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

**Midterm Assignment 30 Marks**

**Department AHS Semester DT 4th**

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

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Q1. Discuss glass ionomer cement briefly?

Answer no 1

***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 & 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

***Advantage***

Inherent adhesion to the tooth surface.

Good marginal seal.

Anti cariogenic property.

Biocompatibilty

Minimal cavity preparation required

Easy to manipulation

Permanente restoration material

Permanente cementation material

***Disadvantage***

Low fracture resistance.

Low wear resistance.

Water sensitive during setting phase .

Less esthetic compared to composite

***Uses***

Anterior esthetic restoration material for class III & V restorations.

For luting.

For core build up.

For eroded area .

For atraumatic restorative treatment.

As an orthodontic bracket adhesive.

As restoration for deciduous teeth.

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

***Answer no 2***

***Introduction***

They are materials that set intraorally and that are commonly used to join a tooth and a prosthesis or restoration of carious tooth

***Classification of cements :***

Type I: Luting agents that include permanent and temporary cements.

Type II: Restorative applications.

Type III: Liner or base applications

***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:***

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

***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

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

Answer no 3

***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

***Advantage***

Inexpensive

Easy to manipulation

Dimensional stability

Good surface detail

Can be added to with fresh zinc oxide eugenol

Non toxic

***Disadvantage***

Cannot be used in very deep undercuts

Only sets quickly in thin section

Eugenol allergy in some patients

Q4. Briefly explain polycarboxylate cement.

***Answer no 4***

***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 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

***Advantage***

Low irritancy

Adhesion to tooth

Easy manipulation

Strength tensile

Solubility (similar to zinc phosphate)

Film thickness (similar to zinc phosphate)

***Disadvantage***

Poor esthetic

Solublity high

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

***Answer no 5***

***Powder ratio***

Zinc oxide

Magnesium oxide

Other oxide and flouride

***Liquid ratio***

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

***Advantage***

Inconspicuous appearance

Speed and case of usage

Low thermal conductivity beneath a metallic restoration