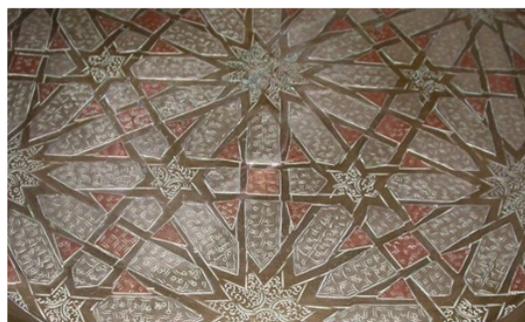


About Brass & Bronze



Objects composed of brass or bronze are commonly found in the home, in the form of vessels, plates, plaques, weapons, and ornaments. Both brass and bronze are known as “copper alloys” because they are both made of copper which has been alloyed with other metals to achieve different working or visual properties. Brass is composed of copper alloyed primarily with zinc, while bronze is composed of copper alloyed with tin. As they age, the alloying constituents and manufacturing processes affect the way these materials deteriorate. Objects that have been damaged, mishandled, or cor-

roded do not accurately reflect the appearance originally intended by the artist. The care procedures described in this handout are for historic and decorative arts objects that have been determined to be stable. They are not appropriate for ethnographic or archaeological materials.



Handling

Inside this issue:

Handling	1
Cleaning	3
Waxing	5
Storage and Display	6
Consulting a Conservator	7
Additional Resources	7

Because copper and its alloys are so reactive, contact with the salts, oils, and acids on human skin can lead to etched and/or corroded surfaces. To prevent continued damage, wear cotton, latex, or nitrile gloves when handling artifacts made from these materials. Remove all jewelry that could scratch the object while you are handling it. Make sure that you have a clean, dry place to examine the object before you move it.

Always support the object with two hands while handling. Avoid holding it by an appendage such as a handle.





Examine the structure carefully, looking for cracks, weak areas, old repairs, and loose or missing parts. Once you have thoroughly examined the structural condition, consider the surface of the object and whether it is safe for you to clean yourself.

When examining the surface it is important to determine what, if anything, is on the surface. Intentionally applied organic coatings, such as paint or shellac, were often applied to enhance an object's appearance and provide protection from corrosion.

Decorative paint is easy to detect on the surface, but transparent organic coatings, like shellac, are sometimes hard to see. If the coating is peeling or lifting from the surface, it may be visible with a bright light and a strong magnifying glass. Transparent coatings were employed both to prevent surface oxidation and to provide a golden appearance. Removal of original paint or a transparent coating would permanently diminish the object.

Patina



Another important type of decorative and protective surface often applied to copper alloy objects is patina. A patina is a thin, chemically-induced layer of relatively stable corrosion on the surface of an object. While patinas can form naturally over time, they are often intentionally created as a part of the finishing process. Patinas can be

created in a number of colors, but shades of brown, gray, black, or blue/green are predominant. Patinated surfaces are sometimes enhanced and further protected with a thin coat of clear or pigmented wax. It is important to avoid removing an intentionally applied patina.

Corrosion Products

Sometimes copper alloy objects are disfigured with spotty, uneven, or blotchy blue/green corrosion products. These corrosion products cannot be easily reduced or removed in a museum, historic house, or home setting. If your object has this problem, or if you are uncertain about its appearance or features, consult a conservator for guidance on proper care.



Cleaning

If the artifact is structurally sound, it has no evidence of original organic (such as shellac or paint) or inorganic surface coatings (such as a patina or plating), and has only minor superficial soil and/or tarnish, proceed with caution. Materials and techniques used should be extremely gentle to avoid causing unnecessary deterioration.

Avoid the use of commercial polishes, since many contain corrosive chemicals such as ammonia or harsh abrasives that can permanently damage delicate surfaces. They often also contain corrosion inhibitors that, while useful on household items that are currently in use, can cause unusual or tenacious re-corrosion in a display setting. Instructions using

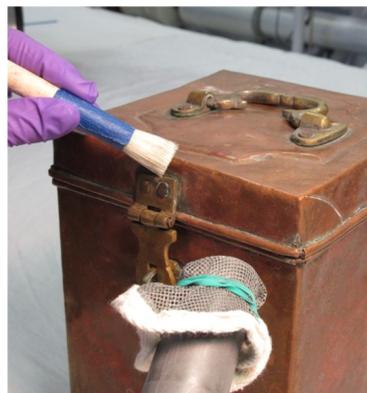
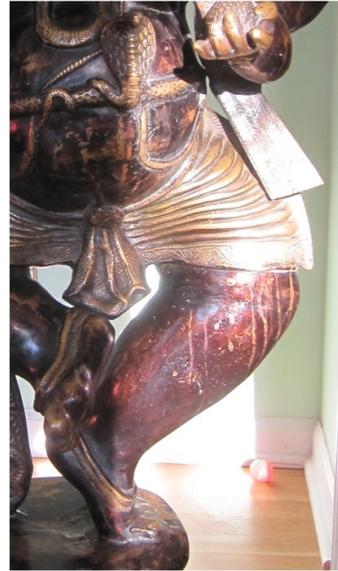
Cleaning Procedure

