

## The Care and Preservation of

### **Glass & Ceramics**

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#### **Introduction**

Glass and ceramic objects can be maintained for years of use and enjoyment provided that some basic care and attention is given to their preservation. The conservation staff at The Henry Ford have compiled the information in this fact sheet to help individuals care for their objects and collections. The first step in the care of collections is to understand and minimize or eliminate conditions that can cause damage. The second step is to follow basic guidelines for care, handling and cleaning.

Glass and ceramics share several material characteristics, which is why it is useful to group them together when discussing preservation and treatment. Glass is an amorphous solid, formed from silica and additives at high heat, resulting in a hard, non-porous final product. Additives can include stabilizers and colorants of various types. Ceramics can refer to a broad range of products, which share the characteristics of being made of a clay body, with or without a vitreous glaze on the surface. Ceramics made at high temperatures (high-fired) and glazed ceramics are less porous than those made at lower temperatures (low-fired) and unglazed ceramics.

#### **Types of Damage**

Glass and ceramics are among the most durable antique collectibles. The primary cause of damage to both glass and ceramic objects is mishandling, causing breakage – by far the most common form of damage that occurs to both. Additional damage in the form of stains and discoloration can be caused by improper use, display, cleaning or repair. In rare instances, inferior manufacturing processes or harsh environmental conditions lead to degradation.

Ceramics can become permanently stained by a variety of factors including inappropriate cleaning, repairs or careless use. Porous, unglazed or cracked ceramics can develop stains as a result of being soaked in water during cleaning. The absorption of colored materials such as foodstuffs, soil from potted plants or rust from contact with metal objects can also cause staining. In addition, the use of inappropriate or inferior quality adhesives and paints during the restoration process can also result in irreversible discoloration. Elevated temperatures can cause darkening of already existing stains and sudden changes in temperature can promote the development of cracks.



In the case of archaeological ceramics, damage can be caused by the presence of salts that have been absorbed into the object from the soil in which it was buried. These salts can absorb moisture from the air when humidity levels are high. This absorption of moisture causes the expansion of the salts which can lead to cracking or delamination of the ceramic object.

In rare instances, a stage of degradation referred to as “weeping glass” occurs. “Weeping glass” manifests itself in the form of droplets of moisture that form on the surface of a glass object. These droplets of moisture leach out unstable components of the glass, producing an alkaline solution. If these alkaline droplets remain on the surface of the glass for an extended period, the surface will develop a fine network of cracks. This phenomenon is referred to as “crizzling.” Both crizzling and weeping are the result of various additives to the silica formulation during glass manufacture.

Glass can also be permanently damaged by lengthy exposure to acidic or alkaline conditions, which is often the case of archaeological glass. Glass that has been buried in the soil for lengthy periods of time develops a matte, scaly, iridescent surface. In the case of archaeological antiques, the iridescent, scaly surface has become a prized aesthetic quality that is desirable for collectors of glass.

### **Storage of Glass & Ceramics**

As with most artifacts, the primary method for preventing deterioration and stabilizing existing deterioration in glass and ceramic materials is to provide a stable environment, within specific boundaries of temperature and relative humidity. The ideal temperature for storage is 65-70°F for all types of glass and ceramics. The appropriate relative humidity is a little more variable; weeping glass should be stored at 40% RH, for example, as excess moisture can accelerate degradation. Archaeological ceramics are best stored at 45% RH, while crizzled glass should be stored at 55% RH. Even if it is not possible to achieve these values exactly, it is critical to avoid fluctuations. Stable and undamaged ceramics and glass have fewer specific requirements and can be stored at RH levels appropriate for whatever other materials they are stored near or with. Again, the most important consideration is to avoid fluctuations.

While precise control of temperature and humidity is desirable, it is not always practical in homes. Therefore, damage should be minimized by avoiding extremes in temperature and humidity. This can be done by ensuring that objects are kept away from heat sources such as furnace vents, fireplaces, warm lights, direct sunlight, and internally lit display cases. Inexpensive temperature and humidity indicators can be purchased from conservation suppliers.

Whenever possible, stacked items should be cushioned using felt, soft cloth or polyester padding to avoid abrasion of decorative surface elements. Care should also be taken to avoid rubbing gilded or iridescent glass surfaces since they can be easily worn off.

When displaying glass and ceramics, the use of spring-type metal plate hangers should be avoided. These hangers place a great deal of stress on objects and can lead to the development of cracks. Metal hangers can also scratch the surface of the object. Plate stands constructed of rigid plastic or painted wood that allow the object to rest at a tilted angle are preferable.

### **Handling of Glass & Ceramics**

Careless handling can result in breakage, chips and scratches that mar the beauty of glass and ceramic antiques. Always use two hands when lifting or moving objects, being careful to lift them from their strongest points. Never lift objects by weak, thin areas such as handles or spouts. This is particularly important in the case of objects that have been repaired previously. Even the best repairs cannot completely restore the structural strength to a broken glass or ceramic item. Antique ceramic dishes and bowls should never be heated beyond room temperature.

### **Cleaning & Care**

Although glass and ceramics are considered to be stable materials, a certain amount of caution must be used when cleaning them. Archaeological and low-fired porous ceramics, as well as weeping or crizzled glass, should only be cleaned by a trained conservator. Most glass and ceramic items, however, can be successfully cleaned, provided that a few basic instructions are followed.

