

Packing Acrylic – Open Pack Method

The polymethyl methacrylate acrylic (PMMA), which is used to form the denture base, is a safe and inert material when processed for use in the mouth.

Unfortunately, this is not true of PMMA in its liquid (monomer) state, as we used it to process the dentures. PMMA monomer has numerous unpleasant side effects associated with prolonged exposure. Treat this material with respect. You may hear from people who will tell you about years of working with monomer without suffering discernable effects, just as you can speak with smokers who don't believe they will develop cancer; but you may also meet people who suffer unpleasant reactions to the smallest exposure. It has been suggested that monomer has accumulative effects, each time you are exposed to it you will become more susceptible. Therefore, the best strategy is to limit your exposure to contact with monomer, and inhalation of its fumes.

Wear solvent resistant gloves (nitrile) and work with fume hoods or a carbon filter mask.

PMMA is mixed similarly to stone, the monomer is added to the bowl, then the powder, then mix without creating excess air bubbles. PMMA should be mixed in a silicone or glass container, do not use a rubber bowl.

An average ratio for an average denture is 10 ml of monomer to 30 cc of polymer. However, you should always check the manufacturer's recommendations, and never eyeball the amounts to mix. Excessive monomer in the mixture will make it more difficult to work with, as well as causing greater shrinkage during polymerization.

Thoroughly mix the monomer and polymer, some brands will seem to yield a dry, sandy mix when using the manufacturer's ratios. This is fine, there needs to be only enough monomer to wet each sphere of polymer in the powder. As the reaction advances, the mixture will smooth out into a usable form.

The classic indication that the PMMA has reached a workable consistency is described as when it reaches the snappy stage. When a piece of the PMMA is removed from the bowl and pulled, it will stretch and break suddenly, like an elastic band. Before this point, if stretched, it will sag and break, trailing threadlike strings between the halves.

Another test that I learned from a student, is to squeeze the sides of the silicone bowl together. Before the PMMA is ready, the bowl will return to its shape, and the PMMA will still fill the bowl, but have tears in the center. When it is ready, the PMMA will pull cleanly away from the sides of the bowl, forming a ball in the center of the bowl.

This method has you start the packing slightly earlier than the snappy method,

which gives you, and particularly a student, more time for multiple packings.

Once the acrylic has reached its packing stage, you can remove enough from the bowl to fill the mold, and shape this piece to the rough form of the mold; a round or u-shape patty for the maxilla, and a sausage shape for the mandible.

The acrylic will be placed into the upper half of the flask, which contains the teeth. Then a piece of cellophane will be placed over the acrylic before the lower half, containing the model is placed over the acrylic. The cellophane will act as a separator, allowing us to open the flask after pressing it to inspect the acrylic.

Trial packs should always be used when processing with the open-pack method. Achieving the correct amount of acrylic to fill the mold is critical to a successful denture base. Too little acrylic results in an under pack, in which the acrylic is filled with small porosities, reducing its density and strength. A badly under packed denture cannot be used in the mouth.

Too much acrylic in the mold will result in an over packed denture. Over packing will result in the two halves of the flask not being able to come together in their required vertical dimension, because of the excess acrylic that is squeezing out between them. This excess is referred to as flash. This increase in the vertical dimension of the dentures will result in a direct increase in the VDO, an open bite.

To trial pack, put the flask into a press after placing the acrylic and cellophane. Slowly raise the pressure of the press, observing any excess acrylic which squeezes out the sides of the flask. If a great deal is squeezing out, stop and allow it to flow, once the flow has slowed add more pressure. You will be able to judge when to add pressure by watching the pressure gauge of the press. As the excess acrylic flows out of the mold, the pressure will drop. Continue until the gauge reads 100 bars, and holds at that pressure.

Leave the flask to press for a few minutes, and then release the pressure and open the flask. Remove the cellophane and dispose of it, use a knife to cut away any flask material which is on the surface of the stone around the denture.

