Denture processing

Denture processing is done in the following steps:

1. Flasking
2. Wax elimination
3. Mixing and packing
4. Curing
5. De-flasking
6. Shaping and polishing

1.Flasking

Is the process of investing the cast with the waxed denture in the flask to make a sectional mold used to form the acrylic resin denture base.

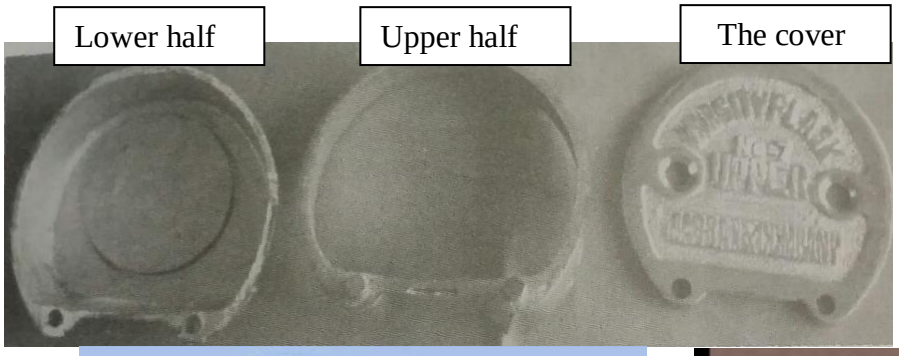
Flask: is a metal case or tube used in investing procedures.

The flask consists of:

a. The lower half (which have a round plate, covering a round hole in the base of the lower half)

b. Upper half.

C. The cover or lid.







Denture base: Is that part of denture which rests on the oral mucosa and to which teeth are attached.

Materials of denture base:

1. The material most often used in making denture bases is polymethyle methacrylate (***pmma***) and is commonly called acrylic resin or just acrylic D.B. Resins are supplied as liquid (monomer) and powder (polymer).

2. Metallic D.B: it may be made from different materials such as gold, aluminum, manganese, platinum, cobalt-chromium alloys and stainless steel.

Advantage of metal D.B:

1. Better thermal conductivity as compared to resins.
2. Increase tissue tolerance because less irritant surface.
3. Reduced bulk across the palate, so more tongue space created.
4. Increased accuracy of fit of the denture base on mucosa of the basal seat.
5. Increased weight, causing increased stability of lower denture.

Disadvantages of metal bases are:

1. Greater restorative cost.
2. Difficulty of rebasing and regrinding the occlusion.
3. Increase weight of maxillary denture.
4. Less margin of error permissible in the posterior palatal seal.





Flasking Techniques

1-Injection molding technique

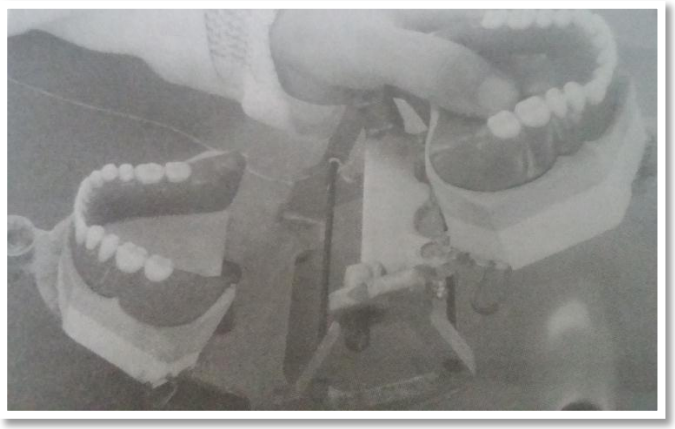
It is a complicated procedure requiring special flask and equipment. In this technique the wax pattern is sprued and the material is injected into the mold .

2- ***Compression technique***

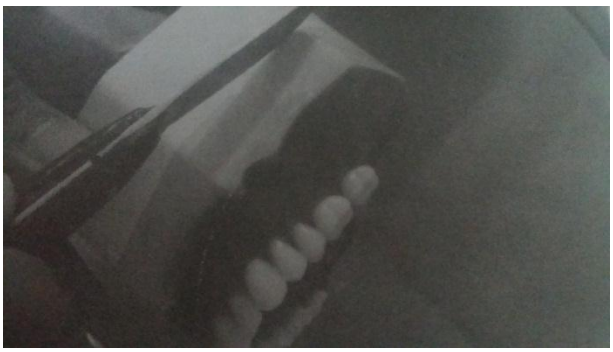
This technique is known as ***''open-pack''*** method.

