

**Taking
Alginate Impressions
for Study Casts**

Background Information

A recurring requirement in the dental office is for study models or diagnostic casts of patients' teeth and adjacent tissues. Various requirements necessitate these models, the most common being for diagnostic purposes. Models are also required in fabricating crowns and dies for prosthodontic appliances.

A diagnostic cast is an accurate replication of the anatomic form of the maxillary or mandibular dental arch showing the relationships of the remaining teeth and the surrounding soft tissues (Figure 1). Diagnostic casts are a supplement to the oral examination, but in some ways they can reveal more. They permit inspection from perspectives that are impossible to obtain when looking in the patient's mouth--the occlusion from the lingual view, for example. They also permit extended observations and comparisons far beyond the patient's endurance for holding his mouth open and are, of course, available for study during the patient's absence. The dentist forms a treatment plan based on the oral examination, an interpretation of other diagnostic data, and a study of the diagnostic casts. The diagnostic casts are used in educating the patient about his/her dental needs and corresponding treatment plan.

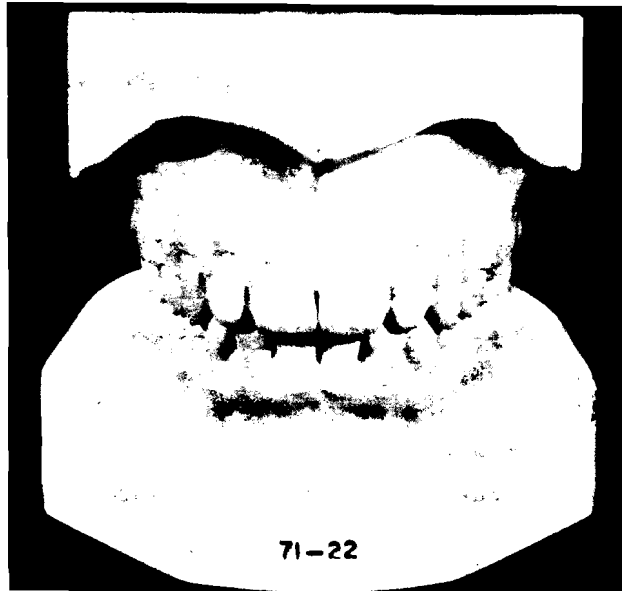


Figure 1. Finished diagnostic cast.

The casts are the final product and are produced in three distinct steps. First, the alginate impression is made directly in the patient's mouth producing a negative mold. Secondly, the impression is poured in dental stone, producing a positive cast. And finally the cast is inspected for defects, repaired if possible, and trimmed to the proper size and shape on a model trimmer.

This module presents a detailed explanation of the importance and procedure for obtaining an accurate alginate impression--the first step in acquiring a diagnostic cast.

PHYSICAL PROPERTIES OF ALGINATE

Alginate is an impression material that is supplied in powder form which is mixed with water and used to make negative impression molds in the patient's mouth. When set, the material is a flexible gel resembling rubber. Its most important characteristic is its ability to rebound from stresses (force applied on a given area). If one presses his fingernail into it, it rebounds to its original form, although more slowly than rubber. This ability to reform after being deformed makes alginate valuable as an impression material because objects that contain curved surfaces or undercuts can be copied. Alginate's ability to rebound is limited, in no way approaching that of rubber. Curiously, it rebounds from sudden shocks better than it does from prolonged strain (change in the shape of the material as a result of stress). Prolonged strain apparently breaks down the internal fibril structure.

COMPOSITION OF ALGINATE

Alginate is classified as irreversible hydrocolloid: hydrocolloid because it consists of particles of a gelatinous (colloidal) state in water (hydro), and irreversible because once it has jellied it cannot be returned to a sol (a liquid colloidal solution) by reversing the chemistry or changing the temperature. Alginate's powder contains several components. The alginate particles are salts of alginic acid, a product obtained from marine kelp. The powder also contains an activator, usually calcium sulfate, which converts the soluble alginate into a semi-rigid gel. A retarder, such as sodium phosphate, is added which keeps the chemical reaction from starting immediately, giving the operator time to complete

mixing. An inert filler is also added to reduce stickiness, help produce a smooth texture, and add strength to the final gel. Since the added ingredients give the material a rather unpleasant taste, flavors such as lemon, peppermint, or spearmint are added.

PACKAGING OF ALGINATE

Alginate is packaged in either individual preweighted packages or bulk form. Bulk form is the more popular of the two, although individual packaging is a more desirable choice when temperature change and moisture are of concern.

Alginate is sensitive to higher temperature and moisture contamination. These variables cause the alginate to lose strength during mixing and be more apt to distort upon removal from the mouth. To alleviate temperature change and moisture contamination alginate needs to be stored in a dry, cool place. With bulk form, the operator is continually opening and closing the alginate container lid, which allows moisture from the air to cause erratic setting of the unused powder. After premeasuring the alginate place the lid back on the container immediately.

