

Preservation Practices



by Hugh Phibbs

Preservation Problem Solving: Anticipating Challenges

Having considered the chemical and physical attributes of the materials that are used to make preservation frames and housings, it is worthwhile to examine what we may expect from elements in the environment that may pose challenges.

Preservation requires successful anticipation. Fire, flood, hostile climates, and biological hazards must all be considered. The expectation that a frame or storage housing can survive long if exposed to fire is unrealistically high. A more realistic expectation is that it be able to withstand the heat of a fire in its vicinity. One of the most salient facts about fire is the profound rate at which the heat it produces rises. In a room with an unchecked fire, an enormous amount of heat accumulates within the first minute near the ceiling. Given their usual placement on the wall, picture frames can be expected to be exposed to most of this heat.

Fortunately, both of the materials commonly used for glazing in frames—glass and acrylic sheet—can give considerable protection. Glass will eventually transmit heat and can, therefore, contribute to the scorching of the frame's contents; however at those temperatures the frame itself may begin to ignite. Another hazard associated with glass is the thermal shock (and possible breakage during that shock) which hot glass may

suffer if water from a fire hose hits it.

Acrylic sheet has a tendency to bend toward heat, which is fortunate. This can result in the sheet “blistering” away from the contents of the frame as heat accumulates. It will eventually ignite, but it should be less likely than glass to pass heat on to the inside of the frame before it does. If it has not burned, it should survive a dousing from a fire hose without fracturing.

As profoundly as the heat from fire rises, fluids move by wicking. This is true of molten wax of a candle, oil in a lamp, or moisture in paper. Combustion or evaporation will draw the fluid to the area in which the reaction and loss of fluid mass is taking place. Indeed, in a drop of moisture on the surface of a glass, the drying occurs at the margins of the drop where it meets the glass, and a ring of soap accumulates there. This accounts for the familiar soap spots found in dishwashers. Tide lines seen in paper that has been locally wetted result from the build-up of oxidized products in paper that have been left at the margin of the wet area as the drying took place there. Initially these materials are only visible in ultraviolet light, but over time they change and can be seen in normal light.

Wicking can be observed in the passage of vapors through porous solids as well as in fluids. Thus, the end grain

of wood is many times more likely to give off acids and peroxides than side grain is. The edge of a wood pulp paper matboard that has not been purified is also a much greater donor of such gases than the flat surfaces of that same board.

The accumulation of moisture in various materials can have profound effects on the materials' shape. If one side of a piece of paper, wood, or acrylic sheet is wetter than the other, the materials will expand on its damp side. Stretched and dried animal skins are even more dramatically affected by the addition of moisture. The most constant medium of moisture exchange is the atmosphere.

As air cools, its ability to hold water vapor decreases and ultimately moisture will condense out of it. As air warms, it can hold more water vapor and moisture will evaporate into it. These facts must be remembered when the environmental conditions in the frame are being considered; whether the frame is highly sealed or open to the air, the relative humidity inside the frame will be

affected by temperature and absolute moisture content.

The uptake and emission of moisture is also characteristic of wood, paper, fabric, and silica gel. When a sealed frame package is cooled or heated, these materials can buffer the relative humidity of the air in the package. During cooling, the buffering material will take up moisture that comes out of the air. During warming, the buffer will donate moisture to the air, maintaining the initial relative humidity. Knowing that wood is a more effective buffer than paper and that silica gel is even more effective allows the preservation framer to create sealed packages with a confidence that the buffer can properly condition the air within.

None of the materials mentioned previously are "alive" and so any description of their "behaviors" is metaphoric. However, some hazards are live and their behaviors must be kept in mind. Invertebrates such as the larvae of beetles and moths, silverfish, and termites can do incalculable damage to works of art and

artifacts. In some cases they can eat through plastics. They avoid light and seek out protein. Their eggs can survive prolonged periods of cold but they can be killed if they are kept for two weeks in an atmosphere which has very little oxygen. Metal/plastic sealing foils that are used to make climate-resistant frame packages can also help with pest control.

Molds and mildews also do best in the dark. They prefer still air and levels of humidity above 70 percent at 70° Fahrenheit. Their root-like structures, called hyphae, can penetrate paper and weaken it. Their fruiting bodies release conidia (sometimes referred to as spores) that disperse quite readily. Their dispersal is a concern, not only in terms of pollution of other materials, but also because some molds can be extremely harmful to human health.

Mindful of the history, materials, and circumstances of preservation framing, how can successful techniques be adapted to solve new problems? This is the issue we will address in next month's column. ■