The procedure of flasking a denture in compression technique is as follows:

1. Sealing the upper and lower trial denture all over the border until the margin of the cast, while the casts on the articulator, by using additional wax. This is done so that the relationship of the trial denture and the cast is not altered during disarticulation.



2. Soak the cast and the mounting in water a few minutes. Separate the cast from the plaster articulator mounting. Try to split the junction between the mounting plaster and the cast with help of a wax knife and a plastic mallet.
Save the plaster mounting, as it will be used to reposition the cast on the articulator after the denture are processed. Neither the master cast nor the mounting has been damaged. Following processing into heat cured acrylic resin the denture and casts can be precisely reattached to the mountings.



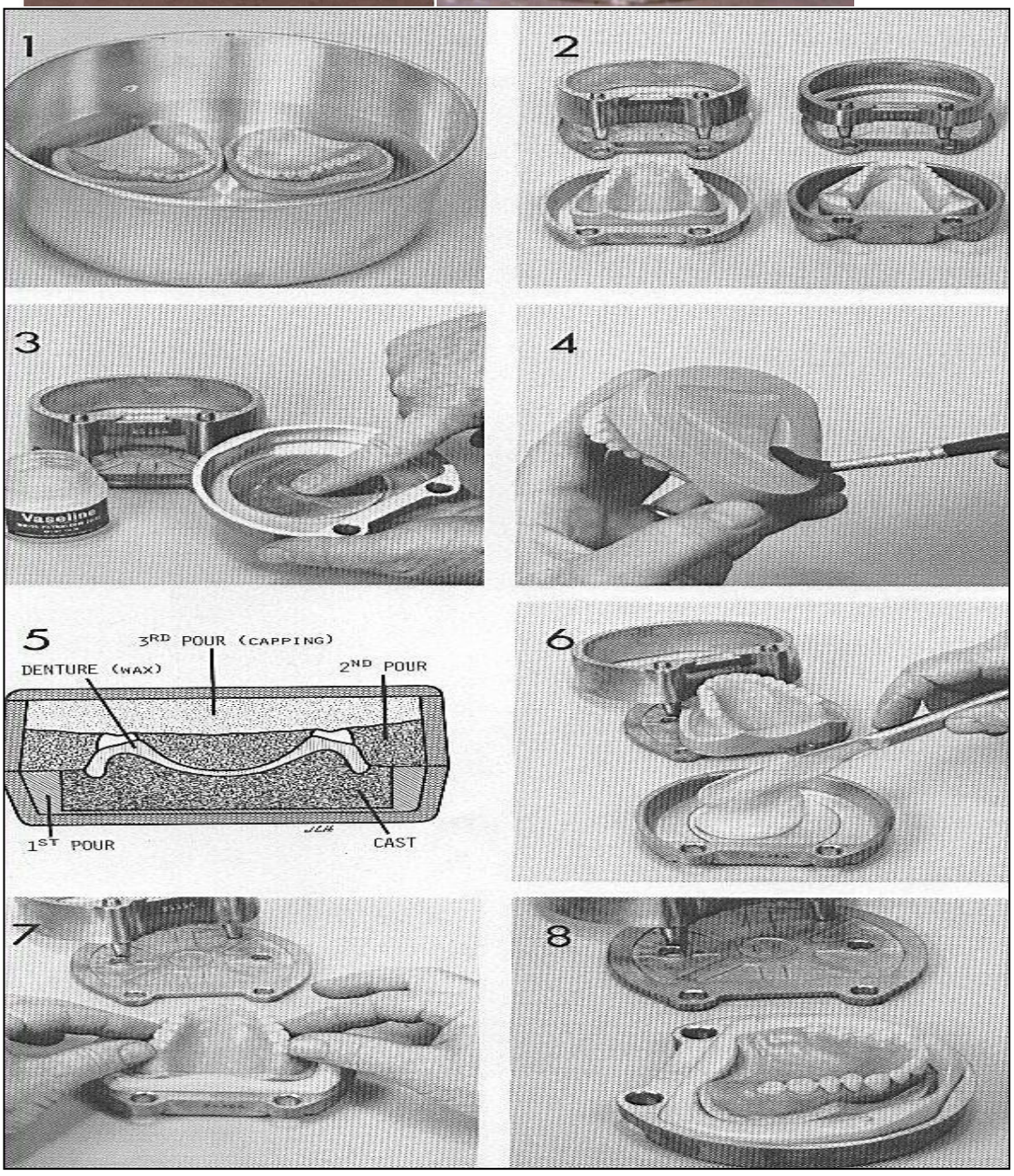




3. The master casts with the wax dentures are placed in the flask to insure that the cast fit in the flask.
The trial denture is tested into the flask to determine its height in relation to the height of bottom half of the flask.

