**Elastomers**

د. حسن الرماحي

**Classification according to type of elastomer.**

1- Polysulfide.
2- Poly ether.
3- Silicon.
   a- Condensation polymerizing.
   b- Addition polymerizing.

**Uses**

1- Impressions of prepared teeth for fixed partial dentures.
2- Impression for removable partial dentures.
3- Impression of edentulous mouth for complete dentures.
4- Polyether is used for border molding of special tray.
5- For bite registration.
6- Silicon duplicating material is used for making refractory cast.

- **Polysulfide**

This was first elastomeric impression material to be introduced. It is also known as Mercaptan or Thiokol
Polysulfide impression material. The two pastes with contrasting colors are mixed together on a mixing pad with a metal spatula.

Available as

1- Light body.
2- Medium body.
3- Heavy body.

Composition

A. Base paste

1- Liquid polysulfide polymer. (80-85 %).
2- Inert fillers (titanium dioxide, zinc sulfate, copper carbonate, or silica). (16-18 %).

B. Catalyst paste

1- Lead dioxide. (60-68 %).
2- Dibutyl phthalate (30-35 %).
3- Sulfur. (3 %).
4- Other substances like (deodorant, and magnesium stearate (retarder) (2 %).
Properties

1- Unpleasant odor and color.
2- It is extremely viscous and sticky, mixing is difficult. However, they exhibit pseudoplasticity.
3- It has long setting time (12 minutes). Heat and moisture accelerate the setting time.
4- Excellent reproduction of surface details.
5- It has highest permanent deformation (3-5 %) 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 by-product (water).
6- It has high tear strength (4000 gm/cm²).
7- It has good flexibility and low hardness.
8- It is hydrophobic so the mouth should be dried thoroughly before making an impression.

Disadvantages

1- Unpleasant odor.
2- Dirty staining.
3- High amount of effort required for mixing.
4- Long setting time.
5- High shrinkage on setting.
6- High permanent deformation.

 Silicone rubber impression materials

These materials were developed to overcome some of the disadvantages of polysulfide.

1_ Condensation silicone
Available as
1- Light body.
2- Putty consistency

**Composition**

**A_ Base**

1- Polydimethyl siloxane.
2- Colloidal silica or metal oxide fillers (35-75 %) depending on viscosity.
3- Color pigments.

**B_ Accelerator**

1- Stannous octoate (catalyst).
2- Orthoethyl silicate (cross linking agent).

**Properties**

1- Pleasant color and odor.
2- Setting time is **8-9 minutes**.
3- Excellent reproduction of surface details.
4- Dimensional stability is comparatively less because of the high polymerizing shrinkage, and shrinkage from loss of by-product (ethyl alcohol). The cast should be poured immediately, the permanent deformation is also high (1-3 %).
5- The tear strength is lower than polysulfide (3000 gm/cm2).
6- It is stiffer and harder than polysulfide, care should be taken while removing the stone cast from the impression to avoid any breakage.
7- It is hydrophobic.
8- Direct skin contact should be avoided to prevent any allergic reactions.
2. **Addition silicone**

They were introduced later. It has better properties than condensation silicone. It is also known as *polyvinyl siloxane*. And available as:

1. Light body.
2. Medium body.
3. Heavy body.
4. Putty consistency

### Composition

#### A. Base

1. Poly methyl hydrogen siloxane.
2. Other siloxane prepolymers.
3. Fillers.

#### B. Accelerator

1. Divinyl polysiloxane.
2. Other siloxane prepolymers.
3. Platinum salt (catalyst).
4. Palladium (hydrogen absorber).
5. Retarders.
6. Fillers.

### Properties

1. Pleasant color and odor.
2. Direct skin contact should be avoided to prevent any allergic reactions.
3. Excellent reproduction of surface details.
4. Setting time is **5-9 minutes**.
5. It has the best dimensional stability among the elastomers. It has low polymerizing shrinkage, and the lowest permanent
deformation (0.05-0.3 %). The cast pouring should be delayed by
1-2 hours; because of hydrogen gas is liberated during polymerization, air bubbles will result.

6- It hydrophobic, so similar care should be taken while making the impression and pouring the wet stone. Some manufactures add a surfactant (detergent) to make it more hydrophilic.
7- It has low flexibility and it harder than polysulfide; care should be taken while removing the stone cast from the impression to avoid any breakage.

❖ Polyether rubber impression material

Polyether was introduced in the 1970. It has good mechanical properties and dimensional stability and available as

1- Light body.
2- Medium body.
3- Heavy body

Properties

1- Pleasant color and odor.
2- The sulfonic ester may cause skin reaction; direct skin contact should be avoided.
3- Setting time is around (8 minutes), heat decrease setting time.
4- Dimensional stability is very good. Polymerizing shrinkage is low. The permanent deformation is low (1-2 %). The impression should not be stored in water or in humid climate, because polyethers absorb water and can change dimension.
5- It is extremely stiff (flexibility 3 %). Its hardness is higher than polysulfide and increase with time; care should be taken while removing the stone cast from the impression to avoid any breakage.
6- The tear strength is good (3000 gm/cm2).
7- It is hydrophilic, so moisture in the impression field is not so critical. It has the best compatibility with stone.

Disadvantages

1- The working time was short.
2- The material was very stiff.
3- It is expensive

❖ Technical considerations of elastomers

1- Impressions are usually made in special trays. Perforated stock trays are used only for making impression in putty consistency.
2- The spacing given is between 2-4 mm.
3- Elastomers do not adhere well to the tray. An adhesive should be applied onto the tray and allowed to dry before making impression.
4- The bulk of the impression should be made with a heavier consistency (to reduce shrinkage), light body should only be used in a thin layer as a wash impression.