Lec. 7 **Dr. Sahar**

Dental materials

Elastic impression material

2. Elastomeric Impression Materials

Elastomers or non-aqueous impression material. Elastomers are synthetic polymers which can be converted to solid rubber at room temperature by mixing with a suitable catalyst. They undergo polymerization (by condensation or addition) reaction to produce flexible cross-linked polymers.

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

Catalyst: a component of reaction that facilitates the reaction and usually does not become part of the final product.

Types of elastomers:

1. Polysulphide.

2. Silicone (condensation silicone, addition silicone).

3. Polyether.

4. Hyprid impression

Each type may be further divided into four viscosities:

A. Light body or syringe consistency (supplied as two paste system (base and catalyst)).

B. Medium or regular body (supplied as two paste system (base and catalyst)).

C. Heavy body or tray consistency (supplied as gars).

D. Very heavy body or putty consistency (supplied as gars)**.**

Uses:

- Crown and bridge impression.
- Implant impression.
- Partial and complete denture impression.

1. **Polysulphide impression material:** It was the first elastomeric impression material to be introduced. It is also known as Mercaptan or Thiokol.

♦ **Uses or application:** Polysulphide are commonly used for crown and bridge and occasionally for dentures work.

♦ **Supplied as:** paste in collapsed tubes as base (white) and accelerator or catalyst (brown or gray colored).





♦ **Available:** in three viscosities by controlling the filler in its composition:

~ Light body ~ Medium body ~ Heavy body

The higher the filler percentage the higher the viscosity and the less setting contraction, less thermal contraction and more dimensional stability.

♦ **Properties:**

Advantages	Disadvantages
Reproduction of fine surface detail.	Dimensional stability is not good: the shrinkage is high 0.45%. It has the highest permanent deformation among the elastomers. This improves with time so pouring of the model should be delayed by half an hour; further delay is avoided to minimize curing shrinkage.
It has high tear strength, good flexibility.	It has long setting time of 12.5 minutes.
Good shelf life	Unpleasant odor and color, stains the cloths and messy to work with.
Inexpensive.	It is hydrophobic so the mouth should be dried before making an impression.

	Requires a custom tray which should be painted with thin layer of adhesive.

2. Silicone rubber impression material:

A. Condensation silicone impression material:

This was the earlier of the two silicone impression materials and developed to overcome the disadvantages of polysulfide.

♦ **Uses: commonly used for crown and bridge and occasionally for partial denture.**
♦ **Supplied as:**

1. ***Light & medium bodied*** supplied as two pastes system (base & catalyst pastes).

2. ***Putty*** supplied in a single large plastic jar, the same catalyst paste may be used or sometimes it may be supplied as liquid.

They come in variety of colors (contrasting colors aid mixing).





**It is a condensation reaction. The reaction is exothermic 1Cº rise. Ethyl alcohol formed as by product evaporates gradually from the set rubber leading to shrinkage.

Dimethyl + Orthoethyl Silicone ⟶ silicone rubber + alcohol

♦ **Properties:**

1. Reproduction of fine surface details, good elastic property, elasticity develop earlier than polysulphide, but it is stiffer and harder than polysulphide.

♦ and bridge and occasionally for partial denture.

2. Dimensional stability is comparatively less than polysulphide but more that of alginate, because of high curing shrinkage (0.4 -0.6 %) also due to evaporation of the ethyl alcohol by-product. To avoid this cast should be poured immediately.

3. Setting time shorter than polysulphide 6-9 minutes.

4. Pleasant color and odor. Direct skin contact should be avoided to prevent any allergic reaction.

5. It is hydrophobic; the mouth should be dried well before making an impression.

6. Adequate tear strength but it is lower than polysulphide.

7. Shelf life is slightly less than polysulphide and more expensive.

8. They are most widely used with stock tray (putty consistency).

B. Addition silicone impression material:

It was introduced later. It has better properties than condensation silicone. It is also known as polyvinyl siloxane, available in four viscosities: light body, medium body, heavy body & putty.

♦ Supplied as:

1- Two pastes system: base and catalyst pastes come in equal size tube (unlike condensation silicones)

2- Putty jars: two equal size plastic jars, one containing the base and other the catalyst.



Sulfur contamination from latex gloves retard the setting of silicones, vinyl gloves should be used, there is no by product.

Silane siloxane + Vinyl Silicone ⟶ Silicone rubber

♦ **Properties:**

1. Excellent reproduction of surface details.

2. It has the best dimensional stability among the elastomers even after one week. It has a low curing shrinkage 0.17% and the lowest permanent deformation 0.05-0.3%.

3. Setting time is 5-9 minutes.

4. It has good tear strength.

5. It is hydrophobic, the mouth should be dried before taking the impression.

6. Pleasant odor and color. Cause allergic reaction so direct skin contact should be avoided.

8. It has low flexibility and harder than polysulphide. Care should be taken while removing the stone cast from the impression to avoid any breakage.

9. Shelf life ranges from 1-2 years and more expensive.

3. Polyether impression material:

It has good mechanical properties and dimensional stability. Its disadvantage is that it is very stiff material, short working time, bitter in taste and expensive.

♦ **Supplied as:** base and catalyst in collapsible tubes. The accelerator tube is usually smaller. It is available in three viscosities: light body, medium body& heavy body.





♦**Properties:**

1. Good dimensional stability and curing shrinkage is low 0.24%. But absorbe water and cause swelling, so that storage in moisture should be avoided.
2. Good reproduction of surface details, good tear strength.
3. Setting time is around 3-5 minutes, the material is clean to handle.
4. Pleasant odor and color, bitter taste and irritating to the skin.
5. It is hydrophilic, so moisture in impression field is not so critical. It has the best compatibility with stone.
6. Excellent shelf life more than 2 years and expensive.

It is extremely stiff. Its hardness is higher than polysulphides and increase with time. Removing it from undercuts is difficult.

4. Hybrid impression material:

- It is combination of addition silicone and polyether impression material.
- It is available in four viscosities (light, medium, heavy and putty).
- It is available in two setting time (regular and fast).
- It is hydrophilic.
- It has pleasant taste.
- Excellent reproduction of fine details.
- Excellent dimensional stability.
- Superior elasticity, allowing easy of removal from undercuts area.

** Technical considerations for rubber impression materials:

1. Impressions are usually made in special tray. Perforated stock trays are used only for

making impressions in putty viscosity.

2. Elastomers do not adhere well to the tray. An adhesive should be applied onto the tray and allowed to dry before making impression.

3. The bulk of the impression should be made with heavier consistency to reduce shrinkage. Light bodied should only be used in a thin layer as a wash impression.