



## Museum Textile Services

### Safe Fumigation of Textiles Affected by Mold & Mildew

Museum and household textiles are all susceptible to damage from mold & mildew. This handout will address how to identify an outbreak, to treat a textile to remove and kill mold & mildew, and to prevent the problem from spreading to the rest of your collection.

- Mold & mildew are two forms of fungal growth commonly found in household and museum environments. Mildew is usually grey or white, whereas mold can range in color from black to red to blue. Mold & mildew often leave permanent stains on paper and fabrics but may be removable from hard surfaces. Like all fungi, mold & mildew reproduce by means of spores, which are tiny particles that are everywhere around us.
- Mold & mildew require high levels of moisture and favor areas with low air circulation, such as attics, basements, backs of closets, and enclosed containers. Mold & mildew outbreaks are also very common following disaster events, such as hurricanes, floods, and fires. You may know you have an outbreak because you see a spotty pattern, which is sometimes fuzzy, or you smell a distinctive musty odor.
- Specific conditions cause mold & mildew to bloom. In 90% relative humidity (RH) and 90°F, it only takes three days for mold & mildew spores to flourish and bloom. As the humidity and temperature decrease, the time it takes for mold & mildew to bloom increases, so at 80% RH and 80°F, it takes three weeks. At 70% RH and 70°F, it may take up to three months for an outbreak to be apparent. Many mold & mildew problems become apparent in collections in late summer after moderate moisture levels and stagnant air have gone unnoticed for several weeks. Mitigating the conditions that encourage mold & mildew growth are as important as removing the mold & mildew bloom from your items for preventing future outbreaks.
- If you believe you have a mold or mildew outbreak, do not use alcohol or bleach on your textiles because they can cause irreparable damage. Allow wet items to completely dry in an area of good air flow, such as a garage. You can vacuum minor mold/mildew residue from dry textiles with a



Multicolored mold growing on textiles in a plastic suitcase stored in a wet basement.



Severe mold outbreak on a wool uniform.

high-efficiency vacuum only if you are certain you can do so without causing damage (see [Vacuuming Textiles](#).) Vacuum in an area with good ventilation, preferably outside, to prevent spreading or inhaling the mold & mildew spores. Thoroughly clean and air out the affected area, and do not store items there again unless you improve the environmental conditions that led to mold & mildew.

- An alternative to bringing your items to a conservator is to treat your objects in a home-made fumigation chamber made of commonly available products. The chemical chlorine dioxide is sold in marine stores and online, and when used carefully, will kill mold spores and inhibit future outbreaks. We prefer the Star Brite® Mold/Mildew Odor Control Fast Release System, which costs about \$15. The directions are easy to follow and treatment is quick.



Placing textiles into the fumigation chamber.

- First choose a safe place to fumigate, such as a garage, a trailer, or a barn (a cold location is preferable to a hot location.) You do not want to breathe the vapors before, during, or after fumigation. Choose a box for your chamber that is large enough to hold your items, leaving at least a foot of head space. Place the box on a large sheet of 4-mil or thicker plastic, with enough plastic to completely encase the box. Stack the affected objects carefully in the box. Follow the directions on the Star Brite® package, moistening the sponge and returning it to the plastic container before unwrapping and positioning the white chemical packet in the slot on the sponge.

- Place the release system in the box at least a foot away from your textiles. We often tape the plastic container to the inside top of the box, or to a separate piece of board draped over the box. Wrap the box with the plastic sheet and tape all edges to seal well. The directions say to fumigate for 4-6 hours but no longer than 24 hours. We generally fumigate during the work day and then leave the chamber open over night to air out before handling the textiles. When you remove the Star Brite® package from the chamber, immediately discard it in a sealed container, preferably outside.



Allowing the chamber to air out in a safe place after fumigation.

- Once the mold & mildew is no longer active, you can safely vacuum the residue left behind by a moderate to severe outbreak. Gloves and facemasks should be worn when handling or vacuuming objects with a moderate or severe mold & mildew issue. Dispose of the vacuum bag after cleaning up, and wipe down or wash out the vacuum attachment and tubes. If you are unsure what to do or your mold & mildew are moderate to severe, contact a conservator for assistance.
- After mold & mildew have been removed from your textiles and storage areas, monitor the temperature and relative humidity using a household thermostat with humidity sensor. Proper air conditioning, dehumidification and ventilation are often sufficient to control mold & mildew.