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Course Title	***:***	***Dental Material-II***
Class ID	***:***	***14538***
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Department	***:***	***Allied Health Science***
Programme	***:***	***BS Dental***
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Q1. Discuss glass ionomer cement briefly?

Ans:

Introduction:

- Glass ionomer cement is a tooth colored material, introduced by Wilson & Kent in 1972. Material was based on reaction between silicate glass powder & polyacrylic acid. They bond chemically to tooth structure & release fluoride for relatively long period.

Classification:

- Type I. For luting
- Type II. For restoration
- Type III. For liner & Bases
- Type IV. Fissure & sealant
- Type V. As Orthodontic Cement
- Type VI. For core build up

Composition

- These materials may be supplied as a powder and liquid or as a powder mixed with liquid for clinical used.
- **Powder:**
- Silica 41.9%
- Alumina 28.6%
- Alumina Fluoride 1.6%
- Calcium Fluoride 15.7%
- Sodium Fluoride 9.3%
- **Liquid:**
- Polyacrylic acid
- Tartaric acid
- Water

Solubility & Disintegration

- Initial solubility is high due to leaching of intermediate products.
- The complete setting reaction takes place in 24hrs, cement should be protected from saliva during this period.

Manipulation

- Preparation of tooth surface
- Proportion & mixing
- Protection of cement during setting
- Finishing
- Protection of cement after setting

3. **Protection of cement during setting:**

- Glass ionomer cement is extremely sensitive to air & water during setting.
- Immediately after placement into cavity Preshaped matrix is applied to it.

4. **Finishing:**
    - Excess material should be trimmed from margins.
    - Hand instruments are preferred to rotary tools to avoid ditching.
    - Further finishing is done after 24hrs.

5. **Protection of Cement after setting:**

- Before dismissing the patient, restoration is again coated with the protective agent to protect trimmed area.
- Failure to protect for first 24hrs results in weaken cement.

Advantages

- Inherent adhesion to the tooth surface.
- Good marginal seal.
- Anti-cariogenic property.
- Biocompatibility
- Minimal cavity preparation required
- Easy to manipulation
- Permanente restoration material
- Permanente cementation material

Disadvantages

- Low fracture resistance.
- Low wear resistance.
- Water sensitive during setting phase.
- Less esthetic compared to composite.

Uses

- Anterior esthetic restoration material for class III & restorations.
- For luting.
- For core build up
- For eroded area.
- For atraumatic restorative treatment.
- As an orthodontic bracket adhesive.
- As restoration for deciduous teeth.

QNo2. Differentiate permanent cement, luting agent and temporary cement?

Ans:

Luting Agent:

- A material that acts as an adhesive to hold together the casting to the tooth structure. Luting agents are designed to be either permanent or temporary.

Permanent Cement	Temporary Cement
• For the long-term cementation of cast-restorations such as inlays, crowns, bridges, laminate veneers, and orthodontic fixed appliances.	• Temporary cements are used when the restoration will have to be removed. Most commonly, temporary cement is selected for the placement of provisional coverage.

QNo3. Write a detail note on manipulation, advantages and disadvantages of Zinc Oxide Eugenol cement.

Ans:

Manipulation:

- Powder / liquid ratio is 1.0 parts of powder to 1 part of liquid.
- Using a small area of the pad surface.
- Instrument should be cleaned before the cement sets on them.
- **MIXING TIME:**
- Mixing time is 2 to 3 mins
- **SETTING TIME:**
- Surface hardens in about 20 to 30 mins. Complete hardening takes place in 2-3 hrs.

Advantages:

- Inexpensive
- Easy to manipulation
- Dimensional stability
- Good surface detail
- Can be added to with fresh zinc oxide eugenol
- Non toxic

Disadvantages:

- Cannot be used in very deep undercuts
- Only sets quickly in them section
- Eugenol allergy in some patients

QNo4. Briefly explain polycarboxylate cement.

Ans:

Introduction:

- Zinc polycarboxylate cement was the first cement that was developed with the property of an adhesive bond to tooth structure along with some metallic restoration.

Availability:

- Zinc polycarboxylate cement is available as powder and liquid.

Composition:

Powder

- Zinc oxide 89%
- Magnesium oxide 9%
- Barium oxide 0.2%
- Other oxides 1.4%
  (bismuth trioxide, Calcium oxide)

Liquid:

- Polyacrylicacid or 32 to 45%
  Copolymer of acrylic acid
- Other carboxylic acids, 30% to 50%
  Such as itaconic acid or maleic acid

Properties of Zinc polycarboxylate:

- pH of liquid in Zinc polycarboxylate: 1.7
- it is highly bio compatible to the pulp which is similar to ZOE cements.
- Working time 2.5 minutes
- Setting time is 6 to 9 minutes
- Solubility: 0.6% (water solubility)
- Film thickness: it is more viscous than zine phosphate cement.

Manipulation or mixing of Zinc polycarboxylate cement:

- Powder / liquid ratio is 1.5 parts of powder to 1 part of liquid.
- Using a small area of the pad surface.
- Mixing time is 30 to 60 seconds.
- Cement should be used immediately because the working time is short.
- Working time 2.5 minutes
- Setting time is 6 to 9 minutes
- Instrument should be cleaned before the cement sets on them.

Uses of polycarboxylate

- Permanent cementation for
- -crowns
- -Bridges
- -Inlays
- -Onlays
- -Orthodontic Cementation

Advantages:

- Low irritancy
- Adhesion to tooth
- Easy manipulation
- Strength tensile
- Solubility (similar to zinc phosphate)
- Film thickness (similar to Zinc phosphate)

Disadvantages:

- Poor esthetic
- Solubility high

QNo5. Distinguish liquid powder ratio of Zinc Phosphate cement, also write its uses and advantages?

Ans:

In Powder:

- Zinc oxide
- Magnesium oxide
- Other oxide and fluoride

In liquid:

- Phosphate acid
- 30 – 40 % water
- Zinc oxide and aluminum hydroxide as buffering agent (buffering agent is a weak acid or base used to maintain the acidity).

Uses:

- Final cementation of cast metal restoration
- Cavity base
- Temporary filling material
- Cementation of orthodontic bands

Advantages:

- Inconspicuous appearance
- Speed and case of usage
- Low thermal conductivity beneath a metallic restoration.