Prepare a clean, well-ventilated work area for the cleaning process including adequate light and sufficient ventilation to remove solvent vapors. A clean towel covered by a clean white sheet can be used to create a padded work surface on your table. Wear protective nitrile gloves to avoid contaminating both the object and your hands. Wear a clean cotton smock or apron to protect your clothing. To the extent possible, disassemble the artifact. Take digital images and notes to be certain that parts can be reassembled correctly.

ingredients such as vinegar, baking soda, and lemon juice should be avoided, as these

substances can damage copper alloy surfaces. The materials and techniques listed below have been tested by conservators and found to be safe and effective when used with care.

Use thin sheets of clear polyethylene plastic sheet to mask out any nonmetallic elements such as wooden handles to protect them during cleaning.



Materials to Have on Hand

- Clean towels and clean white sheets to create a padded workplace.
- Cotton swabs or pads, as needed
- Gloves: nitrile (these gloves offer the best protection when working with mineral spirits and wax. Latex gloves do not offer adequate protection.)
- Mild detergent such as clear, unscented, dishwashing liquid
- Distilled water (1 gallon – half of this should be reserved for rinsing)
- Large container for dilute detergent solution (such as a 5 gallon bucket)
- Soft, clean, natural bristle brushes, such as haké, watch, or paint brushes
- Apron or smock to protect clothing
- Mineral spirits (if needed)
- Clear microcrystalline paste wax, such as Renaissance® wax, or a clear paste wax such as Behlens® paste wax.
- Clean natural bristle stencil brushes, or shoe buffing brushes, for waxing and buffing
- Polyethylene plastic sheet

Remove any loose dirt or dust by dusting lightly with a soft brush. Haké brushes are good choices for dusting because they are made entirely of wood or bamboo. If a soft artist's brush is used, cover the metal ferrule with tape to avoid scratching the artifact. Do not use dusting cloths as they will not reach into small crevices, and can scratch objects if trapped grit is rubbed over surfaces. Be careful not to scratch the surface of your object.

Small copper alloy objects sometimes have iron wires rolled into the rims or edges to increase their structural rigidity. Do not wet these areas with water under any circumstance. Do not allow liquids to penetrate hollow handles or other hollow parts that are difficult to rinse or dry. Never immerse the object in a bath of water.

Old polish residues trapped in recessed areas are a common problem found when cleaning historic copper alloy objects. Many commercial polishes contain waxy components that cause the abrasives to stick to the surface. These can usually be removed by applying a few drops of dilute detergent solution (made by mixing a squirt - approximately a teaspoon - of clear, unscented dishwashing liquid in about a half gallon of water) with a soft brush or cotton swabs. A short amount of waiting time may help fa-

ilitate removal. Gently agitate with a soft brush to help loosen embedded material, and then rinse thoroughly with clean cotton swabs dampened in distilled water. Remove any waxy or oily accretions by moistening a cotton pad or a wad of loose cotton with mineral spirits and wiping the surface. If wax is trapped in candle cups or depressions, saturate a small wad of cotton with mineral spirits and place it on the wax for a short period to soften. Once the wax is soft, push it off with the blunt end of a bamboo skewer and remove any residue with cotton dampened with clean mineral spirits. Avoid scratching the surface with old polish and accumulated grime by using the lightest functional working pressure. Change swabs often to reduce risk and use a rolling rather than rubbing motion. Make sure your work space is well-ventilated if you use mineral spirits.



In many cases, the cleaning actions listed above will be enough to remove light tarnish and fingerprints from the

surface. Because many copper alloy objects are not meant to be bright and shiny, it is best to avoid polishing them. Wipe the object gently with pieces of clean flannel or loose cotton, changing them frequently to prevent surface abrasion. Allow the object to dry completely in a warm, dust free environment.