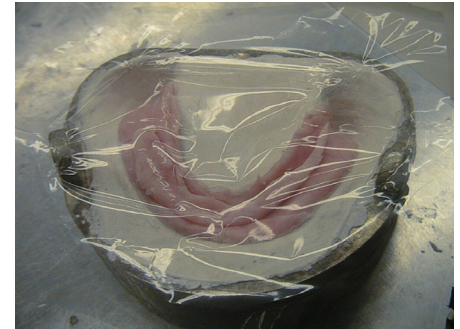
Observe the acrylic. If the surface has a shiny, dense appearance, with a bright, translucent colouring, the mold is properly filled. If the acrylic has a whitish, opaque appearance, with a



7.16 Acrylic not yet ready to pack, observe grainy and torn surface when silicone bowl is squeezed.



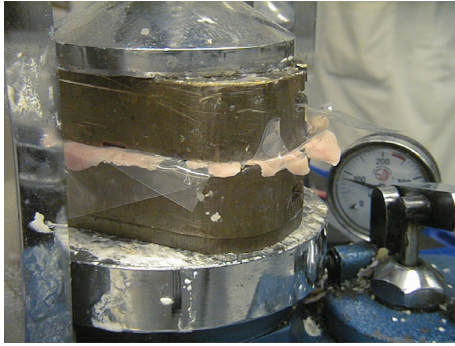
7.17 Acrylic ready to pack, pulls cleanly off bowl when squeezed.



7.18 Acrylic placed into mold cavity and covered with cellophane for trial pack.



7.19 Hydraulic press



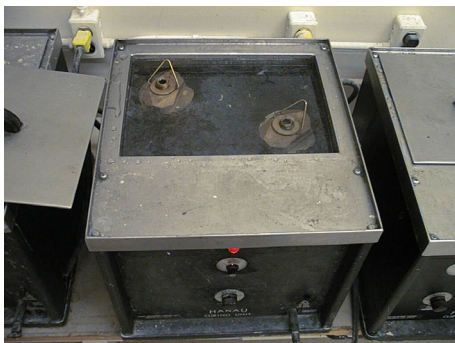
7.20 Flask pressed until excess acrylic squeezes out around edges.



7.21 First press. Acrylic flash to be trimmed away, small amount of acrylic added where needed. Note wrinkles from cellophane.



7.22 The mold is full when the acrylic is pressed smooth and dense. A small amount will be added at wrinkles.



7.23 Place flasks in curing tanks.

chalky surface and cuts or wrinkles, it requires more acrylic and pressing.

I will generally do three trial packs before continuing to process the denture.

By cutting away the flash, you improve the vertical accuracy of the packing.

By adding small amounts of acrylic to areas which appear deficient, you are increasing the strength and density of the acrylic.

Once you are satisfied with the pack, the flasks are placed into the spring compress. The spring compress requires two flasks. So if only one flask is being processed, an empty flask must also be placed into the compress.

The large screw at the top of the spring compress is tightened as much as possible, using the supplied Allen key. This is to maintain internal pressure in the flask, as the acrylic shrinks during processing.

Processing

The polymerization of the PMMA from its monomer/polymer form into a final solid acrylic denture base is often called “processing the denture”.

Polymerization

Polymerization is the process by which the short chains of PMMA in the polymer powder are combined into long chains of PMMA molecules referred to as a polymer macromolecule.

These long chains of polymer wind in amongst each other, similar to pieces of spaghetti in a bowl. Most modern polymers also have a component which causes them to crosslink, meaning that the individual strands bond together where they cross each other, increasing the strength and stiffness of the resultant mass.

Polymerization begins as soon as the monomer and polymer are mixed, and the mix will harden if just left alone. However, it will not polymerize completely, or without porosity unless it is activated by the addition of heat.

Heat is usually supplied to the reaction by immersing the flasks and clamp into hot water.

Development of new denture base materials has given us a number of options when processing the denture base. We will