

BUFFERING RELATIVE HUMIDITY WITHIN A TEMPERATURE GRADIENT

Several of my articles make much of the danger of wrapping art in absorbent materials as an aid to stabilizing the RH during transport. I have also warned about the disruptive activities of absorbent materials in pictures exposed to a temperature gradient.

The heart of the problem is easily presented: absorbent materials tend to maintain a constant RH at their surfaces, over a wide temperature range. If the art, or movable cultural heritage as it is now called, is at a different temperature it sees a different RH, because the water vapour content of the air will be the same as at the surface of the 'buffer', but the temperature is different, so the RH must be different. If this is a mystery to you, I suggest a refreshing glance at the definition of relative humidity.

If the absorbent materials in the container are an essential part of the art, rather than merely a prophylactic addition by the packing conservator, one has to consider how best to prepare the container for transport through a changing temperature.

The solution is to fill the space where the temperature gradient will arise, with porous, absorbent material that is also reasonably thermally insulating, such as crinkled paper. The water vapour that would otherwise fly through space from the warm absorbent material to condense on, or be absorbed by, a nearby cool surface will be slowed by the complicated diffusion path through the fibrous structure of the insulation. At each layer some water vapour will be absorbed, because each layer is slightly cooler than the previous one. The result is a considerable delay in the onset of condensation on the container, and a slower dehydration of the object. The reverse cycle, when the container warms up and water drifts back towards the object, is also slowed.

Source: <http://www.conservationphysics.org/coolfilm/coolfilm1.php>