MIXING OF ALGINATE

Alginate in powder form consists of a variety of particles of varying sizes and specific gravities, causing some of the particles to settle to the bottom. Consequently, the alginate container should be given a vigorous shake before use. The top of the container should be opened carefully to prevent the very fine particles (dust) from being distributed around the operator. New improved alginates with glycol added eliminate the presence of airborne particles making them dustless (e.g., Jeltrate Plus).

Use the specific measuring devices (water and powder measurers) provided by the manufacturer for mixing of alginate. The exact amount of water and powder is necessary for the success of the impression. Follow the manufacturer's direction regarding the ratio of water to powder.

After the water and powder have been measured, place the water in a clean dry bowl. Sift the powder into the water. Adding the powder to the water ensures the powder particles are wet evenly. If mixed in reverse, (the water is added to the powder) the chemical reaction will start early with some particles setting faster than others.

Mix the alginate for the specific amount of time (check the manufacturer's directions) and, using an appropriate spatula (stiff), "swipe" the alginate mass against the sides of the bowl to avoid entrapment of air in the mix. The end result should be a creamy, smooth homogenous mix without any unmixed powder left in the bowl. Inadequate mixing results in grainy mixes and poorer detail in the impression.

SETTING TIME OF ALGINATE

Since alginate reacts (gels) chemically, temperature is a factor in the setting time. The colder the temperature of the water the longer it takes for the alginate to set; conversely, the higher the water temperature the faster the alginate sets. With all other factors constant, an alginate that gels in 4.5 minutes at 68° Fahrenheit (ideal) will require 3.5 minutes at 86° Fahrenheit. At 59° Fahrenheit it will take 5.5 minutes. Hence, if the operator wishes the material to gel in the prescribed time, it is essential he make certain the water is at the recommended temperature by testing with a thermometer. To speed or retard the gelation time, he need only alter the temperature of the water used in the mix. Two types of alginate are marketed: a fast-setting type that gels in 1 to 2 minutes, and a normal type that gels in 2 to 4.5 minutes. The fast-setting type is the most widely used.

The alginate can be checked to see if it has set by touching the leftover material in the bowl for stickiness. If the material is set it will rebound when gently pulled. Alginate improves in elasticity its initial set and is ordinary held in place an extra minute.

DIMENSIONAL STABILITY

Alginate has a tendency, after it sets (gelation), to lose (syneresis) or absorb (imbibition) water, depending on the atmospheric conditions surrounding it. If conditions are dry, it

loses water (shrinks); if immersed in water, it imbibes moisture (swells). In either case, the material is distorted by either shrinking or swelling. The material is dimensionally stable for only a brief period after it is removed from the mouth. The only sure way to prevent distortion is to pour the cast immediately. During syneresis the lost water appears on the surface; dissolved in it are some of the constituents of the material. These chemicals interfere with the setting of gypsum products used to make casts, producing a chalky, powdery surface.

Internal stress can be produced in alginate by movement during the gelation period or by one portion of the mass setting faster than another. The internal stresses often result in distortion of the impression.

ADVANTAGES OF ALGINATE

Although there are problems involved in the use of alginate, it does have certain advantages. It makes an accurate impression--although it is not as accurate as certain other materials, it allows for undercuts (the curved surfaces of the teeth), which some other materials do not. The process is not time consuming. The entire process from seating the patient to the trimmed model may take less than an hour, not counting the 45-minute wait for the dental stone or plaster to set. Alginate is easy to work with, has good viscosity (resistance to flow), and is low in adhesive qualities. It causes the patient no great discomfort and the dentist no great expense, and requires no extensive armamentarium. Alginate has been used with success for decades, and though efforts have been made to replace it, none so far have succeeded. By taking reasonable care it is possible to make many impressions without failure (high rate of success with the material).

TYPES OF IMPRESSION TRAYS

The alginate is carried to the mouth in an impression tray with an attached handle. The handle aids the operator in placing and removing the tray. Trays for holding the alginate are made of various metals, plastic, and styrofoam. The type of tray used depends on the

operator's preference and convenience.

In making an impression, the alginate must be held securely in the tray; since its adherence property is poor, some physical means must be used to hold it in place. There are three types of trays, all in common use.

1. The perforated tray (Figure 2) has small holes drilled close together over the entire surface. When the tray is filled with alginate, some of the material seeps through the holes and locks on the opposite side, thereby ensuring retention of the alginate.

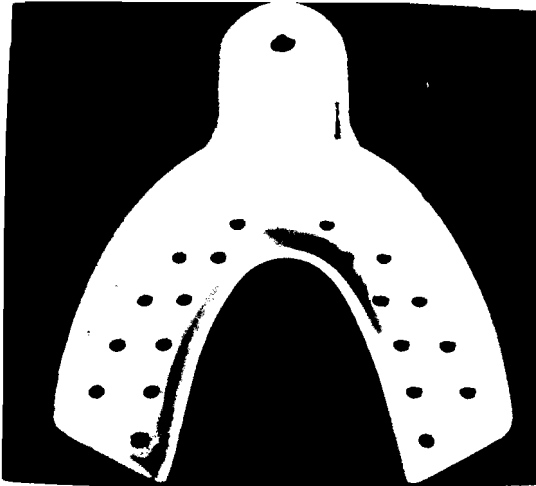


Figure 2. Perforated tray.