The top half of the flask is placed in position to ensure that the teeth are not too high in relation to the top of flask; approximately 3-6mm of space should be available between the teeth and the top of the flask.





4. Invest the lower half of the flask first:

A. Apply a separating medium like liquid soap or Vaseline to the base of casts, slightly over lapping the edges to act as a separator.

B. flasking is done in three steps. In the first step a mix of artificial stone or plaster placed in the base of the bottom half (lower half) of the flask, the cast is centered in the lower half and pushed down word into stone until the bottom of the cast touches the base of the flask and the rim of the cast is nearly level with the top edge of the flask.

The cast should be immersed only at the center of the base and the occlusal plane of the trial denture is parallel to the floor.

The stone or plaster is leveled between the edge of the cast and the rim of the flask, remove any undercuts in the stone or plaster and smoothing it.

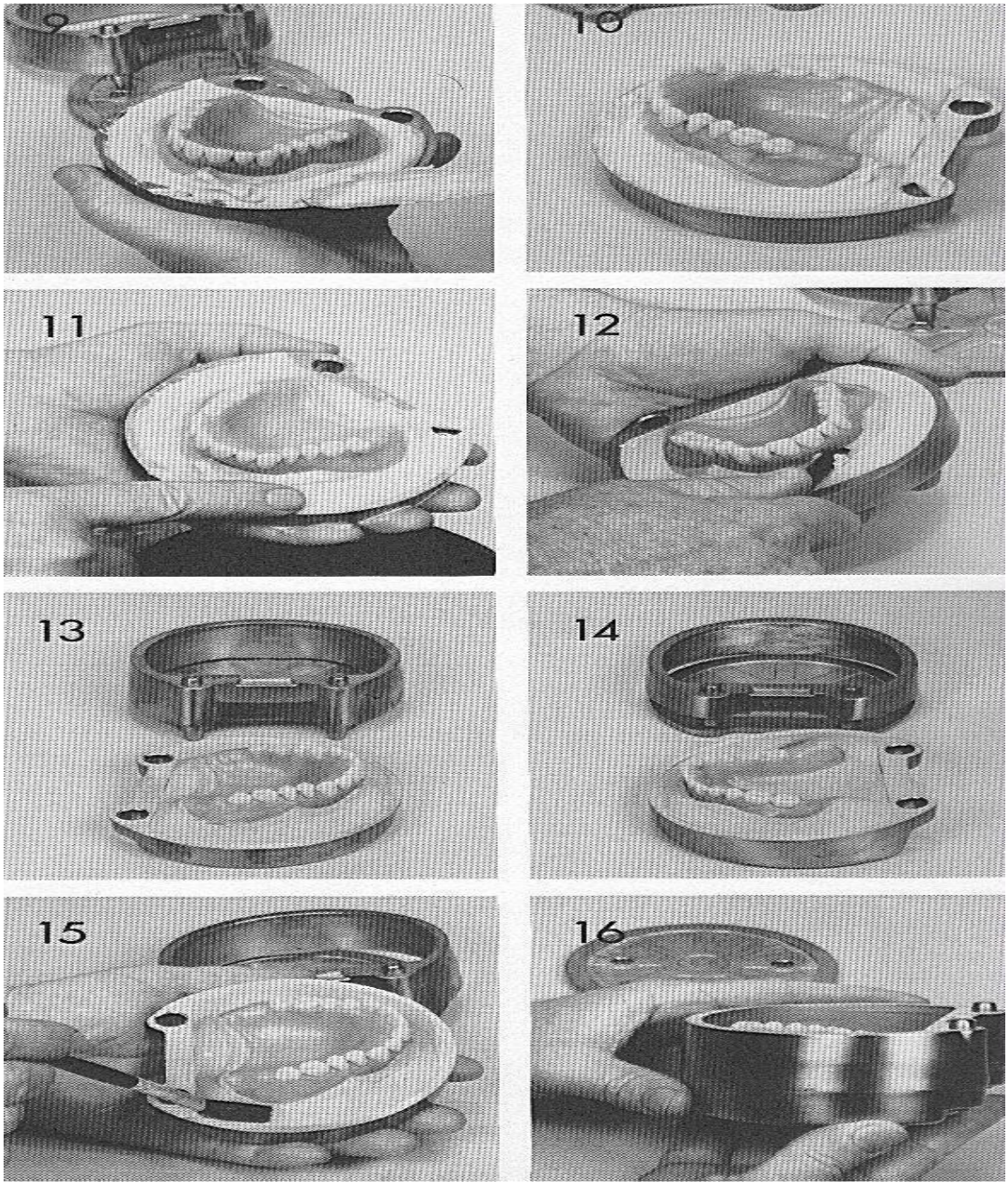
Undercuts will prevent the separation of the upper ring from the lower portions of the flask.

