**Subject Dental Material instructor: Mr. Usman**

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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?

**Answer** : **Introduction of Glass Ionomer Cement**

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 & sealent

Type V. As Orthodontic cement

Type VI. For core build up

**Composition**

These material 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 24 hrs, cement should be protected from saliva during this period.

**Manipulation**

1. Preparation of tooth surface

2. Proportion & mixing

3. Protection of cement during setting

4. Finishing

5. 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 of GIC:**

Inherent adhesion to the tooth surface.

Good marginal seal.

Anti cariogenic property.

Biocompatibilty

Minimal cavity preparation required

Easy to manipolation

Permanente restoration material

Permanente cementation material.

**Disadvantages of GIC:**

Low fracture resistance.

Low wear resistance.

Water sensitive during setting phase .

Less esthetic compared to composite.

**USES OF GIC:**

1 :Anterior esthetic restoration material for class III & 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.

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

**Answer** : **Permanent Cement :**

 Use 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.

**Temperory 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.

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

**Answer** : **Manipulation Of Zinc Oxide Eugenol cement :**

* 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 Of ZOE Cement :**

Inexpensive.

Easy to manipulation

Dimensional stability.

Good surface detail.

Can be added to with fresh zinc oxide eugenol.

Non toxic.

**Disadvantages Of COE Cement :**

Cannot be used in very deep undercuts.

Only sets quickly in thin section.

Eugenol allergy in some patients.

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Q4. Briefly explain polycarboxylate cement.

**Answer** : **Polycarboxylate 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 :**

* Polyacrylicacid or 32 to 48%

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 zinc 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 becouse 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 phospahate).

**Disadvantages :**

Poor esthetic.

Solublityhigh.

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

**Answer** : **Liquid & Powder Ratio of Zinc Phosphate Cement :**

**IN POWDER :**

Zinc oxide.

Magnesium oxide.

Other oxide and flouride.

**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 Of Zinc Phosphate Cement :**

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

**Advantages Of Zinc Phosphate Cement :**

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

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