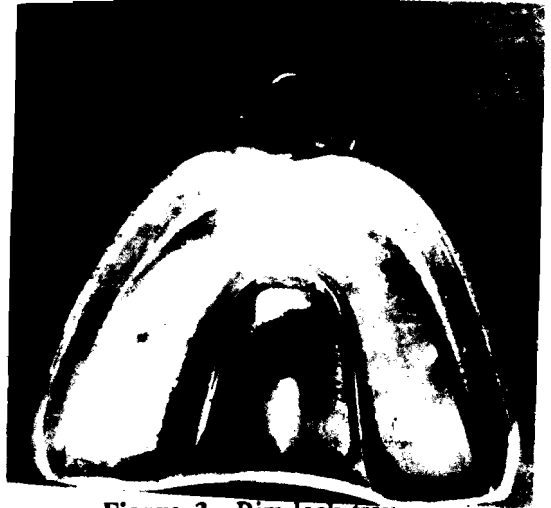


Figure 3. Rim-lock tray.

2. The rim-lock tray (Figure 3) has a slight flange around the periphery, extending inward. In addition, there is a wire loop in the bottom of the maxillary tray. The alginate is held firmly between the flanges and the loop.

3. The adhesive-type tray (Figure 4) is smooth. Up to 10 minutes before use, the operator paints an adhesive on the inside of the tray to which the alginate adheres.

Trays vary in shape depending on whether they are to be used on the maxillary arch (Figure 5) or the mandibular arch (Figure 2). The maxillary tray covers the entire palatal area and the mandibular tray is horseshoe-shaped allowing for tongue movement. Trays also vary in length and depth. In addition, there are special trays, that are less deep, for use in edentulous arches. There are also quadrant trays (Figure 6).

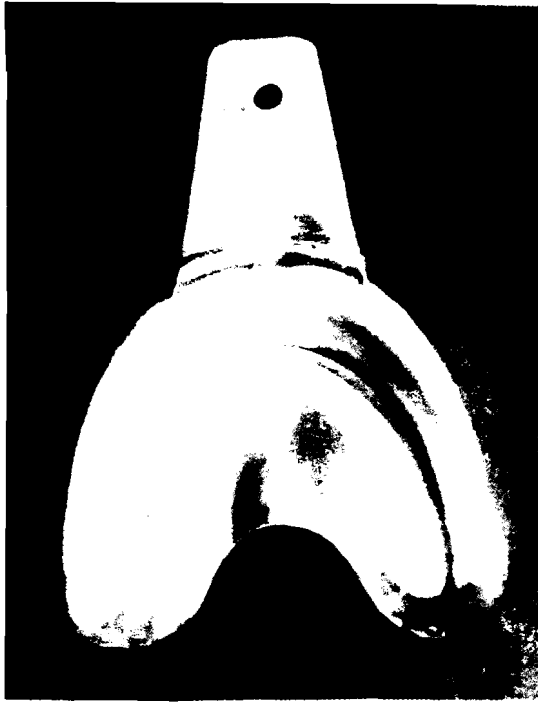


Figure 4. Smooth (adhesive-type) tray.



Figure 5. Maxillary tray.



Figure 6. Quadrant tray.

TRAY SELECTION

The selection and subsequent modification of a tray is based upon three areas of judgment: 1) visual assessment of arch width and length; 2) pragmatic "trying" of the tray; 3) the patient's response concerning the fit, i.e., undue pressure or pain. While the tray should not touch any tissues, neither should it be so large that thick masses of alginate will result. Figure 7a illustrates tray placement during the fitting process; when the teeth touch the tray, the rim of the tray nearly reaches the peripheral turn. Figure 7b illustrates the tray position when it contains the alginate and is in place. The teeth do not contact the bottom of the tray and the alginate has not only filled the peripheral turn but distended it somewhat.

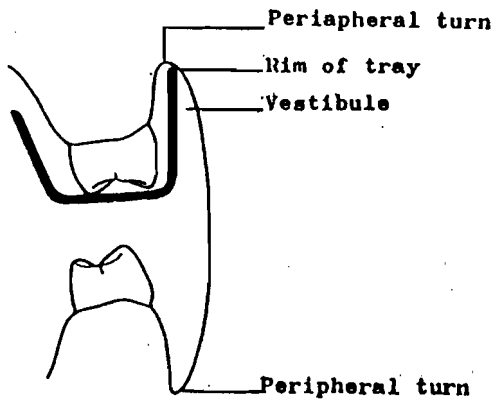


Figure 7a. Empty tray in place.

