Preservation Practices

by Hugh Phibbs

Preservation Problem Solving: Know Your Paper

Having a thorough knowledge of materials is critical to solving problems in preservation. This means knowing which materials are available, what each comprises, and what roles each of them can play. Advertising, professional education, discussions with other framers, and discussions on the Internet can all keep framers abreast of what the market has to offer.

The market for preservation framing materials should be seen as going beyond traditional framing wholesalers; it should extend to preservation suppliers and manufacturers of food and medical grade materials that can be adapted for use in framing. In evaluating materials, one can learn a great deal about them if they are thoroughly described by their vendors.

A well-written description will tell a good deal about the chemistry of the product and how the components have been processed. Conversely, a description of a product as being "archival" or "acid-free" is not specific enough. Any material that has a neutral pH when it is made can be described as "acid-free." However, papers that contain lignin and some sizing materials or plastics that have been modified with acids may change as they age and become acidic.

What should one look for in the materials used to make framing products? Plant-derived materials are primarily made of cellulose; a polymer made of sugar molecules and pure cellulose is critically useful since it does not donate anything to the materials around it. Lignin is an adhesive component, present in almost all plants, and can donate peroxides to materials near it and should be removed from conservation-quality boards and papers. Cotton has the advantage of being virtually lignin-free, while other fibers must have their lignin removed. Getting all the lignin out is quite difficult, and the test for residual lignin has a margin of error so that it can not detect miniscule amounts. In practice, papers that have had all but a trace of lignin in their fibers removed have performed well and should be considered safe to use in preservation.

Most fibers are bleached in the paper making process. Ideally, the bleaching process would not include chlorine, since that element can be difficult to remove and forms many compounds, some of which are harmful. Consequently, conservators often recommend the use of unbleached cotton as a thread or cloth. Fortunately, the presence of residual chlorine has not been an issue that has affected high quality papers and boards.

When paper is made, there are a wide variety of materials that are added to the fibers: fillers, sizings, pigments, dyes, optical brighteners, and, in the case of laminates, adhesives. One of the most common fillers is kaolin, a fine, white clay that is also used in making porcelain. If one looks at old clay-coated magazine stock and compares it to newsprint of the same age, it becomes apparent that this material does nothing to harm the paper fibers.

Other fillers may not be as benign. Starch and animal glues are often used to size good quality boards and papers. Although the glue sizing in watercolor paper may cause some color change in time, it seems sizing tends to protect the fibers from degradation by pollution without causing harm. Alum rosin has also been used as a sizing in paper making and has been a major source of destructive acid.

Most pigments are chemically stable and must be considered in light of their possible physical contamination of materials with which they come in contact. This is most true of the color black. Dyes are less light stable and are becoming rarer in conservation-quality boards and papers.

Optical brighteners fluoresce in ultraviolet light and make whites look whiter. Their presence in paper is only an issue when enough moisture is present so that they might be transported from one paper to another. This should only be the case when hinging is being done, and so, hinge and blotter papers should be free of optical brighteners. The handmade Japanese paper, or washi, used in hinging is never meant to look so white that such brighteners might be added.

The final element on our list is the adhesive that is used to laminate papers in board making. In the past, adhesives such as sodium silicate and starch were commonly used. Today, most lamination is done with polyvinyl acetate. This plastic is acid modified and can become acidic over time. Fortunately, most conservation-quality boards have calcium carbonate added which can neutralize and acid that the PVA might donate.

This list of paper additives is quite incomplete and since a wide variety of things can be used in the paper making process, the best way to know whether a paper is safe is to test it. Testing for pH can be easily done with testing pens. Acid detecting strips can be used to check for the presence of acetic acid.

A much more elaborate test, the Photo Activity Test or P.A.T., assays the paper or board for the possibility that it might discolor photographic materials. The Oddy test shows whether a material will give off anything that can cause change in sensitive metals: copper, lead, and silver. Both of these tests are quite exacting and papers and boards that have passed these tests can be used with complete confidence.

Last month we have seen how papers can be used various ways to support objects and works on paper and on board. They can also serve as buffers, filters, and scavengers.

Paper has the ability to absorb and desorb moisture and can buffer the environment of a sealed enclosure. As the temperature rises, the paper will give off moisture to the air. As the temperature falls, the paper will take moisture from the air and the relative humidity will remain stable. Silica gel can do this more effectively but its significant expense makes it hard to justify in most framing applications.

Paper can also take up some pollutants. The presence of calcium carbonate enhances the paper's capacity to handle acids. When zeolites are added, the paper or board can also absorb oxidizing gases and can serve as a filter, since it will still allow water vapor and other atmospheric gases to pass through. The calcium carbonate and zeolites can take up pollutants permanently, and thus, they can function as scavengers for pollution that might come from an unstable component of the material being framed.

The one function that paper cannot perform is that of the barrier. Only glass and metal can form effective barriers.

Vegetable derived materials, starch, papers, and boards are far and away the most useful components in preservation. As we said last month, their wide variety allows for engineering supports to meet the needs of disparate objects. They can be bonded with many adhesives, including non-reactive starch. Their expansion and contraction in response to changes in relative humidity can be used to make edge supports loosen and grow more taut in accordance with the needs of the object. And as we have just seen, they can be used as buffers, filters, and scavengers.

Next month, we will examine animal, mineral, and synthetic materials in terms of their attributes and uses. ■