Preservation Practices

Nineteenth Century Contributions to Preservation

by Hugh Phibbs

As the Nineteenth Century progressed, new materials made books and prints more widely available. The use of wood pulp in making paper, and alum rosin sizing in printing, made the prices for books and prints drop. This also made products which not only destroyed themselves, but also contaminated other materials that came in contact with them. Some early books were so acidic that their pages disintegrated entirely, leaving only the printed letters themselves. Earlier (less acidic) paper which was stored in contact with these newer materials would discolor and then weaken.

We are faced with the consequences of these actions today when we disassemble old frames. In addition, this is only one instance in which the modification of cellulose in the late Nineteenth Century led to problems which remain with us today.

When cotton was modified with nitric acid, nitrous cellulose could be made. This early plastic has shown itself to be notoriously unstable over time. The same may be true of cellulose which is modified with acetic and other acids. These "revolutionary" products, which appear to be stable to begin with, can only be maintained if they are carefully stored at low temperatures which delay their self destruction. Other synthetic polymers have proven to be vulnerable to ultraviolet light and oxidation. An example of the exposure of polyethylene to ultraviolet was detailed in Paul Messier's article on the degradation of early resin coated prints in *PFM* October 99.

Polymers which are modified with plasticizers tend to release them. In extreme cases, oily droplets may appear on the surface of the plastic. Vinyl polymers are frequently softened with significant quantities of plasticizers and some contain chlorine, another hazardous component that can cause problems as it leaves the plastic. Even stable polymers, such as acrylics, may have a variety of additives used to modify them when they are made into the emulsions we use as paints.

Beyond the plasticizers needed to make the polymer flexible, polymers may contain emulsifiers and biological inhibitors to discourage the growth of mold. Those materials which show the greatest stability, such as polyester and the polymers used to make non-stick cooking surfaces, can be difficult to use in fabricating housings since they interact so little with other materials.

Synthetic polymers were not the only materials which were introduced to the public as industrialization progressed. Aluminum had been a relatively precious metal because it was difficult to extract until electrical separation processes made it inexpensive. Titanium, too, was unfamiliar to our ancestors, but it can be commonly found today in its dioxide form as a white pigment used by artists. These newer materials may not be at all harmful, but since we have less experience with their behavior over hundreds of years, we must watch their performance.

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Lead carbonate, which has been used to make white for centuries, will turn black in the presence of hydrogen sulfide. This means that if it were used as a water-based paint, it could be disastrously affected by pollution. This fact has been known since the Renaissance but that knowledge did not prevent the execution of works of art in which lead white water-based paint was employed. We struggle to maintain these works today. If we keep careful tabs on the newer materials as they become available, we can advise artists and preservation framers as to the pitfalls we may observe.

Indeed, today we are fortunate to have a constantly increasing supply of products made of safe and stable materials. Conservation-quality boards made of cotton or alpha cellulose fibers can be found in a vast array of colors so that works on paper can be given proper physical and aesthetic settings. Backing boards made of stable polymers and papers can further isolate the material from harm. Buffering and scavenging materials, such as calcium carbonate, active carbon, zeolites, and particulate copper in a polymer matrix, can be used to provide a chemical defense against pollution. Metal foils and glass can be employed as vapor barriers when inimical climatic conditions may be encountered or to isolate the material being framed from wood or other chemically hazardous materials.

The simple enumeration of the products available today illustrates the sometimes bewildering range of choices with which a framer may be faced. It is here that it is sometimes worth remembering that delicate materials have been successfully preserved for the last thousand years. The materials and conditions which fostered their preservation can guide our thinking as we design the housings to protect the unique and valuable items which come under our care. ■