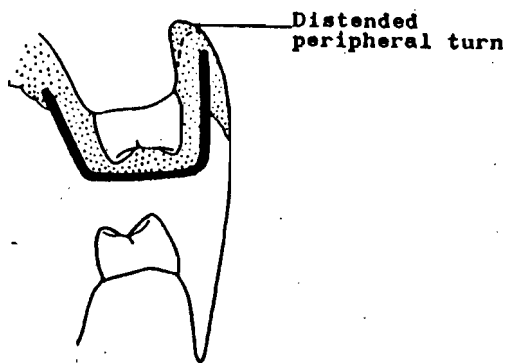


Figure 7b. Tray with alginate in place.

Inspect the area to be covered by the impression. Examine the shape and size of the arches, frena (Figure 8 and 9), and ridges. Look for tori, and any other conditions that might require bending or extending the tray or selecting a larger tray.

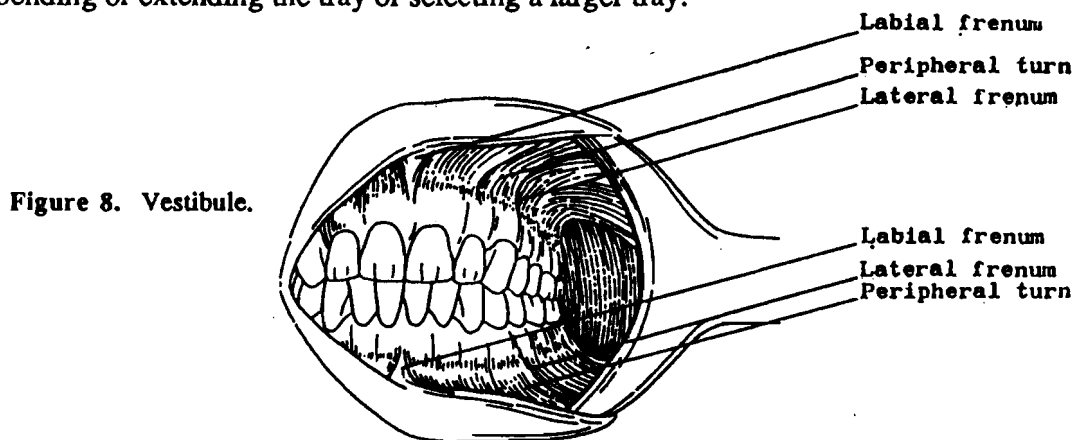


Figure 8. Vestibule.

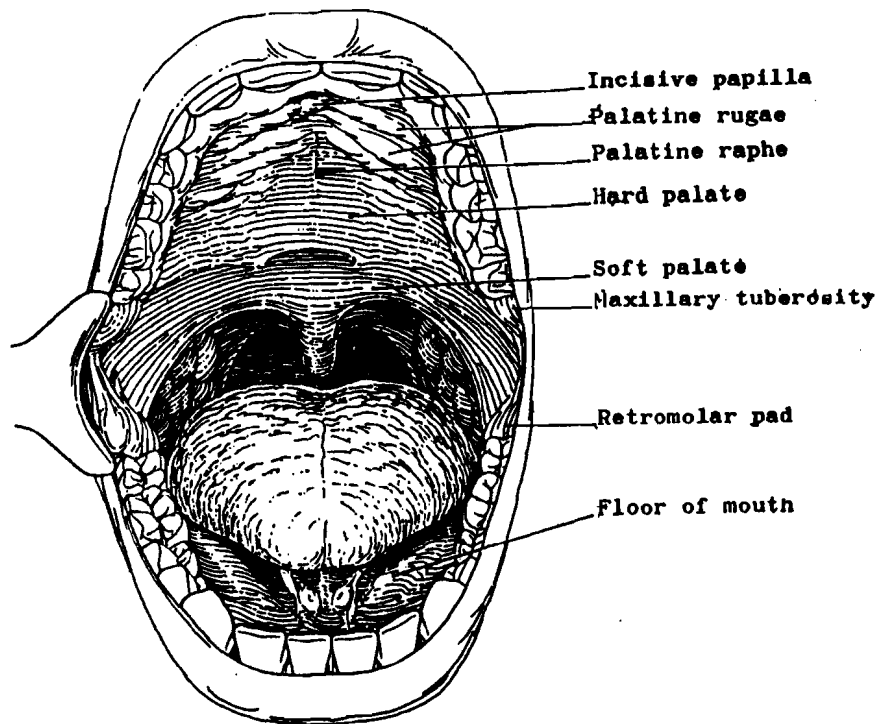


Figure 9. Oral cavity.

When trying the tray in the patient's mouth, notice that the tray is considerably wider posteriorly than relaxed lips. Place one side of the tray about the center of its length in one corner of the patient's mouth. With your finger or mirror, distend the other corner and rotate the tray into the mouth.

Ask the patient about their discomfort level while the tray is in place. Explain that their mouth will feel "full" while the tray is in place but they should not experience any pain or discomfort. Make any adjustments necessary.

