

## Freezing to Kill Insect Pests

Freezing is a non-chemical, non-toxic, inexpensive and effective pest eradication method, which is widely used in the international museum community. Unlike most commonly used chemical-based fumigation methods it has no residual action. It is popularly used for treatments of objects susceptible to damage from other chemical-based methods, usually textiles, and other organic-based materials such as paper, leather, wood and feathers etc. Items containing a variety of materials (composites) may not be suitable - seek the advice of a Conservator if in doubt. Inorganic materials such as metal, stone, ceramics and glass are only rarely affected by pests.

Materials which may be damaged by low temperatures, and composite objects, particularly those which contain materials with very different thermal properties (e.g. painted leather), should not be treated with this method. Objects which cannot be well sealed or have surrounding air adequately evacuated from the packaging, also should not be treated with this method as condensation may form on their surfaces during thawing.

Extreme care must be exercised when handling frozen materials, as many become brittle, and may be easily damaged. Always wear gloves for the protection of yourself and the object. The normal degree of care in handling objects should be exercised when placing objects inside a freezer. Note that a large volume or mass of materials will take longer to freeze and defrost; however, in the case of electrical or equipment failure, this may be an advantage. Over-stacking may cause physical damage to fragile materials, and should be avoided.

### Method

The object to be treated is placed in a plastic bag which is sealed and as much air as possible removed – air may be simply pushed out, or the nozzle of a vacuum cleaner may be inserted when there is no danger of the object collapsing. The object is then placed in a pre-chilled freezer at -20° Celsius and left at this temperature for a minimum of three days. However a longer length of time may be required depending on the object size and freezer temperature.

After the treatment time, materials may be removed from the freezer and set aside to defrost, *still in their plastic bags*. Do not perforate the plastic nor open plastic or remove objects from plastic wrapping until they are fully defrosted (usually 24 hours) i.e. they are at room temperature. If warm air leaks into the bag or onto a cold object, condensation will form and water damage will result. All dead pests should be cleaned from the treated object and the item closely monitored for further activity after treatment.

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