WARNING: When working with solvents, always follow all recommended safety precautions noted on the containers. Mineral spirits are flammable and their fumes can be harmful to your health if not used with care. Nitrile gloves should be used during the cleaning and waxing procedures, as they offer protection from mineral spirits and the solvents present in the wax mixture. **Always be aware of the location of the nearest fire extinguisher when working with flammable solvents and waxes.**

Waxing

To protect the object from water and airborne pollutants, apply a small amount of microcrystalline paste wax to a soft, clean, dry cloth or very soft brush and rub it over the entire surface of the object, being careful to get complete coverage. Do not apply too much wax; only a small amount is needed. Wait a moment and buff the wax out with clean pieces of old silk, clean old nylon stockings, or soft brushes. Wax has a flat plate-like structure and buffing helps align and compress the plates for a more complete and protective coating. If you accidentally leave unbuffered wax on the surface too long, apply a small amount of fresh wax to soften the dried wax and buff immediately.

To maintain the wax coating, periodically dust the object with a soft natural bristle brush and check for evi-

dence of discoloration. The wax should provide good protection for at least a year, if the object is kept in stable environmental conditions. If the item must be handled, wear clean cotton or nitrile gloves. For objects on permanent display, consider having a conservator professionally clean the object and apply a stable organic resin coating. This durable and protective coating can provide up to twenty years of protection and minimizes the wear and tear associated with repeated handling and dusting



Storage and Display



For maximum protection, keep metal objects indoors, in a space other than a garage or damp basement. Store them at least four inches above the floor to prevent water damage from floods or leaks. If possible, house the objects in a closed container to prevent dust accumulation, which can attract moisture to the object's surface, resulting in corrosion. Closed storage also minimizes the object's exposure to atmospheric pollutants and changes in relative humidity. Polyethylene or polypropylene storage tubs are readily available and can be identified by the "PE" or "PP" imprint found on their underside. Another storage option is boxes composed of acid-free, lignin free board.

Environmental Conditions

Copper alloy objects are best preserved by keeping them in a clean, stable environment, where the temperature is kept below 72°F and the relative humidity is kept between 30 and 50%. Higher humidity levels will result in corrosion on metal surfaces. If there are organic materials such as wood present with the metal, keep the relative humidity above 40% to keep the organic components from drying out.

Avoid using containers or shelving composed of wood, which can off-gas harmful acidic vapors. Materials such as wool, felt, and rubber, should not be stored with the object as they can emit sulfur gases.

Copper alloy objects should be stored so they do not touch other metal objects, or lay directly on a metal shelf. Either of these situations can lead to corrosion. Sheets of acid-free tissue paper, thin polyethylene foam, or clean, undyed cotton can be used as a barrier between metal surfaces or as supportive padding underneath an object.

It is also important to protect objects from overexposure to light, which causes irreversible damage, especially to organic materials and coatings. Exposure can be partially limited by using window shades and applying UV filtering films to windows, and sleeves to fluorescent lights. Remember: light exposure is cumulative and the surest way to protect your object is to keep it out of direct light (both natural and artificial) and limit the amount of time it is on display.

Consulting a Conservator

If your copper alloy object is unstable, damaged, or exhibits original paint, coatings, or applied patina on the surface, it is best to have it looked at by a conservator before trying to clean and wax it yourself. A conservator will be able to assess all the issues relating to its care, and determine an appropriate treatment that does not diminish its value. Conservators can provide basic structural repairs, corrosion reduction, protective coatings, and proper storage materials for objects.

Additional Resources

Canadian Conservation Institute. *Care of Metals*. Retrieved from <http://canada.pch.gc.ca/eng/1453994182990>

American Institute for Conservation of Historic & Artistic Works. *Caring for Your Treasures: Metal Objects*. Retrieved from www.conservation-us.org/docs/default-source/resource-center/paintings.pdf

Conservation Suppliers

Conservation Resources International

5532 Port Royal Road
Springfield, VA 22151
Toll free: (800) 634-6932
www.conservationresources.com
Archival housing/storage supplies, photographic supplies, general

Gaylord Archival

P. O. Box 4901
Syracuse, NY 13221-4901
Toll Free: (800) 448-6160
www.gaylord.com
General conservation supplies, housing supplies

Hollinger Metal Edge, Inc.

6340 Bandini Blvd
Commerce, CA 90040
Toll Free: (800)-862-2228
www.hollingermetaledge.com
Archival housing/storage supplies

Light Impressions

100 Carlson Road
Rochester, NY 14610
Toll Free: (800) 975-6429
www.lightimpressionsdirect.com
Photographic supplies, housing, matting and framing supplies

University Products

517 Main Street
P. O. Box 101
Holyoke, MA 01041
Toll Free: (800) 628-1912
www.universityproducts.com
General conservation supplies, housing and matting supplies

Talas

330 Morgan Ave
Brooklyn, NY 11211
Telephone: (212) 219-0770
www.talasonline.com
Conservation supplies, photographic supplies, general

Gerald R. Ford Conservation Center

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