

Preservation Practices



by Hugh Phibbs

Pollution Concerns

People have known that pollution is inimical to the preservation of art and artifacts since the Bronze Age. In the *Odyssey*, Ulysses tells Telemachus to take his armor out of the smoke for safekeeping. Homer did not know that the aromatic hydrocarbons in the smoke would interact, chemically, with the copper in the bronze of the armor's alloy and cause oxidation. However, like other thoughtful observers of his time, he had watched what happened when bronze was coated with soot.

The ancient Middle Easterners who secreted the documents that we know as the Dead Sea Scrolls and the Gnostic Gospels understood that placing those delicate materials in covered jars that were buried in sand or stored in caves cliffs would aid in their preservation, chemically and physically. During the Renaissance, Cennino D' Andrea Cennini noted in his *Artists' Handbook* that one should not use lead white paint on outdoor paintings. He understood that water-based paints that contain lead

carbonate will turn black if they are exposed to the sulfur in smoke, although they could be used in books that were usually kept closed. Lead carbonate in oil paint was protected by the oil that surrounded the pigment particles.

Our more recent ancestors understood the need to sequester early photographs in metal and glass keepers. They gilded the edges of their best books to keep pollution from wicking into the fibers of the pages. They kept beloved swatches of hair in metal and glass lockets; protecting it from pollution and pests.

Today, our air is no less polluted than the air that has been breathed through most of human

history. We have replaced the locally concentrated pollution of wood and coal fires with the more widely dispersed pollution from autos and power plants.

Pollution is ubiquitous in our atmosphere. Even at our North and South Poles, the chemical and physical pollutants in our atmosphere can be found. Dust blown into the air in Asia settles

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out over North America. Coal burned in the Midwestern states lowers the pH of rain that falls on much of the eastern part of the U.S. We can see pollution in our homes if we look at sunlight entering a room and see particles suspended in the air. We can smell pollution every time we make coffee, cook bacon, use air “freshener,” or release other aerosols into the air. We capture pollution in the filters in our furnaces and air conditioners, and in room air filters. Some pollutants, such as geological dust, have primarily physical consequences, while many other types have both physical and chemical effects.

Physical pollution can be considered as grime. When a porous item become begrimed, the complete removal of the pollutant grime is difficult at best. A soiled paper or fabric is likely to require soaking, since surface cleaning (wet or dry) cannot reach deeper deposits and may disrupt the structure of the surface.

Most unvarnished paintings can also become physically polluted. When acrylic paint dries, the water that leaves the paint leaves holes and the resulting surface is sponge-like. Reproduction prints and photos that have been transferred to canvas and have been given a covering layer of acrylic will have the same problem. Oil pastels are made with non-drying oil and physical pollutants can become lodged in a surface made of this medium. Oil stick is made with drying oil, but its long drying period means that it can collect physical pollutants for years. Casein has a naturally matte surface which is somewhat vulnerable to physical pollution and even more vulnerable to abrasion.

Egg tempera on panel and oil paint are the only media that form surfaces smooth enough that they can be displayed unglazed without fear of physical pollution.

As visually disfiguring as grime is, the chemical consequences that it, and other forms of pollution may entail, can represent the greatest threat to the future of materials to be preserved.

The support materials used in works of art and artifacts are primarily organic and are quite vulnerable chemically. Wood, linen, and cotton are all cellulose, which is vulnerable to oxidation (from oxides of nitrogen, sulfur, and ozone), to acid hydrolysis (which can take place when these pollutants react with atmospheric water to produce acids), and to pollutants that can come from the interaction of UV light and lignin that may be part of the paper or board.

Wool, silk, animal skins, and glues are all protein. Like cellulose, proteins are chemically sensitive in the extreme. The other sorts of material used in making supports for such items—metals and synthetic polymers—have their own vulnerabilities: metals to oxidation; and synthetic materials to oxidation and UV light. Keeping pollutants away from these materials is essential to their preservation. The colorants used to make designs on the surfaces of such support materials can also suffer when exposed to pollutants, but exposure to light probably represents the greatest threat to their preservation.

How Can Pollution Be Kept At A Distance?

Glazing can be part of the answer. Glass serves as a profound vapor barrier, and acrylic sheet is quite useful in this role. Each of these materials can be found with UV filtering material added to them, making them doubly useful. Keeping pollution from entering the back and sides of the frame will also help. Backing boards that are made of, or contain, plastic can be beneficial in slowing the influx of pollution. Taping the edges of the package using pressure-sensitive tape with an added barrier layer that is applied to protect the edges of the mat is another line of defense against both pollution and infestation by insects.

None of these steps adds up to a profound or hermetic seal of the package. Thus, they can be safely undertaken in settings that may lack the careful monitoring of relative humidity that is required for work on truly sealed packages.

It might be argued that framing an item without glazing can eliminate possible problems that can be associated with glazed framing. Glazing can trap moisture that comes from the wall behind the frame. That moisture can accelerate chemical reactions and can cause the item to change shape. If moisture comes in significant enough quantities, it can form liquid water and can serve as an agent of transportation for degraded parts of the framed item, causing tide lines or foxing.

Placing a barrier film on the back of the frame can provide excellent protection against moisture coming from the wall. Using a polyolefin film such as Tyvek, that is intended for use in excluding architectural moisture, instead of the traditional paper dust cover is one way of providing such protection. Composite metal and plastic films such as Marvelseal 360 or metallized poly-

ester can also function as vapor barrier backing materials, but they are more expensive than the house wrap and the extra protection they would give is not necessary.

The final element that is required for making such a frame as effective as possible is the use of proper spacing materials to keep the framed item away from the glazing. One simple means of holding a needlework project away from its glazing comes from a technique that has been used with installation of paintings on canvas in frames: a spacing element is fixed to the sides of the support which extends in front of the framed item and keeps it back from the glazing. Since needlework projects are frequently pinned to support boards, strips of conservation quality board can be secured to the edges of the support board with added pins.

Pushing pins through the board will be difficult, so the holes through which the pins will pass should be started in the board strips with an awl, tapped with a hammer.

Some years back, some textile conservators favored framing that permitted air circulation though the framed textile. When air that was infusing the textile was the filtered, washed, conditioned air of a museum, that strategy could work well. But even the best air conditioning system in a home or office can not be expected to take enough of the pollution from our air to find benefit in this approach.

Until we stop burning fossil fuels, running machines that emit ozone, and using polymers that emit pollution, keeping delicate works of art and artifacts are safest in closed storage units or glazed, enclosing frames. It is worth remembering that even in museum environments, with very carefully monitored air, such items are not left out in the open for long. Rather, they are sequestered in storage and display housings that add an extra layer of protection to that which the building and its air handling machinery provide. Any owner who wants to see an item framed without glazing should be informed of the consequences that such framing entails. This will allow them to make that decision, mindful of hazards that exposure to urban, industrial air represents. ■

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