of composite resin.**

**ANS#5.**

**COMPONENTS**

Matrix

Filler

Coupling Agent

Initiators and accelerators

Pigments

**Uses of composite resin:**

The various uses of composites include:

Esthetic tooth-colored restoration in the anterior region

Diastema closure

Improving/modifying tooth size and shape

Masking discolored teeth via composite veneering

For luting and core build-up

Orthodontic bracket adhesive