

Subject Dental Material

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Midterm Assignment

30 Marks

Department AHS

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- **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 kind of dental cement that was developed in 1965 and began to be used in restorative dentistry in 1972. Made of a silicate glass powder combined with a water-soluble polymer, these cements are also called "giomers." They are used to permanently cement dental inlays, bridges, crowns and orthodontic brackets and to fill cavities.

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 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

Advantages of GIC:

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

Temporery 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.

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.



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 :

- Polyacrylic acid or copolymer of acrylic acid 32 to 48%
- Other carboxylic acids, such as itaconic acid or maleic acid. 30% to 50%

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 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 phosphahate).

Disadvantages :

Poor esthetic.
Solublityhigh.



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 ease of usage
- Low thermal conductivity beneath a metallic restoration.