Use your mirror to retract the cheek in order to view the fit in the vestibule (peripheral turn). While viewing the mandibular tray fit ask the patient to lift his tongue to his palate, then, when the tray is seated, to let it slide forward.

TRAY MODIFICATIONS

Since trays and the shape of dental arches vary in so many ways, the operator sometimes finds it difficult to select a tray that fits properly. If such is the case, select one that has the correct width, but is not long enough. Using utility wax the tray can be extended to the desired length. If the patient's teeth protrude, the sides of a metal tray may require bending for both maxillary and mandibular arches. If the distance from the occlusal surfaces of the teeth to the peripheral turn is unusually great, the sides of the tray will require extension with wax.

After the tray has been selected, a strip of wax is molded around the periphery of the tray. The wax ensures a better fit in the vestibule and protects the patient from any sharp edge. Should the tray fall short of fitting in a given area, wax can be used to build up the edge. If the patient has a high palatal vault, the palatal portion of the tray can be built up with wax. Another technique employs pieces of wax 1/8 inch thick and about 1/2 inch square placed in the bottom of the tray: two pieces in a quadrant tray, three or four in a full-arch tray. The wax serves as a stop for the patient's teeth, keeping them from touching the bottom of the tray. The exact location of the wax stops is not critical; usually two are placed where the premolars will bite, two where the most distal molars will bite. Other operators use no stop wax at all and depend upon judgment for seating the tray to the proper depth. The rims of thin metal trays (except for the rim-lock) may be bent to fit the patient's mouth.

TRAY STERILIZATION

It is important to know what type of sterilization methods to follow in order to reuse an impression tray from one patient to another. Some trays are unable to be sterilized or disinfected and are for one time use only.

Metal trays can be sterilized in the autoclave and can be reused. Plastic trays are often considered disposable since sterilization is inefficient, but they can be placed in sterilizing solution and reused. Styrofoam trays are not reusable and must be discarded (disposable).

DISINFECTION OF IMPRESSION AND BITE REGISTRATION

Care must be taken to protect your dental staff and dental laboratory technicians when handling impressions and the wax bite registration. The same prevalence of antibodies to the hepatitis B virus are present in dental laboratory technicians as in other dental auxiliaries.

To begin the process of disinfecting an alginate impression and accompanying wax bite, it should be rinsed immediately after removal from the patient's mouth. Any blood, saliva, and debris should be rinsed off with a gentle flow of running water. Shake the excess water off both the impressions and wax bite and then spray each with the manufacturer's recommended disinfectant. The impression and wax bite are then placed in a sealed bag for the manufacturer's recommended disinfection time. Some examples of sprayable disinfectant compounds are: household bleach, chlorine dioxide, phenolics, or iodophor compounds.

If the impression and wax bite are to be sent off to the dental laboratory it should be placed in a sealed bag after the disinfecting process. The dental laboratory technician should be notified of any communicable diseases related to the case in question so precautionary measures can be taken at the lab.

STORAGE OF ALGINATE

There are times when an alginate impression cannot be poured in plaster/stone immediately and must be stored until there is time available to pour. In such circumstances, the impression is wrapped in a damp paper towel and placed in a humidior (sealed plastic container will do). Even if the delay between the removal of the impression and the pouring of the impression is only five minutes, the impression must be stored to avoid distortion. If there is an excess of material overhanging the impression tray (particularly common in the posterior region), it may inadvertently cause displacement of the adjacent jelled material. The excess material should be removed from the impression with the use of

a lab knife before storing the impression.

LABELING OF THE IMPRESSION

The operator taking the alginate impression is not always the one who makes the stone cast, nor is he necessarily the one who puts it away. Consistent labeling is important. For labeling alginate impressions, a paper tag with attached string works well. (NOTE: For stone casts, the time-honored system of pencil painted over with fingernail varnish is effective). Some people like to use one of the various supposedly waterproof marking pens that are available; others prefer self-adhering labels. Whichever method you use, the essential label information is the name of the patient and the date the impressions or casts were made. Laboratory procedures may, however, require additional data.

GAGGING PATIENT--VARIATION IN TECHNIQUE

Patients vary greatly in their tendency to gag. With those who gag readily, and with some children, a technique used in the past has been to apply a little topical anesthetic to the soft palate. Numbing of the soft palate has a tendency to stimulate gagging so this technique is no longer advisable. If gagging should occur the operator needs to be confident and reassuring to the patient. It is important not to remove the tray before the material has set since the alginate will adhere to the interproximal surfaces of the teeth and be time consuming to remove. Additionally the fibril structure will be affected which diminishes the strength of the alginate. Some approaches for the operator to use with the gagging patient are:

- 1) Encourage the patient to breathe through his/her nose rather than mouth when the tray is being seated and throughout the setting of the material. Some patients will worry about their ability to breathe while the impression is being taken. Explain to the patient that the impression will take only a few minutes, and to breathe through his/her nose. If that proves difficult, it is still possible to breathe through the mouth.
- 2) Have the patient concentrate on an object in the operatory rather than the procedure (e.g., a spot on the wall), or have the patient lift his/her leg and hold it until the material sets.