Investing plaster is contoured to form a gradual slope from the landarea of the cast to the edge of the base of the flask. The landarea of the base of the flask should not be covered with investing plaster.

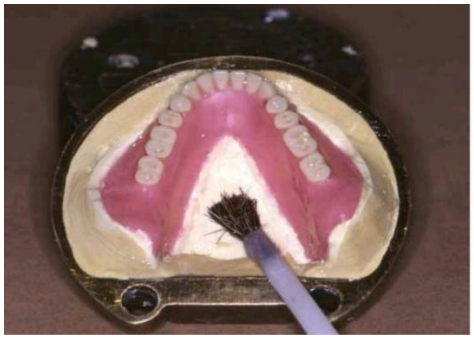
Note that the posterior portion of the maxillary cast is level with the edge of the flask, while for the mandibular cast the posterior portion of the base of the lower flask is higher to accommodate the mandibular cast; the stone has been brought up around the posterior portion of the cast. No undercuts are present.

The stone or plaster allow to set to begin with the second step of flasking (investment the upper half of the flask).

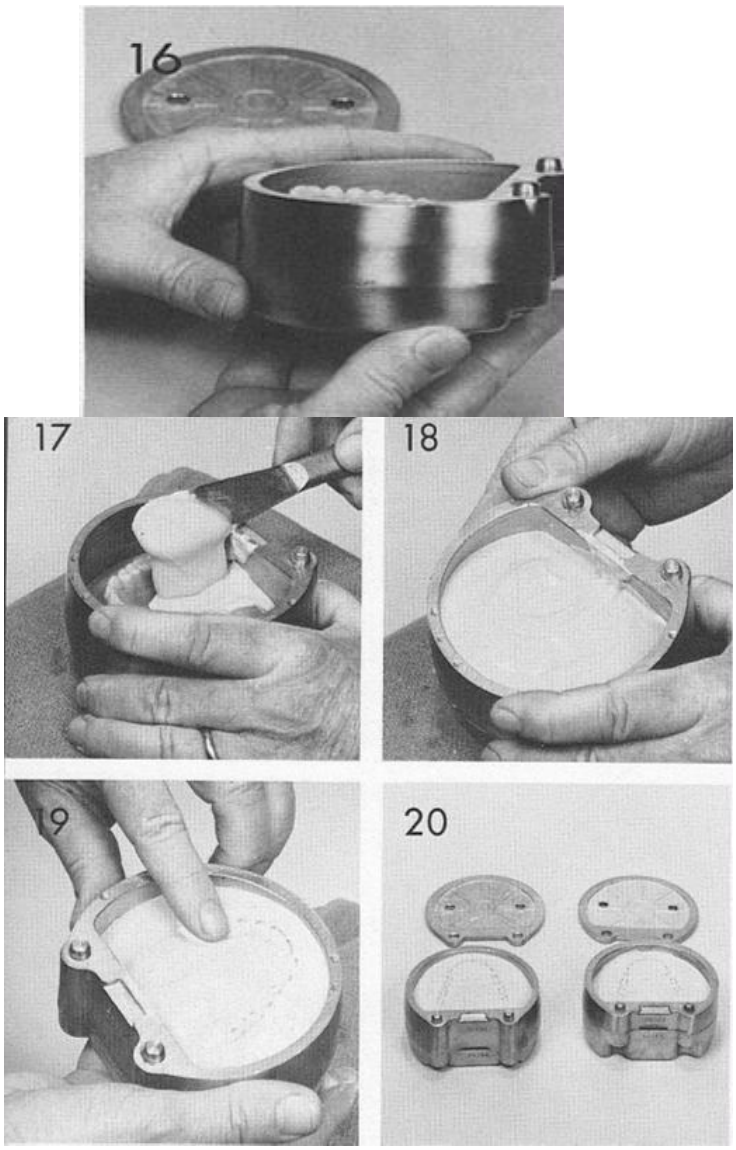




5. After the final setting of stone or plaster has occurred it will be coated with separating medium.

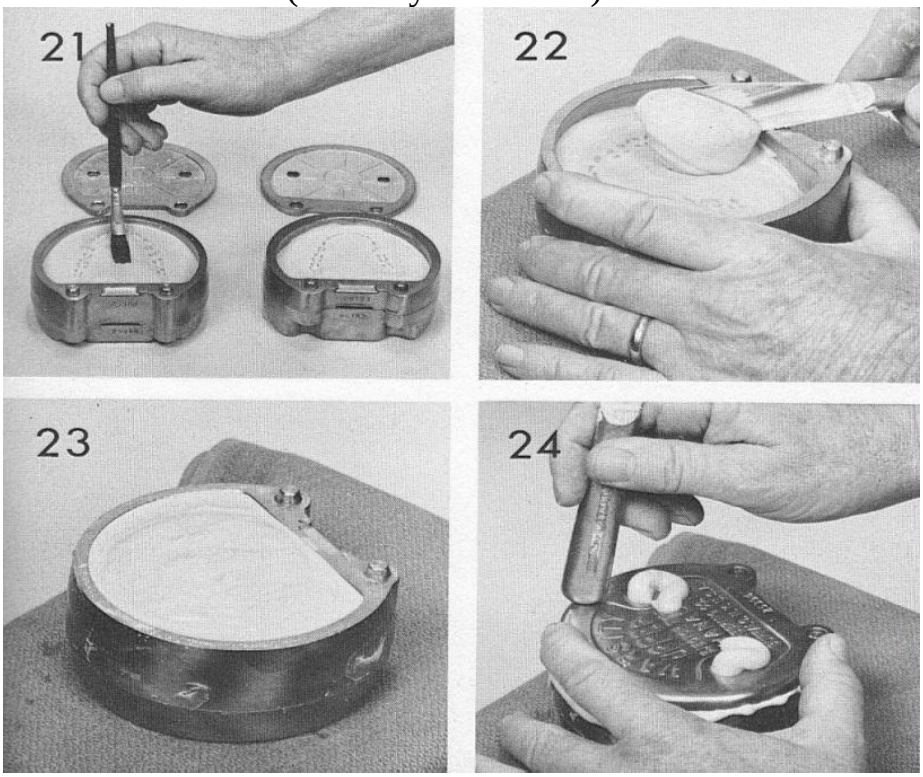


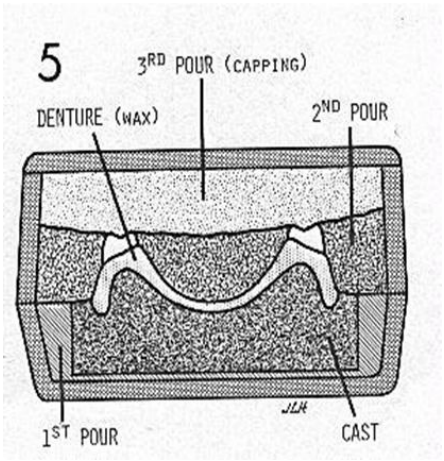
