Dental Material

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Lecture 3

Elastomeric impression material

In addition to hydrocolloids there is another group of elastic impression materials. They are soft and rubber like and are known as elastomers or non aqueous impression material.

Elastomers are flexible cross-linked polymers when set. They are synthetic polymers which can be converted to solid rubber at room temperature by mixing with a suitable catalyst they undergo polymerization and /or cross linking (by condensation or addition) reaction to produce firm elastic solid.

Types of elastomers (According to the chemistry):

1. Polysulphide.

2. Condensation polymerizing silicones.

3. Addition polymerizing silicones.

4. Polyether.

5. Hybrid impression (combination of addition silicon and polyether).

Presentation:

Regardless of type all elastomeric impression materials are supplied as two paste systems (base and catalyst) in collapsible tubes. While the Putty consistency is supply in jars. Each type may be further divided into five viscosity: In increasing order of filler content

- ✓ Extra low or very low bodied.
- ✓ Low or light bodied. This material is used because of its ability to flow in and about the details of the prepared tooth. Aspecial syringe is used to place the light-bodied material immediately around the prepared teeth.
- ✓ Medium or regular bodied
- ✓ Heavy bodied or tray consistency (they are much thicker. they are used to fill the special tray. Their stiffness helps to force the light-bodied material into close contact with the prepared teeth and surrounding tissues to ensure a more accurate.
- ✓ Very heavy or putty consistency.

Uses: generally used in all cases

1. Crown and bridge impressions.

2. Partial and complete denture impressions.

3. Implant.

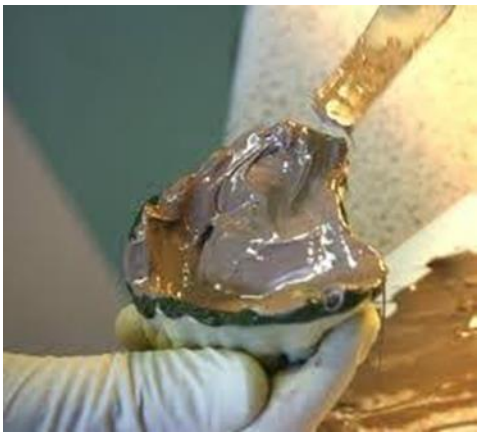
Polysulphide impression material:

This was the first elastomeric impression material to be introduced. It is also known as Mercaptan or Thiokol.

Presentation: paste in collapsed tubes as base and accelerator or catalyst. Base is white colored; accelerator is brown or gray. Available in three viscosities (by controlling the filler in its composition). Light bodied, medium bodied, heavy bodied.

Setting reaction

Mercaptan + lead dioxide → polysulphide +water (by product)



Properties:

- Setting time: 12 min
- Good flexibility
- High tear strength
- Hydrophobic
- It has highest permanent deformation .among the elastomers, so pouring of the cast should be delayed by half an hour. Further delay is avoided to minimize curing shrinkage, and shrinkage from loss of byproduct (water).
- Require custom tray. The tray is painted with adhesive.

Disadvantages

Unpleasant odor

High shrinkage on setting.

High amount of effort required for mixing.

Stains clothing & messy to work with

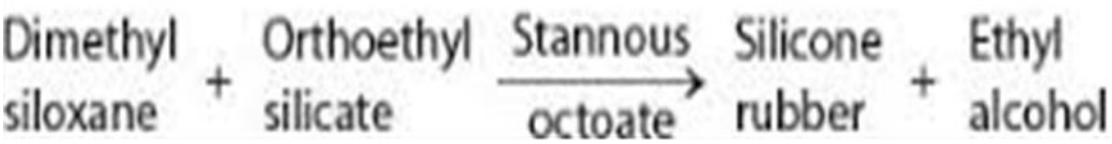
High permanent deformation.

Silicone impression materials

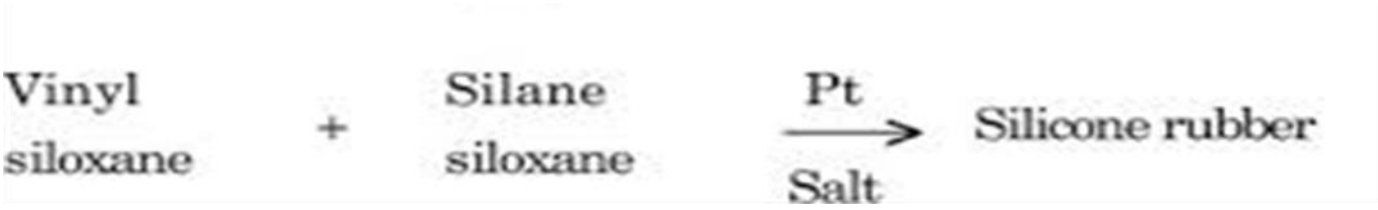
Two types of silicon impression materials based on the type of polymerization reaction occurring during its setting :

- Condensation silicon impression materials
- Addition silicone impression materials.

1.Condensation silicon impression materials.



2. Addition silicone impression materials.



Developed as an alternative to Polysulfides

- ✓ Has more desirable qualities in comparison:
- ✓ Easy mix
- ✓ Better taste and odorless
- ✓ Shorter setting time (5- 9 minutes).
- ✓ Good elastic properties (used in case of severe undercut).
- ✓ Addition silicone impression materials has the best dimensional stability among other elastomers even 1 week.
- ✓ Direct skin contact should be avoided to prevent any allergic reactions.
- ✓ Sulfur contamination from natural latex gloves inhibits the setting of addition silicone
- ✓ Hydrophobic

Dispensing & composition

- Light, regular, and heavy viscosities and putty
- Dispensed as a cartridge with 2 chambers (pastes), or two putty system

Disadvantage

- Should poured immediately (Condensation Silicone).
- Expensive

Polyethers

- Good mechanical properties ,dimensional stability and hydrophilic
- Used for crown and bridge and over-denture work since they are very accurate and also more hydrophilic than other silicon.

Dispensing & composition

•Dispensing same as other rubber materials (2 tubes)

•In addition, it's supplied in pouches of base and catalyst placed in mechanical mixer.

Properties

•Stiff , difficult to remove from undercuts

•Short working and setting times

•Setting time 3 5 minutes

•Sensitive to moisture and temperature

• Hydrophilic (must not be stored in water or disinfectant)

•accurate

Disadvantage

- It is expensive

- The working time was short.
- The material was very stiff.

Hybrid impression (combination of addition silicon and polyether)

- Good mechanical properties ,dimensional stability and hydrophilic
- Adequate Bond of impression material to tray
- Resistance to deformation

Terminology

Polymerization: chemical reaction that transforms small molecules into large polymer chains.

Addition reaction: Polymerization reaction in which each polymer chain grows to maximum length in sequence and there is no by-product.

Condensation reaction: Polymerization reaction in which the polymer chains all grow simultaneously and by-product is formed.

Cross-linking: the reaction that links or joins polymer chain to form a network structure.

Thank you