- 3) An ice cube placed in the patient's mouth prior to taking the impression will have a numbing effect and may help prevent the gagging sensation.
- 4) Since nitrous oxide/oxygen inhalation sedation depresses the gag reflex, it can be used to relax the patient to reduce gagging during the taking of impression.
- 5) Alginate may extrude posteriorly and cause gagging in the patient. To prevent this possibility, you can construct a post dam, which is simply a dam of wax constructed across the posterior of the tray.

TONGUE SPACE OF THE MANDIBULAR IMPRESSION

Sometime before pouring the mandibular impression a "tongue" of alginate should be placed between the flanges of the mandibular tray. This "tongue space" alleviates a mound of excess plaster or stone from the floor of the mouth when the cast is poured. Mix a scoop of alginate and place it on your left index finger (if your hands are small, use two fingers). From beneath the tray place the alginate in the tongue space. Using moistened fingers of your right hand, join the alginate to the lingual borders of the impression, creating a smooth floor. Allow the alginate to set and remove the supporting left index finger.

The alginate for the tongue space should meet these criteria:

- The surface is smooth.
- The addition does not overlie the impression.
- The addition is generally flat.
- The addition is long enough to include the the retromolar pad.

ALGINATE IMPRESSION PROCEDURE

The steps of each procedure are described as though you were doing them without an assistant.

1. ASSEMBLE THE ARMAMENTARIUM

- a. patient drape
- b. impression trays
- c. flexible rubber or plastic mixing bowl: clean, dry and without scratches.
- d. stiff spatula with rounded end to prevent scratching the bowl.
- e. saliva ejector
- f. alginate of choice and manufacturer's measurers (water and powder).
- g. soft utility wax to prepare tray border and wax stops.
- h. manufacturer's recommended disinfecting agent

2. SEAT THE PATIENT

3. OPERATOR SHOULD WEAR EYEGLASSES, MASK, AND GLOVES

4. INSTRUCT THE PATIENT

The muscles of the cheeks are strong enough to force the alginate out of the peripheral turn and/or move the tray, so it is important for the patient to relax. The patient's head should remain motionless with mouth in a relaxed open state, head resting comfortably against the head rest. Explain that the material is flavored (if applicable) and will feel cold when first placed.

5. POSITION THE PATIENT AND INSPECT MOUTH

The patient should be seated upright with the occlusal surfaces of the teeth roughly parallel with the floor. Position yourself on the patient's right side facing the patient. Have the patient remove any removable appliance. A container with water is provided

for the patient to place his/her appliance. Inspect the area to be covered by the impression for any conditions that might require bending or extending the tray or selecting a larger tray. Check to be sure the teeth are clean; impressions are best if the teeth have been cleaned recently. Remove food particles, materia alba, and plaque as necessary. Rinsing with mouthwash is helpful in removing debris and ropy saliva, and aids in lowering surface tension which prevents bubbles in the impression. Mouthwash also provides a pleasant taste for the patient.

6. LUBRICATE THE PATIENT'S LIPS

Lubricate the patient's lips with petroleum jelly to make tray insertion and removal easier and prevent alginate from adhering to the skin.

7. SELECT APPROPRIATE TRAYS

Mandibular Tray

Use the following criteria to assess the tray fit:

- The tray clears all tissues (buccal, posterior and anterior borders) by a least 4mm. Move the tray from side to side to make this appraisal.
- The tray is long enough to cover part of the retromolar pads (Figure 9), but not so long that it depresses the anterior border of the ramus. The ramus could interfere by moving the tray forward which forces the inside curve of the tray against the incisors.
- The tray sides fall at least 4mm short of the peripheral turn.
- The tray sides do not grossly depress any frenum.
- The patient should not feel pain or excessive pressure.

Maxillary Tray

The following maxillary tray criteria should be met:

- The maxillary tray clears the tissues by at least 4mm.

- The tray is long enough to cover part of the maxillary tuberosities (Figure 9).
- The tray sides fall at least 4mm short of the peripheral turn.
- The tray sides should not grossly depress any frenum.
- The patient should not feel pain or pressure.

8. INSTALL THE WAX

Mold utility wax around the tray rim and place the squares of wax in the bottom. Notch the wax to fit around the labial frenum to alleviate patient discomfort if it should be a problem and to enable you to take a more accurate impression of the patient's oral landmarks.

9. MOLD THE WAX TO THE VESTIBULE

Reseat the tray and gently press the patient's cheeks against the periphery of the tray. This process molds the wax against the tissue, ensuring a better fit in the vestibule (Figure 7a) and reducing the possibility of alginate flowing out of the tray prematurely.

10. ASK THE PATIENT TO RINSE HIS MOUTH

The patient should rinse with water or mouthwash while you are preparing the alginate. Alginate takes best against a surface wet with water, less well against a surface wet with saliva.

