In addition to the hydrocolloids there is another group of elastic impression materials, they are soft rubber like and are known as elastomers, or synthetic rubbers, or rubber base, or rubber impression materials, or elastomeric impression materials. They are non-aqueous elastomeric dental impression materials.

**CLASSIFICATION ACCORDING TO KINDS OF ELASTOMERS**

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

**CLASSIFICATION ACCORDING TO VISCOSITY**

1- Light body.
2- Medium or regular body.
3- Heavy body or tray consistency.
4- Very heavy or putty consistency.

**Used for**

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.

**Supplied as**

- Regardless of type all elastomeric impression materials are supplied as two paste system (base and catalyst) in collapsible tubes.
- Putty consistency is supplied in jar.
Polysulfide

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

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 %).

Figure (4-7): Polysulfide impression material. The two pastes with contrasting colors are mixed together on a mixing pad with a metal spatula.
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.
These materials were developed to overcome some of the disadvantages of polysulfide.

**CONDENSATION SILICONE**

This was the earlier of the two silicone impression materials. It is also known as *conventional 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.

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ADDITION SILICONE

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

**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 prepolymer.
3- Fillers.

**B- ACCELERATOR**
1- Divinyl polysiloxane.
2- Other siloxane prepolymer.
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.

**Figure (4-8):** Section of an impression in which heavy body (A), and light body (B) materials have been used to obtain optimal accuracy and dimensional stability.

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**Polyether rubber impression material**

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

**Available as**

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

**Figure (7-9):** Polyether impression material. The two pastes have been extruded on to the mixing pad ready for mixing using a metal blade spatula.
Composition

A- BASE
1- Polyether polymer.
2- Colloidal silica (filler).
3- Glycol ether or phthalate (plasticizer).

B- ACCELERATOR PASTE
1- Aromatic sulfonate ester (cross-linking agent).
2- Colloidal silica (filler).
3- Phthalate or glycolether (plasticizer).

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.
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.

**METHOD OF MAKING IMPRESSIONS**

**1- SINGLE MIX TECHNIQUE**

- **Tray used:** spaced special tray.
- **Viscosity used:** regular body only.

**Method**
The paste is mixed and material is loaded onto the tray, the tray with material is seated over the impression area, the material is allowed to set.

**2- MULTIPLE MIX TECHNIQUE**

- **Tray used:** spaced special tray.
- **Viscosity used:** (a) heavy body and (b) light body.

**Method**
The two viscosities are mixed simultaneously but on separate pads. The heavy body is loaded onto the tray while the light body is loaded into the syringe. The syringe material is injected onto the area of impression. The tray containing the heavy body if then seated over it. Both materials set together to produce a single impression.
3- RELINE TECHNIQUE (TWO-STAGE TECHNIQUE) (PUTTY WASH TECHNIQUE)

- **Tray used**: perforated stock tray.
- **Viscosity used**: (a) putty (b) light body.

**Method**
First a primary impression is made with putty in the stock tray. After setting it is kept aside. Light body is mixed and spread into the putty impression. The primary impression is then seated over the impression area and held till it is set.

**Automatic dispensing and mixing device**

**Advantages**
1- More uniform mix.
2- Less air bubbles incorporated in mix.
3- Reduced working time.

*Figure (4-10): Addition silicone impression materials packaged with auto-mixed cartridges, mixing gun, and static mixing tips, and dynamic mechanical mixer.*
**Figure (4-11):** The bulk packaging of an elastomeric impression material. The pastes are extruded through the mixing nozzle using an electrically powered motor inside the device. The mixed material can be extruded directly into an impression tray which is held underneath the nozzle. The nozzle itself is disposable and is replaced with a fresh nozzle for each individual mix.

**Figure (4-12):** Top left, impression tray containing elastomeric impression is seated too late as elasticity starts to develop. Top right, increased seating pressure is applied to overcome the stiffness of impression material. Lower left, distortion develops because of recovery of excessive elastic deformation. Lower right, the die produced in the distorted (inaccurate) impression is too narrow and too short.