

## DENTAL IMPRESSION MATERIALS USEFUL FOR MAKING MOLDS OF FOSSILS

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### INTRODUCTION

Dental impression materials that are used for making molds of teeth and gums, in situ, are designed to produce high quality molds and to set within a few minutes in a person's mouth. These materials are also effective for making molds of fossils (Colbert, 1980, p. 203-205; Quilty and Williams, 1975), especially when the molds must be made quickly.

### CHARACTERISTICS OF MATERIALS

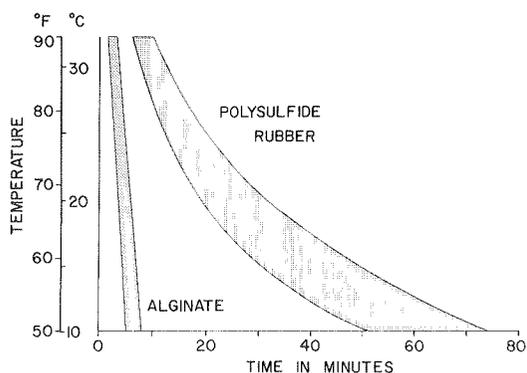
Two types of dental impression materials are available. They have very different characteristics, and are both useful to the paleontologist in certain situations.

Alginate impression material (made from algae) comes in powder form and is mixed with water, like plaster of paris. Dentists mix the alginate in rubber bowls, to reduce the formation of bubbles. It must be mixed thoroughly and rapidly and then applied quickly, because it sets within a few minutes (Text-fig. 1). The resulting mold can be removed as soon as it has set. Alginate molds are pliable like latex, but are not permanent molds. They are useful only in situations where a permanent cast can be made from the mold within a few days. The molds must be protected from damage and from sharp bending, or they will crack. Consequently, alginate molds cannot be used for fossils with significantly undercut surfaces, or for molding complete three dimensional ob-

jects. Also, if casts cannot be made immediately the molds should be kept in closed plastic bags to prevent drying and excessive shrinking. Molds sealed in plastic bags and placed in a box or loosely rolled in a can for protection can be successfully kept for at least a week under field conditions, and can be carried in a pack if necessary.

Shrinkage of molds was experimentally analyzed under simulated field conditions. Five alginate molds were made; each approximately 15 cm × 30 cm and 0.4 to 1.3 cm thick. Each one was placed in a separate plastic garbage bag which was closed with a wire tie. They were then kept outdoors in an exposed but shaded place for 9 days, and the distance between pairs of pencil marks was measured periodically (Text-fig. 2). Molds can be kept for more than a week before the casts are made, if the two to three percent shrinkage can be tolerated. If molds are not kept in plastic bags they become hard and brittle and shrink at least 20% within a few days. To make casts with virtually no shrinkage, wrap the fresh alginate molds in a wet cloth, put them in a plastic bag, and pour the plaster casts within one hour.

The second type of dental impression material is a type of polysulfide rubber compounded to set rapidly (Text-fig. 1). This material makes durable, long-lasting, molds with characteristics similar to other types of poly-



TEXT-FIG. 1—Setting time of dental impression materials at various ambient temperatures. Data are from laboratory experiments, and indicate time from application of mold material (after 30 to 60 seconds of mixing), until the mold can be safely removed from the fossil.

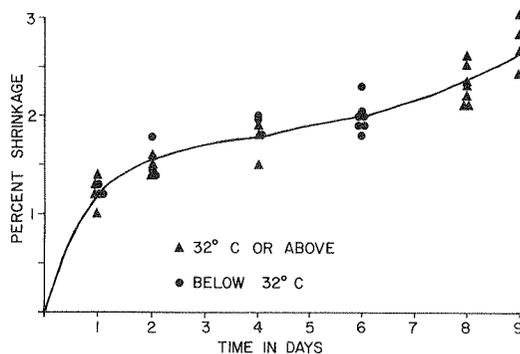
sulfide rubber (Rigby and Clark, 1965). It comes in tubes like toothpaste, and a tube of base must be mixed with a tube of accelerator until the entire mixture is of a uniform color. Then it can be applied to the fossil. It sets slightly faster if covered with a damp cloth.

A mold release should be used with both alginate and polysulfide rubber mold materials. A concentrated solution of liquid detergent and water, or silicone mold release are both effective.

Dental impression materials have a finite shelf life, and should not be kept too long before they are used.

Various brands of these materials are available. The alginate impression material that we used was Caulk Jeltrate, Type II—normal set, from the L.D. Caulk Company, Division of Dentsply International Inc., Milford, Delaware 19963. The polysulfide rubber was Coeflex rubber base impression material, from Coe Laboratories, Chicago, Ill. 60658. Other types of dental impression material are available, but are significantly more expensive. Contact a dentist or a dental supply store for more information. Most large cities have at least one dental supply store.

Another dental material, castone, is useful for making plaster casts. Castone (Ransom and Randolph Co., Toledo, Ohio) is just like plaster of paris, except that castone is much harder and more durable than plaster of paris. Castone in 100 pound drums from the Ransom and



TEXT-FIG. 2—Shrinkage, in percent reduction from original length or width, of alginate molds kept outdoors in plastic bags. Measurements from one group of three and one group of two molds.

Randolph Company costs about the same as plaster of paris.

#### DISCUSSION

The principal advantages of these mold materials are: 1) They set very rapidly. It is possible to pour a mold and walk away with the finished mold within a few minutes. 2) They set fairly rapidly even at low temperatures. Alginate material was successfully used in the field for making molds of trace fossils when there was snow on the ground, and latex rubber would not set properly. 3) They are available, at least in small quantities, in relatively remote areas. Almost all dentists have some type of impression material and most dentists are likely to be willing to sell some, although they may not be able to part with a large amount on short notice.

The polysulfide rubber molds have the additional advantage of being more durable than alginate. Alginate molds have more limitations than polysulfide rubber, but in situations in which those limitations are not critical, the alginate has the advantages of being faster setting, much less expensive, easier to work with (aside from the need to keep it in plastic bags and protect it from damage), and it may be more practical for molding large areas. We have successfully made quality molds of large areas of fossil footprints by covering them with several batches of alginate impression material. In warm weather the alginate sets too rapidly for the batches to bond to each other. It then becomes necessary to reinforce the mold

with burlap; unfolding the burlap over each successive batch and pushing it into the wet alginate.

## REFERENCES

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- Rigby, J. K. and D. L. Clark. 1965. Casting and molding, p. 389-413. *In*, B. Kummel and D. Raup (eds.), *Handbook of paleontological techniques*. W. H. Freeman and Co., San Francisco.

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