The upper half of the flask is put into place and a mixing of the stone or plaster is done. Pouring the second mix to flow and reach all surfaces of teeth. The flask is resting on a vibrator to be sure that the stone reaches all crevices around the teeth without any air bubbles.
The stone or plaster is wiped off the occlusal surfaces of the teeth leaving the teeth exposed.
The occlusal surfaces of the teeth will be evenly exposed. If the occlusal surfaces of the teeth are not evenly exposed, it indicates that the occlusal surface is not parallel to the floor.
This mix allowed to set.
The second stage of the flasking has been completed.

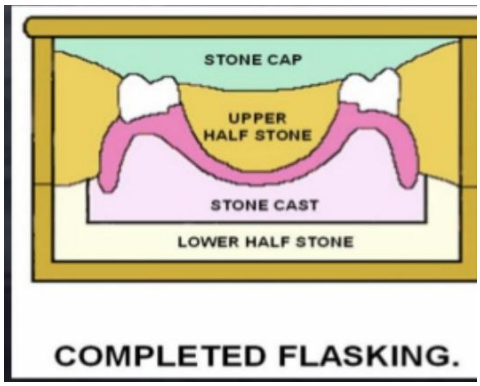


6. A separating medium is painted on the second layer of stone or plaster after setting and smoothing.

A third mix is done and placed in the top half of the flask. This is referred to as the capping, the flask is slightly over-filled.
