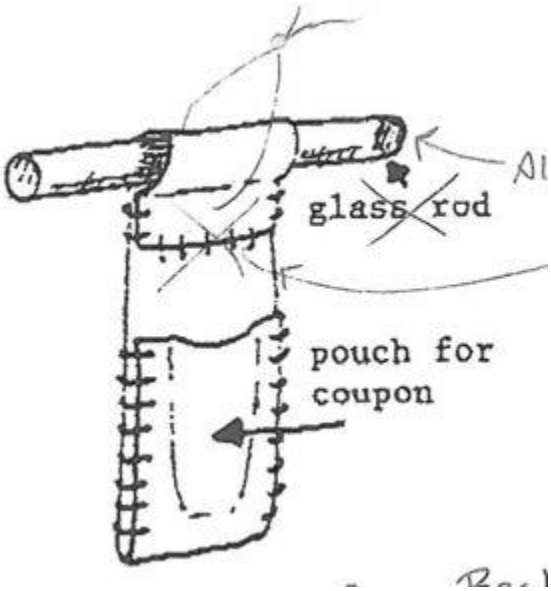
Cleveland Museum of Art (CMA) Protocol

Test Method Description:
Testing methods were adapted from the Philadelphia Museum of Art. For all testing, the oven is set to 35 degrees Celsius. Samples are prepared with clean tools to avoid contamination. Nitrile gloves are worn during sample and coupon preparation and changed between polishing compounds. Information is recorded and collected on spreadsheet and since 2012, photos are taken of the coupons after the test is finished.
Starting in 2014, the sodium azide test has been used to eliminate fabrics prior to Oddy Testing.

Sample and Beaker Preparation



1. If tested material is fabric, wash in two rinses of cold tap water to duplicate industrial washing process of fabrics used in exhibition cases.
2. Prepare one 1000 mL Pyrex beaker and one 16 oz Pyrex jar for each material tested plus an additional beaker and jar for the batch control. Rinse each piece of glassware with deionized water followed by wiping with acetone on cotton pads. Cover with aluminum foil until needed.
3. For each fabric tested, sew five cloth bags.
4. Roll a sheet of aluminum lengthwise to form a 1/4 inch rod and place over top of beaker, crimping edges to secure. Repeat for each piece of glassware used in testing.
5. Fabric bags can be tied to the aluminum rods with Nylon monofilament or cotton thread used for making bags. Other types of materials tested can be balanced on an upside down jar or beaker placed in the bottom of the outer beaker. Tested materials do not touch the water. If fabric gets wet due to excessive condensation they are redone.
6. Cover each beaker with two pieces of aluminum foil and crimp loosely. Inscribe the associated sample number into the aluminum foil with a bamboo skewer.

Note: Coupon preparation is done on a clean, disposable work surface to prevent contamination. Scissors or scalpel are cleaned between cutting each type of metal. Individual coupons are cut after polishing is complete.

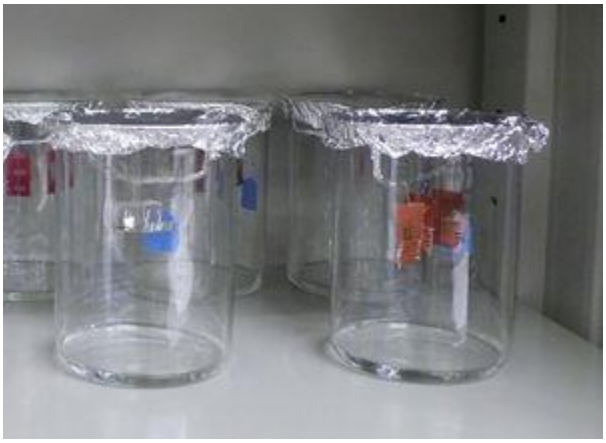
Preparing Silver (Ag) and Copper (Cu) Coupons

1. Fill ultrasonic cleaner with deionized water and turn on for five minutes to allow degassing.
2. Calculate total size of metal foil needed for testing: two 1 x 0.25 inch coupons of Cu and Ag are required for each material tested. One for "accelerated" test container in the oven and one for "ambient" test container at room temperature.
(2)(0.25) x (# of tests + 1 control) = total size of foil in inches
3. Degrease each foil sheet by swabbing or soaking for one minute in naphtha, then ethanol, and finally acetone.
4. Wearing clean gloves, rinse three times in acetone and dry with clean cotton pad or kimwipe.
5. Coupons are not reused, so do not require corrosion removal or much polishing.
6. Polish foils with 1 µm alumina and rinse with deionized water. Examine under microscope to check for corrosion. Repeat until surface is clean.
7. Immerse metal foil in ultrasonic cleaner for 23-30 seconds.
8. Rinse with acetone and air dry. Examine under microscope to check for polish residue. Repeat rinsing until clean.
9. Cut foil into individual coupons with clean scissors.

Preparing Lead (Pb) Coupons

1. Calculate total size of metal foil needed for testing: one 1 x 0.25 inch coupons of Pb is required for each material tested.
(0.25) x (# of tests + 1 control) = total size of foil in inches.
2. Degrease foil by swabbing or soaking for one minute in acetone and xylene.
3. Wearing clean gloves, rinse three times in acetone and dry with clean cotton pad or kimwipe.
4. Coupons are not reused, so do not require corrosion removal or much polishing. Remove corrosion or surface discoloration with smallest grit size of abrasive paper that works efficiently (220 or 600). Examine under microscope to check for corrosion. Repeat until surface is clean.
5. Rinse three times in acetone and rub dry. The metal may darken slightly at this point.
6. Examine under microscope to check for polish residue. Repeat rinsing until clean.
7. Cut foil into individual coupons with clean scissors.

Completing the Setup



1. Each accelerated test jar receives one silver and one copper coupon. Each ambient test jar receives one silver, one copper and one lead coupon. Use clean plastic tweezers to place coupons in appropriate fabric bags or on top of sample material. The goal is to have each coupon half in contact with the sample and half not in contact with anything. Coupons can be bent if necessary. The control coupons are usually pierced and tied to the aluminum rod with monofilament or cotton thread. Replace aluminum lids on jars.
2. **Accelerated test beakers:** Pour 50 mL deionized water into bottom of 1000 mL beakers. Cover with 2 layers of aluminum foil and place in the oven.

Ambient test jars: Pour 25 mL deionized water in bottom of each 16 oz jar. Cover with aluminum foil so 1 inch of the side is covered and cut off excess. Wrap Teflon tape around edge of foil to create air seal. Store at 21 degrees C.
3. Check coupons for corrosion under the microscope after 28 days and compared to the control coupons. Coupons may be checked earlier to eliminate non-usable fabrics.

Time Period Method Used: 2009-current