11. PROPORTION THE WATER, AND TEST THE WATER TEMPERATURE

Ideally, a thermometer is used for testing the water temperature. If one is not available, use room temperature water (68° Fahrenheit).

12. PREPARE THE ALGINATE

Check the temperature of the water and shake the container of alginate. Mix the alginate

and water according to the manufacturer's instructions. Remember to add the powder to the water rather than vice versa. Stir and spatulate for the recommended time (from 40 seconds to one minute). Spatulating the mix against the walls of the bowl helps to eliminate air. Rotate the mixing bowl in the palm of your hand during spatulation. Alginate should be smooth and free of bubbles. If the mix is too loose (soupy), discard it and mix again with less water.

13. LOAD THE TRAY

The mandibular arch is taken first. Many patients tend to gag on the maxillary impression because they experience the sensation that the alginate is flowing down their throats. If the mixture is too fluid or the tray overfilled gagging may actually occur. Taking the mandibular arch first helps to familiarize the patient with the procedure and increases his confidence.

Use the mixing spatula to load the tray rapidly with one to three increments. Wipe the spatula along the tray edge with each increment. If a perforated tray is used press some of the alginate through the holes to lock the impression material into place. Fill the tray with alginate until it is even with the utility wax border. Use a damp finger to smooth the surface of alginate before inserting the tray.

14. SEMI-DRY THE TEETH AND MUCOSA

Use either a gauze sponge or air syringe to dry the teeth and surrounding soft tissue.

15. APPLY A PRELIMINARY LAYER OF ALGINATE TO THE TEETH (optional step)

Using your forefinger, take up a scoop of alginate from the bowl and rub it over the occlusal surfaces of the patient's teeth. The occlusal surfaces are critical because their detail is fine and the alginate has little opportunity to flow. This technique reduces the possibility of surface air entrapment and aids in obtaining better detail. Additional

alginate may be applied to other suspicious areas-- severe undercuts, for example. The operation must be completed swiftly and without allowing contamination by saliva. The patient's body temperature hastens the setting of alginate. If too much time elapses between the preliminary application and the seating of the tray the alginate in the tray may not cohere smoothly to the preliminary alginate. Ask the patient to retract and raise his tongue while the tray is being placed, then to let it relax as the tray is seated.

16. POSITION AND SEAT THE TRAY

Mandibular Arch Impression

When seated, the tray must be level, in all directions: from the posterior to anterior and side to side across the mouth. It cannot be off centered to one side or twisted. The handle should be positioned in the midline of the arch. The beginner often becomes so involved with one aspect of the seating that he misses the total picture. It is important to keep the basic alignment in mind during the entire process. When inserting the tray retract one side of the cheek with the side of the tray and rotate the tray into the mouth while retracting the other cheek with your other hand. Keep the top of the mandibular tray parallel with the opposing arch to achieve maximum visibility and working space. Seat the tray straight down, making sure that sufficient alginate flows to the deepest portions of both the lingual and facial aspects of the arch. Voids occur most frequently in these areas, especially in the vestibule adjacent to the lip. Pull out the lip to allow alginate to flow and displaced air to escape.

Maxillary Arch Impression

The procedures for casting the maxillary arch are the same except for a few variations. Although the patient remains seated upright for the maxillary impression, the operator should stand behind the patient.

In order to capture the peripheral turn of the maxillary arch, make sure that the sides of the tray reach into the vestibule. It may be necessary to build up certain areas with wax.

Inspect the patient's palatal arch (Figure 9); if it is unusually high, extra wax is added to the palatal area of the tray. The tray should be long enough to include the tuberosities (Figure 9) and the hamular notch (notch behind tuberosity).

Seat the tray in the posterior first and then the anterior. There are two reasons for seating the tray at the posterior first: 1) when the tray is seated anteriorly first, alginate tends to squeeze toward the posterior leaving an inadequate amount to fill the anterior vestibule adjacent to the lip; and 2) in squeezing the excess alginate to the posterior, you run the risk of gagging the patient. As the tray is being seated, lift the patient's lip to allow alginate to flow into the area, then let the lip lie comfortably over the tray. As a precaution against gagging, seat the tray and ask the patient to lean forward slightly and to breathe through his nose. (See Gagging Patient--Variation in Technique page 20).

17. REMOVE EXCESS ALGINATE

Remove any gross excess of alginate with the dental mirror. Drag it forward to prevent alginate from entering the patient's throat.

18. HOLD THE TRAY STEADY FOR THE PRESCRIBED TIME

Very little pressure is required. Excessive pressure will produce distortion. Use even pressure with your fingers in the bicuspid area. Regular alginate can be removed two minutes after the initial gel; hence, it is a good idea to hold it in position an extra minute. Hold the tray in place to alleviate any tray movement that might occur from swallowing, etc., during the setting process.

19. REMOVE THE TRAY

Run your index finger around the periphery to break the air seal. Give the tray a slight tilt to make certain the seal is broken in all areas. Remove the tray with a quick pull in line with the long axis of the teeth. When doing so, keep two fingers on the occlusal

surfaces of the opposite arch you are taking to prevent injury to the teeth. Wiggling the tray out of the mouth will cause distortion of the impression.