The lid is placed on the flask and is tapped firmly to place. Excess stone will exude through the holes in the lid and around the edges. The flasking of the maxillary and mandibular dentures is complete.
This method is called (three layer methods)







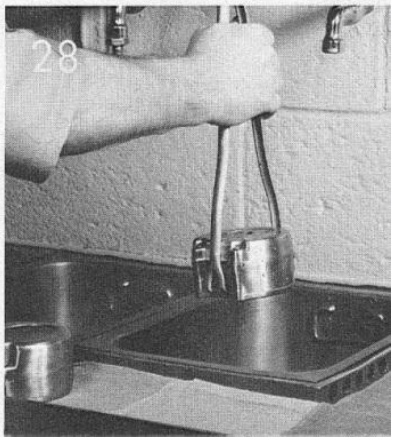
2.Wax elimination:

After the flaking, let the stone completely set, the wax must be eliminated to form a mold into which resin may be packed. This is done by placing the flask into boiling water for 5 minutes.

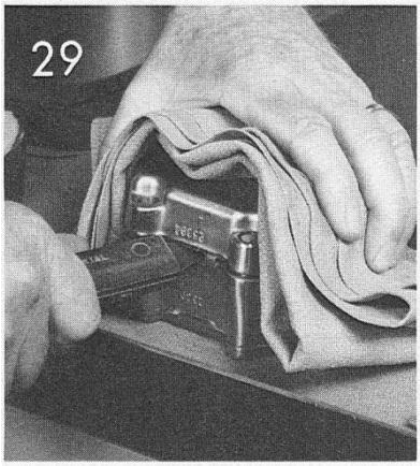
This will soften the waxed denture base, which can then be easily removed from the mold when the flask is opened.

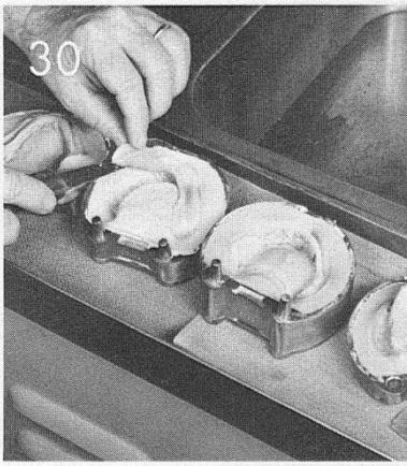
Dewaxing is done to just soften the wax and not melt it. Dewaxing for a prolonged time will lead to leaching of the wax into the investing plaster. Once the wax leaches into the gypsum in the flask, it is very difficult to completely eradicate the residual wax.