Some antique ceramic or glass items contain fragile painted or gilded surface decoration that can be removed or damaged by harsh cleaning solutions. It is important to use only dilute cleaning solutions, applied with soft cloths during cleaning. Antique ceramics should never be soaked in any liquid. Prolonged soaking and uneven drying can lead to staining of ceramics. This is particularly probable in items that are chipped, scratched or that have cracked glazes. Lastly, automatic dishwashers should never be used to clean antique ceramics or glass.

Recommended materials for cleaning ceramic objects include mild detergents in water. The detergents most used here at The Henry Ford are Triton X-100, Vulpex, and Orvus. A mixture of ethanol (ethyl alcohol) and water 1:1 can also be used for cleaning. Glass can be cleaned in much the same manner as ceramics, with the addition of dilute ammonia as

a potential cleaner.

Before proceeding to clean an object, it is important to inspect and test the object to make sure that no elements will be removed or damaged during cleaning. Examine the object to determine if there is any flaking gilding or paint that could be wiped away during cleaning. Once it has been determined that it is safe to proceed with cleaning, the cleaning solution should be tested in a small, inconspicuous area to ensure that decorative designs will not be damaged.

Dilute detergents (approximately 1% in water) should be applied using a soft cloth or cotton balls. The residual detergent should be removed by wiping with distilled water applied also with a cloth or cotton balls. In both instances, the cloth should be damp, not wet. The object should then be allowed to air dry. Additional cleaning involving the removal of tenacious stains and dirt should be left to a professional conservator.

If the glass or ceramic object is broken, small repairs on stable objects can be successfully completed using the following guidelines for adhesives and methodology. Archaeological glass, painted glass and glass photographs can be easily damaged by inappropriate repairs and, therefore, should be repaired only by professional conservators. It is also recommended to consult a conservator regarding adhesive choice for low-fired or very porous ceramics, and those in poor condition, with damage to glazes and/or staining.

Choosing an adhesive for a ceramic object is not always a simple task. For high-fired ceramics with low porosity, an acrylic resin such as Paraloid B72 is often a suitable adhesive. When used at concentrations of around 30% weight by volume in a solvent such as acetone or ethanol, it has suitable tack and hold for many ceramics. Staining is always a concern with ceramics; please consult a conservator before beginning repairs to assist with adhesive selection.

The most commonly used adhesive for the repair of glass objects is epoxy. The major disadvantage to using epoxies is that they discolor with time and exposure to light. The adhesive used most often at The Henry Ford is Hxtal NYL-1. Hxtal is a strong, clear adhesive that is one of the most stable epoxies currently available. Many commercially available epoxies discolor within a short period of time resulting in unsightly repairs. When repairing a broken glass object, care should be taken to avoid abrading broken edges while trying to align them. Abraded edges will prevent proper alignment during repair.

Hxtal can be applied in two ways to repair glass. For thicker glass, the epoxy can be applied to all broken edges, and then the pieces should be aligned and secured with clear adhesive tape until the epoxy cures. For thinner glass, the object can be reassembled using clear

adhesive tape ‘stitches’ before the epoxy is applied; then, small dabs of the epoxy can be applied along the break lines and allowed to wick into the breaks. This mechanism is known as ‘capillary action’. In both cases, residual adhesive should be removed before the epoxy fully cures, using acetone that is applied with a soft rag or cotton swabs. It is safe to remove excess epoxy after 24 hours. The epoxy should be allowed to set for at least 72 hours prior to removal of the adhesive tape; the Hxtal will not be fully cured for a week.

Once a glass object has been repaired using epoxy, it should be kept out of direct sunlight. Sunlight will accelerate the yellowing of the adhesive. Although epoxy is a strong adhesive, it may not withstand prolonged soaking. The object should not be soaked in liquids as they may loosen the mended area.

For stain removal and other more interventive treatments, please consult a conservator.

### **Disaster Response**

Glass and ceramics in good condition are robust, but in the case of emergency salvage are vulnerable to breakage. Glass and ceramics in poor condition, as discussed earlier with weeping and crizzling glass and some archaeological ceramics, are especially vulnerable to water damage, and must be dried as soon as possible after an event involving water.

If glass and ceramic objects are identified as salvage priorities, their removal to a safe location must be accompanied by padding and packing to prevent breakage during the emergency operations. If breakage has already occurred by the time salvage operations begin, an archaeological approach can be very useful – remove fragments and shards from one area at a time, mapping where they came from, and keeping them together for potential future re-assembly.

Further discussion on disaster response can be found in The Henry Ford’s conservation information sheet on that topic, and in various online resources.

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### To Find a Conservator:

The American Institute for Conservation

<https://www.culturalheritage.org/about-conservation/find-a-conservator>



## SUPPLIERS

### *Humidity Indicators*

- University Products  
517 Main Street  
PO Box 101  
Holyoke, MA  
(800) 762-1165  
[www.universityproducts.com](http://www.universityproducts.com)
- Talas  
213 West 35<sup>th</sup> Street  
New York, NY 10001-1996  
[www.talasonline.com](http://www.talasonline.com)

### *Vulpex & Orvus Detergents, Hxtal Epoxy*

- Conservation Resources International L.L.C.  
8000-H Forbes Place  
Springfield, VA 22151  
(800) 634-6932  
[www.conservationresources.com](http://www.conservationresources.com)

### *Acetone & Ethanol (ethyl alcohol)*

- Hardware stores

### *Plate Stands*

- Michael's Crafts