20. REMOVE BITS OF ALGINATE FROM THE MOUTH AND ALLOW PATIENT TO RINSE

21. RINSE THE IMPRESSION

Rinse the impression briefly in running water to remove saliva, blood, debris and/or bits of loose alginate. Shake excess water off. The impression should be kept damp, but not wet. Wrap the impression in a damp paper towel and place in a humidifier until time to disinfect.

22. EVALUATE THE IMPRESSION.

Mandibular Impression

The impression should meet the following criteria:

- All detail is reproduced, including the complete peripheral turn and a portion of the retromolar pads.
- The detail is sharp, not blurred or indistinct.
- The impression is free of voids in critical areas.
- The impression is free of large folds of alginate.
- There are no areas where the alginate has pulled away from the tray.
- The impression is free of rips and tears, except in interproximal areas.
- Alginate thoroughly covers the tray (no tray is visible through the alginate).
- The impression is free of bulges or depressions that indicate a sub-surface bubble.
- The alginate is smooth, not sponge-like.

Maxillary Impression

Use the same criteria used for evaluating the mandibular impression for the maxillary

impression and add:

- Impression includes part of both maxillary tuberosities.
- Palatal arch is complete.

Often one is not certain that a particular area has been reproduced--all the peripheral turn, for example. A judgement can be made on the basis of the appearance of the alginate. When alginate has been impressed against a wet membrane, a smooth, shiny surface is produced; when it has set without touching anything, it has a slightly rough, mat (dull) surface.

The alginate impression in Figure 10 is unsatisfactory for several reasons: the large palatal void, the void on the occlusal surface of tooth # 15, the tear on the lingual of tooth # 4, and the pitted texture of the palate. Figure 11 shows another set of deficiencies: exposure of the metal tray, a tear, and granular texture. In practice, the acceptability of an impression depends upon its purpose. If it is to be used for an acrylic temporary crown, for example, and both the tooth being restored and the adjacent teeth are in good condition, one may overlook minor defects in other areas. Do not attempt to repair small imperfections in an impression; they are much more easily repaired in the stone cast. If there are large defects in noncritical areas, you can melt wax directly into the alginate to repair them. The presence of the tongue prevents obtaining an impression of the floor of the mouth. This floor is artificially constructed with excess alginate mixed for the mandibular impression.

23. TRIM AWAY EXCESS ALGINATE

Using a sharp lab knife, trim away any excess alginate around the periphery, especially along the bottom of the tray. Pressure applied to an extensive area, such as might occur when the tray is left to rest on a surface, may distort the impression in adjacent areas. Be careful not to remove any alginate in areas that must be used as reference points.

24. TAKE THE WAX BITE REGISTRATION

After taking both the mandibular and maxillary impression an interocclusal bite record is needed to correctly relate the mandibular model to maxillary model during the trimming process. A soft moldable wax is used to obtain a registration of the patient's occlusion. The wax is manufactured in a horseshoe shape. It is slightly heated by either warm water or passed over a bunsen burner flame. The wax is placed on the mandibular arch and the patient is asked to gently bite into the wax. After the wax cools it can be removed from the patient's mouth. Store the wax after it has been disinfected in a cool dry place so the wax does not distort. Make sure the wax is identified and placed with the appropriate impressions.

25. DISINFECT THE IMPRESSION

Use the manufacturer's recommended spray disinfectant for the alginate you are using. Spray the impression and wait the recommended time. If the impression is being sent to the laboratory, wrap it in a sealed bag.

26. LABEL THE IMPRESSION AND STORE IT

Attach a label to the impression tray. Wrap it in wet towels and store it in a humididor. Figure 12 illustrates the shrinkage that takes place when alginate is not stored in a humid environment.

Defects in the Impression and Possible Causes

Alginate is sponge-like.	Alginate was inadequately mixed.
Impression does not include portion of maxillary tuberosity or retromolar pad.	Tray too short or seated short.
Impression does not capture peripheral turn.	Sides of tray not high enough. Too little alginate. Tray not seated far enough.
Tears in alginate and alginate sticking to teeth.	Teeth too dry. Too early or rough removal.
Details blurred.	Tray moved during gelation. Tray seated after gelation started.
Rough alginate surface.	Insufficient or prolonged spatulation. Water too warm or improper W/P ratio. Tissues inadequately cleansed. Inadequate removal of saliva.
Bubbles, bulges, or depressions.	Air entrapment caused by poor spatulation, poor tray loading, or poor seating
Tearing of alginate along edge of tray.	Alginate too thin or teeth too dry. Removal of tray too rough, too rapid, or too slow.
Separation of alginate from tray.	In a perforated tray, alginate not keyed through holes. In a smooth tray, insufficient or dry adhesive.
Tray visible through alginate.	Wrong size tray. Tray not seated squarely, or seated too far without stops.

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