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**Midterm Assignment 30 Marks**

**Department AHS Semester DT 4th**

* **Attempt all questions, all questions carry equal marks.**

Q1. Discuss glass ionomer cement briefly?

Q2. Differentiate permanent cement, luting agent and temporary cement.

Q3. Write a detail note on manipulation, advantages and disadvantages of Zinc Oxide Eugenol cement.

Q4. Briefly explain polycarboxylate cement.

Q5. Distinguish liquid powder ratio of Zinc phosphate cement, also write its uses and advantages

**Answer no 1**

**Glass ionomer cement**

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

# Classification of Glass ionomer cement

1. Type I. For luting
2. Type II. For restoration
3. Type III. For liner and bases
4. Type IV. Fissure and sealent
5. Type V. As Orthodontic cement
6. Type VI. For core build up

# Composition

# These materials may be supplied as a powder and liquid and powder mixed with liquid for clinical uses.

**Powder:**

Silica 41.9%

Alumina 28.6%

Alumina fluoride 1.6%

Calcium fluoride 15.7%

Sodium fluoride 9.3%

**Liquid:**

Polyacrylic acid 35%

Tartaric acid 5-15%

Water

**Manipulation**

1. Preparation of tooth surface

2. Proportion and mixing

3. Protection of cement during setting

4. Finishing

5. Protection of cement after setting

**1. Preparation of tooth surface**

The enamel and dentin are first cleaned with pumice slurry followed by swabbing with polyacrylic acid for 5 sec. After conditioning and rinsing the tooth surface should be isolate and dry.

**2. Proportion and mixing**

First increment is incorporated rapidly to produce a homogenous milky consistency.

Mixing is done in folding method to preserves gel structure.

Finished mixing should have a glossy surface.

**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.

**Uses**

1. Anterior esthetic restoration material for class III and V restorations.
2. For luting.
3. For core build up.
4. For eroded area.
5. For atraumatic restorative treatment.
6. As an orthodontic bracket adhesive.
7. As restoration for deciduous teeth.

# Advantages

1. Good marginal seal.
2. Anti-cariogenic property.
3. Biocompatibility
4. Minimal cavity preparation required
5. Easy to manipulation

# Disadvantages

1. Low fracture resistance.
2. Low wear resistance.
3. Water sensitive during setting phase.
4. Less esthetic compared to composite.

**Answer no 2**

Permanent cement

For the long-term cementation of cast ‑ restorations such as inlays, crowns, bridges, laminate veneers, and orthodontic fixed appliances.

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.

Temporary cement

Temporary cements are used when the restoration will have to be removed. Most commonly, temporary cement is selected for the placement of provisional coverage.

**Answer no 3**

**Zinc Oxide Eugenol cement (ZOE)**

Zinc Oxide Eugenol cement is introduced in 1858 and widely used in dentistry for temporary luting and permanent luting temporary restoration, base liner.

 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.

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.

Advantages

1. Inexpensive
2. Easy to manipulation
3. Dimensional stability
4. Good surface detail
5. Can be added to with fresh zinc oxide eugenol
6. Non toxic

Disadvantages

1. Cannot be used in very deep undercuts
2. Only sets quickly in thin section
3. Eugenol allergy in some patients

**Answer no 4**

Poly carboxylate cement

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**

Polyacrylic acid or copolymer of acrylic acid 32 to 48%

Other carboxylic acids 30% to 50%

(such as itaconic acid or maleic acid)

**Properties of Zinc polycarboxylate cement**

1. PH of liquid in zinc polycarboxylate:1.7
2. It is highly bio compatible to the pulp which is similar to ZOE cements.
3. Working time 2.5 minutes
4. Setting time is 6 to 9 minutes
5. Solubility: 0.6 %
6. Film thickness: it is more viscous than zinc phosphate cement.

**Manipulation of Zinc polycarboxylate cement**

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

**Uses of Zinc polycarboxylate cement**

1. Permanent cementation for
2. Crowns
3. Bridges
4. Inlays
5. Onlays
6. Orthodontic cementation

# Advantages of Zinc polycarboxylate cement

1. Low irritancy
2. Adhesion to tooth
3. Easy manipulation
4. Strength tensile
5. Solubility (similar to zinc phosphate)
6. Film thickness (similar to zinc phosphate)

**Disadvantages**

1. Poor esthetic
2. High Solubility

**Answer no 5**

 **ZINC PHOSPHATE CEMENT**

Zinc phosphate cement are the oldest material and widely used in dentistry for luting permanent metal restoration.

**Composition**

**Powder**

Zinc oxide

Magnesium oxide

Other oxide and fluoride

# Liquids

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).

**Liquid and powder ratio**

1. Powder and liquid ratio are 1.4 gm/0.5ml.
2. The powder is added in small increments.

**Uses**

1. Final cementation of cast metal restoration
2. Cavity base
3. Temporary filling material
4. Cementation of orthodontic bands

# Advantages

1. Inconspicuous appearance
2. Speed and case of usage
3. Low thermal conductivity beneath a metallic restoration.

Disadvantages

1. Slight solubility in mouth fluids
2. Opaque material not soluble for visible surface.