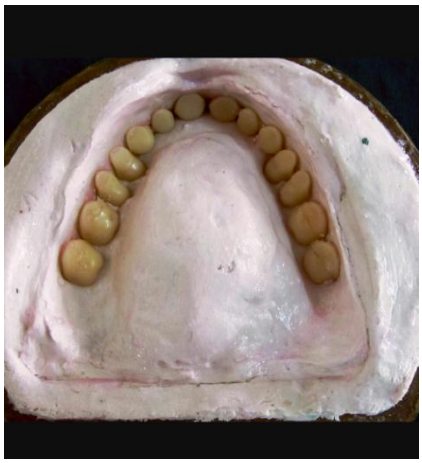




After 5 minutes, remove the flask from the boiling water and gently open it, do not force it to open. Insert an instrument (like the blunt end of a plaster knife) between the upper and lower halves and gently separate them.





Remove the semisolid pieces of the waxed denture base. All the teeth should remain in the top half of the flask.

Using hot water and a ladle as soon as possible, flush out all the remaining wax and any residue that may be present. When the water has been drained from the flask, the mold is washed again with boiling water containing a powder detergent and then with clean boiling water to remove all traces of the detergent solution, which are undesirable, especially with acrylic resin teeth.
It is essential to remove all wax residues, because acrylic resin will not adhere to a surface coated with wax.
Stand the flask on its side and allow the water to drain from it and wait until the flask dried and cooled.
The denture teeth are imbedded in one side of the flask (upper half) and the master casts are imbedded in the other side (lower half)



3.Mixing and packing
Packing: introduction of denture base resin into the mold cavity.
The maxillary and mandibular molds are now clean and ready to be coated with tinfoil substitute.
Tinfoil substitute if used as a separating medium, large brush may be used to cover the cast and the open areas of the upper half of the flask.

A smaller brush is used to carry the tinfoil substitute around the teeth. Care should be taken not to paint the teeth with separating medium.
The first layer of separating medium is applied when the flask is warm. This closes the micro pores in the cast. Mold should be warm not hot; the continuity of the film will break if the mold is steaming hot.

The objectives of applying a separating medium are:
-To prevent water from the mold entering into the acrylic resin. This may affect the rate of polymerization and color. It can also result in crazing.
-To prevent monomer penetrating into the mould material causing plaster to adhere to the acrylic resin and producing a rough surface.

The flask is left to dry and another coat is painted on the flask and also left to dry.



The maxillary and mandibular molds are now ready for packing the denture resin.
A hot or heat cure acrylic resin is made by mixing the powder (polymer) and liquid (monomer) in accordance to manufacturer's instructions.
When the material reaches dough stage, the material is ready for packing.



Packing the material around the buccal, labial and palatal surfaces in the upper half of the flask of the maxillary mold, and around the buccal, labial, and lingual surfaces in the upper half of the mandibular mold.



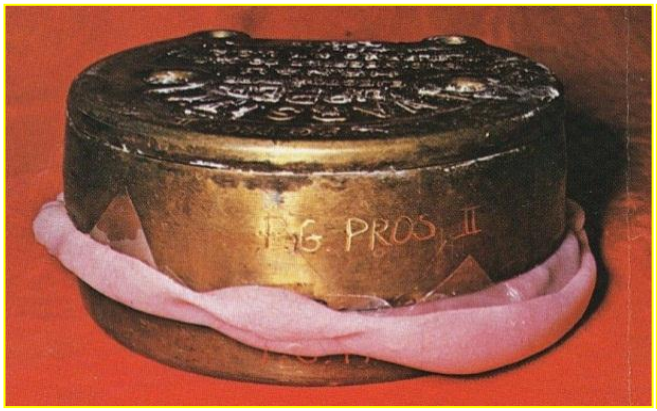
Being sure to press the acrylic resin well into these areas around the teeth, use enough material to insure over packing on the closure. Pack in one direction to avoid trapping air between the material and mold.

