

USING A-D STRIPS TO COMPARE SHELVING FURNITURE



INTRODUCTION

Volatile acids contribute to the corrosion of metals, weakening of paper, and efflorescence on calcareous materials (materials mostly or partly composed of calcium carbonate, such as limestone, chalk, many marine shells, etc.). One source of acids commonly found in collections storage areas is wood and wood composite shelving. There are several mitigation techniques available including lining, sealing, and replacing the shelves. Ideally, mitigating the potential effects of all wood shelves would be addressed immediately, but this is often not feasible for small and medium institutions.

In institutions with mixed shelving and limited resources, it is important to prioritize mitigation activities so that the most harmful shelves can be addressed first. The acidity and amount of vapors volatilized from wood and wood composite products depends on the type of wood, the cut, adhesives and other compounds used in production, and the age of the shelves. If this information is not available to the collection steward, it is difficult to determine which shelves pose the largest and most immediate threat to collections. This 24-hour test using A-D Strips can help inform prioritization in such situations.

The [Image Permanence Institute](#) (IPI) developed A-D Strips to evaluate the deterioration of acetate film. The blue dye-coated paper strips are placed inside a film can for 24 hours. The dye is sensitive to acidic vapors and changes color in their presence. IPI warns against relying on A-D Strips for anything other than their intended purpose, but A-D Strips have been repurposed for other environmental monitoring. In this application, A-D Strips are used to compare offgassing of shelving materials.

METHOD

The test requires A-D Strips, plastic cups such as polystyrene (PS) or polyethylene (PETE), polyethylene terephthalate film (Mylar or Melinex), and disposable gloves such as nitrile.

Cut two pieces of Mylar so that one piece is slightly larger than an A-D Strip and the other piece is slightly larger than the cup opening. Place both on the shelf or other surface being tested with an A-D Strip on top (Fig. 1). A-D Strips should be handled with gloves.

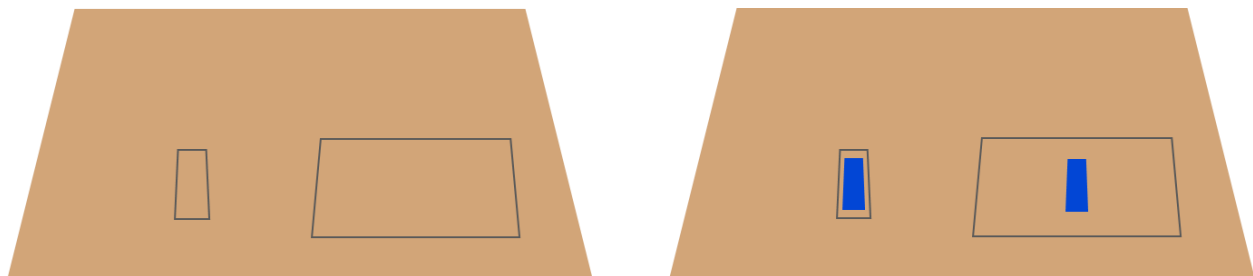


Figure 1. From left to right: A) Two Mylar pieces placed on the test surface; B) A-D Strips placed on Mylar.

Cover each A-D Strip with an upside down plastic cup, ensuring that the cup on the larger piece of Mylar is not touching the shelf (Fig. 2).

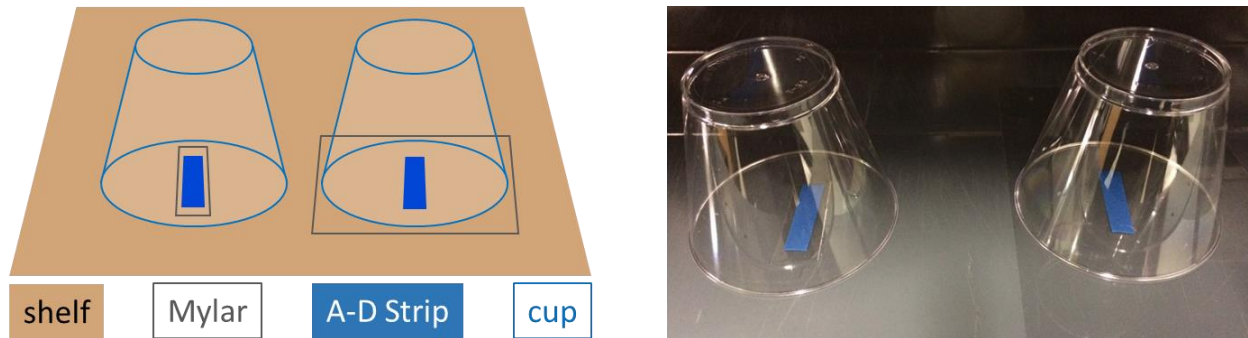


Figure 2. Diagram and photograph of the experimental set-up. In each image, the exposed A-D Strip is on the left and the masked A-D Strip is on the right.

A-D Strips are light sensitive, so the experiment is ideally conducted in the dark. Alternatives include covering the cups with an opaque material, using opaque cups, or permitting light exposure but ensuring every Strip is exposed equally using a light meter.

Repeat the arrangement for all the materials to be tested. Duplicate sets are recommended to reduce the occurrence of outlying results. For example, each shelf being tested might have two or three pairs of A-D Strips. Very different results between duplicate sets could indicate inconsistencies in the set-up or defects in the materials being used. Cups should all be the same dimensions, composition, and manufacture.

After 24 hours, compare the exposed and masked A-D Strips. The pair with the greatest color difference corresponds with the greatest source of acidic vapor (Fig. 3).

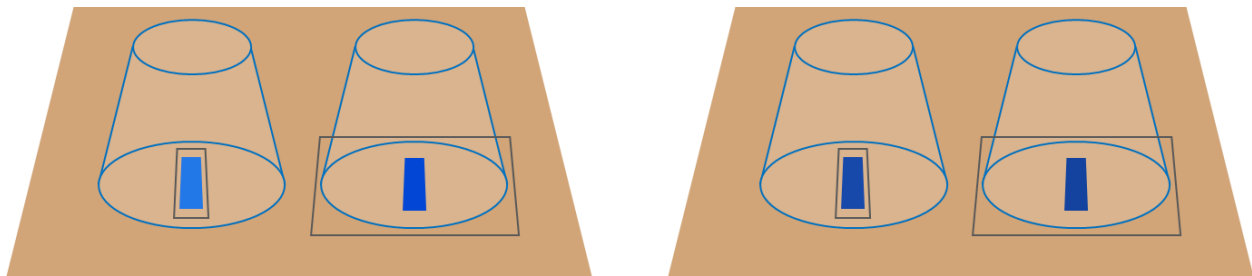


Figure 3. Illustration of example results based on actual comparison of plywood (left) and metal (right). The shelves were of unknown age and manufacture. The plywood shelf was deemed a source of acidic vapor; the metal shelf was deemed a non-source. Results are not representative of all plywood and metal.

This test is subjective and qualitative. A-D Strips come with a color scale, but this was developed by IPI for acetic acid only. Wood products can offgas a mix of acids including acetic and formic acids, so the color scale should not be relied upon for this test. It may be possible to quantify results using a spectrophotometer (color meter).

For more information and to purchase A-D Strips, please visit the IPI website: <https://www.imagepermanenceinstitute.org/imaging/ad-strips>.