

Archaeological Preservation Research Laboratory Report 14:

Preservation of Kelp Specimens

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Currently, laboratory specimens at Texas A&M University and other leading institutions are prepared using a variety of solutions including formaldehyde and formalin as a preservation medium. Apart from the fact that these chemicals are noxious and potentially dangerous, they only act as preservatives when specimens are immersed in them. Exposure to air sets the processes of deterioration in motion and as students use specimens, they deteriorate rapidly.

Dr. Mary K. Wicksten, an associate professor in the Department of Biology at Texas A&M University, has observed that many current means of specimen preservation are not capable of preserving many of the delicate features of botanical specimens needed for analysis. Dr. Wicksten provided APRL with two samples of kelp that had been transported to her laboratory from California for study. Based on previous experiments conducted at the Conservation Research Laboratory, a simple strategy for conservation of the kelp samples was designed.

In preparation for silicone bulking, two sections of kelp were rinsed in a bath of running fresh water and the surfaces of their leaves were lightly rubbed using finger tips in the hope of removing loose grit and sand from their surfaces. Sample 1 was then dehydrated for 4 hours in a bath of acetone, within a freezer-mounted vacuum chamber. For four hours, a vacuum of 28 Torr was applied to the sample in acetone. After dehydration, it was quickly patted dry in a paper towel and immediately placed into a large beaker containing 500 ml of PS 343 silicone oil. The beaker was placed back into the freezer-mounted vacuum chamber and for eight hours, a vacuum of 28 Torr was applied as a means of replacing acetone with silicone oils. After vacuum bulking, the kelp was allowed remain in the solution at ambient pressure within the freezer for 16 hours.

Sample 2 kelp leaf was dehydrated in the same manner as sample 1 except this sample received only 1 hour of dehydration. After one hour, the leaf was quickly surface patted with a paper towel and then placed into a 500-ml solution of PS 343 / PS 340 silicone oils, mixed in a 50:50 solution. Sample 2 was then placed back into the freezer-mounted vacuum chamber and a vacuum of 28 Torr was applied for 8 hours. After bulking, it was

allowed to remain in silicone oil for 16 hours with the addition of 100 ml ethyltrimethoxysilane.

In preparation for cross linking the silicone oils, a warming oven was preheated to 137 degrees Fahrenheit. Within the chamber, the lid of a large plastic bucket was placed within the oven and a disk containing 2 ounces of CT-32 catalyst was placed in the center of the lid. A piece of mesh steel was placed over the dish, serving as a place to rest the silicone bulked samples so that they would be exposed to the fumes from warmed catalyst. With the bucket placed in position over the lid, a containment chamber was created for keeping the catalyst fumes in close contact with the bulked specimens. A secondary source of catalyst fumes was supplied using a heat lamp to heat a beaker of CT-32 with a large tube running into the oven and into the top of the containment chamber. To force the catalyst fumes into the containment chamber, a small aquarium air pump was connected to the beaker containing the warmed catalyst, forcing catalyst fumes into the containment chamber (Figure 1). Samples 1 and 2 (Figures 2 and 3 respectively) were both exposed to catalyst fumes for 24 hours and then both were removed from the oven and allowed to sit for 24 hours in fresh air before inspection.

While cleaning sample 2, the leaf, which was partially broken near the pneumatocyst or bulb-like structure at the base of the leaf, completely separated. The pneumatocyst of sample 2 remained round and showed no signs of shrinkage. The pneumatocyst of sample 1 collapsed before the specimen was removed from the warming oven. In both cases, the coloration and delicate edge features of the kelp samples have been preserved. After sitting at room temperature however, the pneumatocyst of sample 2 did show some signs of slight shrinkage, and after three months, the pneumatocyst is still supple and pliable, although mounting the specimen in a plastic sheet protector has caused the pneumatocyst to flatten. The pneumatocyst of sample 1 has collapsed and appears to be brittle and inflexible.

In both cases, the diagnostic features of the kelp specimens have been well preserved. Sample 1 appears to have a glossier finish than sample 2 and over time, the surface of sample 2 appears to be comparatively dry. The use of ethyltrimethoxysilane is not necessary for the successful preservation of these samples and is most probably the reason sample 2 is drier than sample 1. From the standpoint of aesthetics, sample 1 has maintained a more natural appearance as compared to the drier appearance of sample 2. Visual inspection of both kelp samples shows that Sample 1 has remained more supple over time, with a surface appearance that appears moist and natural.

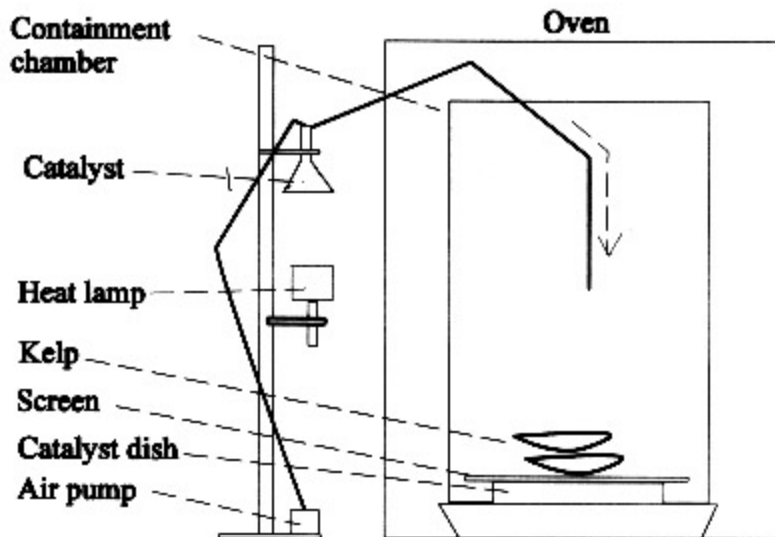


Figure 1. Set-up for the preservation of kelp specimens.

Citation Information:

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