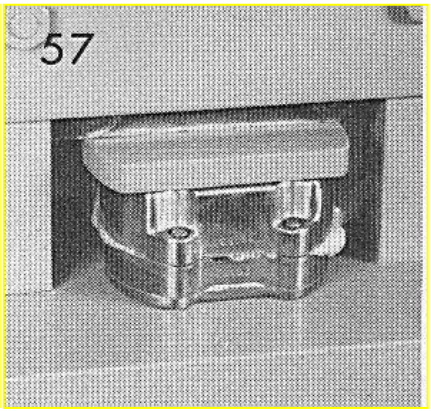
A plastic sheet of cellophane or similar material is placed between two halves; (this allows the flask to be reopened for inspection and to add or remove resin without having the cast adhere to the tissue surface of uncured resin)

The flask is then closed over the plastic sheet using hand pressure and then place the flask in a bench press and gradually closed. to allow the resin to flow within the mold and to allow the excess material to flow outside of the flask extending between the two halves of flask and to avoid porosity.

The acrylic dough is packed into the flask in slight excess with the help of a hydraulic or mechanical press



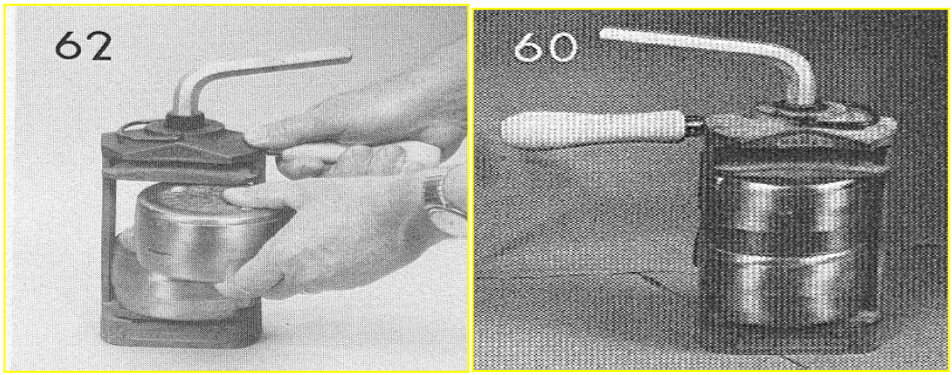




Remove the flask from the press, open the flask carefully, the excess material is cut away precisely at the denture border with sharp instrument like scalpel, and additional resin is added at any places that are deficient.



This trial packing procedure is repeated until the mold is filled, all excess material had been removed and metal edges of the two parts of the flask are in complete contact.
The introduction of too much material termed "over packing" lead to a denture base that has excessive thickness and malpositioned prosthetic teeth.
The introduction of little material termed "under packing" leads to noticeable denture base porosity.
Apply a tinfoil substitute to the lower part of the mold that contains the cast. Assemble the upper and lower halves of the flask and place them in the processing press, then let the closed flask remain under pressure for 30-60 minutes before curing.
This is known as bench curing.
To allow the liquid to penetrate the powder thoroughly since the last material added is usually drier than the first added to the flask.
If resin teeth are used, it provides a longer exposure of resin teeth to monomer lead to a better bond of the teeth with the base material.



4.Curing :

It is the polymerization of the hot cure acrylic to produce the final denture.

Methods of curing:-

1. Slow cycle curing method

This is the preferred method to cure the acrylic resin. The flask and clamp are placed in a curing unite. The denture is processed for 9 hours in water held at a constant temperature of (60-70^{o}C)

2. Rapid cycle curing method:

The flask put in water at 65^{o}C for 11/2 hours. Then boil for 30 minutes. (This method may induce greater dimensional changes in the denture than the slow cure.)

The flask must cool to room temperature before deflasking begins. It is crucial that sufficient time allowed for cooling inside the flask.

The flask; should be cooled slowly i.e. bench cooled. Sudden cooling can result in warpage of the denture due to differential thermal contraction of the resin and the gypsum mould. Cooling overnight is ideal. However, bench cooling for 30 minutes followed by placing under tap water for 15 minutes is sufficient.

If this precaution is not taken, increased distortion of the acrylic will occur.