**Impression materials**

A dental impression is a negative record of the tissues of the mouth .It is used to reproduce the form of the teeth and surrounding tissues .The negative reproduction of the tissues given by the impression material is filled up with dental stone or other model materials to get appositive cast .The positive reproduction of a single tooth is described as a die, and when several teeth or whole arch is reproduced, it is called a cast or model. The impression material is carried to the mouth in a tray which is either stock or special tray.

**Advantages of using a cast or model**

1-Models provide a three-dimensional view of the oral structures, thus aiding in diagnosis and treatment planning.

2-Many restorations or appliances are best constructed on a casts.

3-Models can be used to educate the patient.

4-They serve as pre- and post- treatment records.

5-Technical work can be passed on to technicians by using casts.

**The desirable properties of impression materials**

1. An accurate reproduction of surface details.

2. Dimensional accuracy and stability.

3. A pleasant odor, taste, and acceptable color.

4. Not toxic or allergenic to the patient.

5. No release of gas or other byproducts during the setting of the impression or cast and die materials.

6. Adequate shelf life for requirements of storage & distribution.

7. Easy to use (mix and handle) with the minimum of equipment (economic)

8. Suitable working and setting time that meets clinical requirements.

9. Adequate strength to avoid breaking or tearing upon removal from the mouth.

10. Dimensional stability on setting over temperature and humidity for a period long enough to permit the production of a cast or die.

11. Compatibility with cast and die materials.

12. Readily disinfected without loss of accuracy.

* No single material is ideal for all application and none of the current materials completely satisfies the requirement.

**Classification impression materials**

**1. Mode of elasticity:**

The most popular classification, the set impression materials can be either rigid or elastic.

**A)) rigid impression material:** the material is not flexible and will fracture when deformed. They cannot engage undercuts, their use restricted to edentulous patient. (Impression plaster, impression compound, Zinc oxide eugenol and impression waxes).

**B)) Elastic impression material:** means that the material is flexible and can be deformed and still return to its original form when unstressed. Can engage undercuts and may be used in edentulous, partial dentate and fully dentate patients.

Elastic impression materials are subdivided into:

  **I: Hydrocolloid** include 1)) agar (**reversible hydrocolloid**)

 2)) alginate (**irreversible hydrocolloid**)

 **II: Elastomers** include 1)) polysulphide

 2)) condensation silicone

 3)) additional silicone

 4)) polyether

 5)) hybrid impression (combination of silicon and

 Polyether).

**2Mode of setting:**

There are two basic setting mechanisms reversible and irreversible:

A)) **set by chemical reactions (Irreversible material):** chemical reactions have occurred and that the material cannot revert to a previous state in the dental office. For example, alginate, zinc oxide– eugenol (ZOE), impression plaster and elastomeric impression materials.

b)) **set by physical reaction (reversible material, thermoplastic material):** soften upon heating and solidify slightly above body temperature with no chemical change taking place such as impression compound, agar and impression waxes.

**3. Viscosity of the material before set:**

A)) **mucostatic:** not compress the tissue during setting of the impression. Low viscosity material.

B)) **mucocompressive:** compress the tissue during setting of the impression. High viscosity material.

**Interaction of the impression materials with saliva:**

A)) **hydrophilic impression materials:** the material is compatible with moisture and saliva (the impression material will absorb saliva from the patient mouth and we get full adherence between the tissue and the material).

B)) **hydrophobic impression materials**: the material is not compatible with moisture and saliva the material repel saliva (any drop of saliva within the patient mouth will make slight depression or concavity on the impression material so the patient mouth must be dried before making the impression).



**Hydrophobic Hydrophilic**

  *Properties* *Reaction* *Set* reaction with saliva

**Rigid**

1. Impression Plaster Rigid Irrev. (Chem.) Hydrophilic

2. Impression Compound Rigid Rev. (Phys., heat) Hydrophobic

1. Zinc Oxide/ Eugenol Rigid Irrev. (Chem.) Hydrophobic

**Hydrocolloid**

4. Alginate (Irreversible) Elastic Irrev. (Chem.) Hydrophilic

5. Agar (Reversible) Elastic Rev. (Phys., heat) Hydrophilic

**Elastomers:**

6. Polysulfide Elastic Irrev. (Chem.) Hydrophobic

7. Condensation Silicone Elastic Irrev. (Chem.) Hydrophobic

8. Polyether Elastic Irrev. (Chem.) Hydrophilic

9. Addition Silicone Elastic Irrev. (Chem.) Hydrophilic &

 Hydrophobic

**Rigid impression material (non elastic)**

1. Impression plaster.

2. Impression compound.

3. Zinc oxide eugenol impression material.

4. Impression waxes.

1. **Impression Plaster**

Used as mucostatic impression material for making final impressions for edentulous patients

Doesn’t compress and displace tissues during seating of tray due to its fluidity

* **Presentation:** present as powder mixed with water (w/p=0.6)**.**
* **Composition:**
1. Calcium sulphate β- hemihydrates ([CaSO4]1/2 H2O).
2. Potassium sulphate (K2SO4): to reduce expansion and to accelerate the setting reaction.
3. Borax: to reduce the rate of setting (counter act potassium sulphate).
4. Starch: is added for easier separation of impression plaster from the cast (to help disintegration of impression on separation from the plaster/stone model).

After cast hardens, the impression and the cast are put in hot water, the starch swells and the impression disintegrates, making it easy to separate the cast from the impression.

* **Manipulation:**

The water is placed into rubber bowel and the powder is added, mixing them till the creamy mixture is formed then the special tray (thickness of 1-1.5 mm) is filled and seated into the patient mouth where it is allowed to set.

* **USES:**

1. Making final impression in constructing complete dentures.

2. Occlusal bite registration material.

3. Maxillofacial prosthesis.

* **Properties:**
1. Setting time 3-5.
2. The mixed impression plaster has very low viscosity which makes it possible to take impressions with a minimum force on the soft tissues (mucostatic technique).
3. It is hydrophilic (patient complain very dry sensation after having impression because of water absorption nature of this material) and thus adapts readily to soft tissue recording their surface details with great accuracy.
4. The material is best used in a special try made of acrylic (1-1.5 mm spacer).
5. Very good dimensional stability (dimensional change during setting about 0.06%).
6. A separating medium must be used between the cast and the impression plaster (rinse the impression plaster with solution of sodium alginate or soap with water before pouring the cast).
7. Rarely used these days as they are brittle and fractures very easily.
* **Advantages**:
1. Very good dimensional stability.
2. Good accuracy.
3. Short setting time.
4. Easy to mix.
5. Low viscosity-mucostatic
6. Cheap.
* **Disadvantages**:
1. Cannot be used in undercut ridge (rigid impression material).
2. Heat due to reaction.
3. Rigid once set.
4. Dry sensation in the mouth.
5. Able to flow to pharynges.
6. We need separator.

