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**Subject Dental Material**

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**QUESTION NO: 1**

**Discuss glass ionomer cement briefly?**

**ANSWER:**

**Glass Inonmer Cement:**

**Discovery:**

Glass ionomer cement was discovery by Wilson and Dr.kent in 1972 and use in dentistry for the first time by Dr.Mclean and Dr.wilson in 1975.

**Definition:**

* Glass ionomer cement are tooth color, adhesive, restorative material used for restoration of eroded areas.
* They are produced by mixing a powder prepared from a calcium aluminosilicate glass with an aqueous solution of polyacrylic acid.
* They release fluoride ions which is beneficial to the teeth.\

**Classification:**

* Type 1 (luting cements)
* Type 2 (restorative cements)
* Type 3 (cavity liners and base)
* Type 4 (pit and fissure sealants)
* Type 5 (orthodontic bands)
* Type 6 (for core build up)

**Mode of Supply:**

They are supplied as a powder and liquid or as a powder mixed with liquid for clinical used.

**Composition:**

**Powder:**

* Silica 41.9%
* Alumina 28.6%
* Alumina fluoride 1.6%
* Calcium fluoride 15.7%
* Sodium fluoride 9.3%

**Liquid:**

* Water
* Polyacrylic acid
* Tartaric acid

**Solubility and Disintegration:**

* Due to separation of intermediate products its initial solubility is high.
* The setting reaction of this material is complete in 24 hours, during is time its cement should be protected from saliva.

**Manipulation:**

1. Preparation of tooth surface
2. Proportion and mixing
3. **Protection of cement during setting:**

The cement is very sensitive to air and liquid in the period of setting. So preshaped matrix should be applied to it when the material is applied.

1. **Finishing:**

Hand instruments are preferred to use to avoid ditching. The extra material should be removed. Further finishing is done after setting (24 hrs)

1. **Protection of Cement After Setting:**

The restoration should be coated with a protective agent, after all the process is done. The will be weak if it is not protected**.**

**Advantages:**

* Adhesion to tooth tissue.
* Fluoride release.
* These cement have longer shelf life and they are strong.
* Easy manipulation.
* Rapid set at mouth temp.
* Good marginal seal.
* Permanent restoration material.
* Permanent cementation material.
* Minimal cavity preparation required.
* Anti-cariogenic property (prevent tooth decay).

**Disadvantage:**

* Moisture sensitivity.
* Brittle structure.
* Clinically poor aesthetics.
* Poor strength.
* Less wear resistance.

**Uses:**

* Core build up.
* Eroded area.
* For orthodontic bracket attachment.
* Liners and base.
* Repair of defective margins in restoration.
* Restoration in primary dentition.
* Atraumatic restorative treatment.

**QUESTION NO: 2**

**Differentiate permanent cement, luting agent and temporary cement ?**

**ANSWER:**

**Luting Agent:**

Luting agent is a material by which crowns, restoration are fixed or attached to tooth structure.

**Permanent Cement:**

Permanent cement is use in the long-term cementation of cast restoration such as inlays/onlays, crown, bridge, veneers, and orthodontic fixed appliances.

**Temporary cement:**

They are use for temporary time when the restoration have to be removed which include crown, inlays, and bridges.

**QUESTION NO: 3**

**Write a detail note on manipulation, advantages and disadvantages of Zinc Oxide Eugenol cement?**

**ANSWER:**

**Zinc Oxide Eugenol Cement:**

* These cement have low strength.
* Used for temporary luting and permanent luting, temporary restoration and base liner.

**Manipulation:**

* Powder/liquid ration is 1.0 parts of powder to 1 part of liquid.
* Instruments should be cleaned before the cement sets on them.
* Using a small area of the pad surface.

**Setting Time:**

* About 20 to 30 minutes the surface will be hard.
* In 2 to 3 hour the surface will be completely hard.

**Mixing time:**

* 2 to 3 minute is mixing time.

**Advantages:**

* Inexpensive
* Easy manipulation
* Non toxic
* Good surface detail
* Dimensionally stabile
* Can be added with fresh zinc oxide eugenol

**Disadvantages:**

* Allergy in some patients
* Cannot be used in very deep undercuts
* Only set quickly in thin section

**QUESTION NO: 4**

. **Briefly explain polycarboxylate cement?**

**ANSWER:**

**Zinc Polycarboxylate Cement:**

* First dental cement to exhibit chemical bonding to teeth.
* The material form an adhesive bond with enamel and dentine.

**Mode of Supply:**

They are available as powder and liquid form.

**Composition:**

**Powder:**

* Zinc oxide 89%
* Magnesium oxide 9%
* Barium oxide 0.2%
* Other oxide 1.4% (bismuth, trioxide, calcium oxide)

**Liquid:**

* Polyacrylicacid or copolymer of acrylic acid 32-48%
* Other carboxylic acid, such as itaconic acid or maleic acid 30-50%

**Properties of Zinc Polycarboxylate:**

* More biocompatibility than zinc phosphate cement
* Moderate strength
* Moderate solubility
* PH of zinc oxide ploycarboxylate is 1.7
* Film thickness more viscous than zinc phosphate cement.
* Excellent thermal conductivity.

**Manipulation OR Mixing:**

* 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.
* Working time 2.5 minutes
* Setting time is 60 to 9 minutes

**Using:**

* The materials are primarily used as luting cements for;
* Crowns
* Bridges
* Inlays
* Or as cavity base materials
* Orthodontic cementation

**Advantages:**

* They are acidic but not as irritant as phosphate cement.
* Good marginal adaptation
* Anticariogenic property
* Adhesion to tooth
* Easy manipulation
* Good strength

**Disadvantages:**

* High solubility
* Poor esthetic

**QUESTION NO: 5**

**Distinguish liquid powder ratio of Zinc phosphate cement, also write its uses and advantages?**

**ANSWER:**

**Powder:**

* Zinc oxide
* Magnesium oxide
* Other oxide and fluoride

**Liquid:**

* 30- 40% water
* Phosphate acid
* Zinc oxide and aluminum hydroxide as buffering agent.

Powder/Liquid ratio of Zinc phosphate cement is about **3.5:1**

**Uses:**

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

**Advantages:**

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