METALS

Introduction

Almost all metal artifacts are subject to corrosion, which will vary in degree depending on the type of metal and atmospheric conditions. The conservation of metals is a vast and complex subject that could fill many volumes. The purpose of this brief section is to give some basic guidelines for the better care and handling of metal artifacts.

Generally, most metals are best maintained at a relative humidity of about 40%. All work surfaces and storage bins or shelves should be well padded. Atmospheric conditions in urban or factory areas must be carefully monitored to prevent harmful chemicals in the air from damaging artifacts. Many metal artifacts are soft and must be handled with great care to prevent injury by abrasion and denting.

General

When dealing with metal artifacts the following general rules should be followed:

1. Badly damaged metal objects heavily pitted with rust, whether of silver, copper, iron, steel, or bronze, should only be treated by trained conservators. Never should any fierce treatment in the way of abrasion or over-strong solvents or acids be used on antique metals.

2. Never, under any circumstances, use an abrasive, buffing wheel, or wire wheel on a metal artifact.

3. Always be sure that any solvents or cleaning solutions used on metals are washed away thoroughly before any protective coatings are applied. Otherwise, the corrosive action of the chemicals will be sealed into the metals and continue to work. The same rule applies to moisture. Always be sure that the metal object is completely dry before applying any wax or protective coating.

4. Always be sure that the wax or protective coatings are thoroughly wiped so that no stickiness remains. Never put a metal object away if it is sticky, since abrasive dust will tend to cling to its surface and will scratch the article when it is wiped clean.

5. Make it a habit to wipe iron or steel objects with a silicone or wax-treated cloth after working with them or before putting them away to prevent rusting due to finger prints.

Iron and Steel

Iron and steel objects are difficult problems from the point of view of cleaning and protection. They are both readily attacked by rust, and once this rust has a firm hold it can be almost impossible to eradicate it completely.

1. Evaluate the piece carefully. Some objects survive only as iron oxide (rust) and if all the rust is removed, the artifact will completely disappear. A good way to test this is with a magnet. If there is a strong pull, chances are there is a hard core of iron beneath the rust. If an object is composed almost entirely of iron oxide, a trained conservator must be called to preserve it.

2. Once new rust is found on an artifact, it must be removed as soon as possible. If left for any length of time, it will cause pitting and scoring. Once this occurs, little can be done to remedy the defect. Often, restoration is not possible without presenting a surface that is too shiny and bright. A uniform dark finish minimizes the surface defects and immediately marks the object as a relic. The decision concerning restoration of metals should always be made by a trained conservator appointed by the Division for Historic Preservation Collection Care Center,

3. The best way to clean an iron artifact is with a soft brush, dusting the piece lightly. If it is in good condition, a neutral shoe polish or clear wax can be applied **to** prevent oxidation. Be sure the piece is clean and dry before application as dirt and moisture sealed on the sur**face** can do damage.

4. If an iron object shows light rusting, it may be removed with a soft cloth and some dry Bon Ami. After the rust is removed, clean the piece with a clean soft cloth before waxing.

5. Always wipe a piece off after handling and before putting it away. The moisture on hands is very acrid and will rust and pit a piece of metal very rapidly if not removed. This is why it is desirable to wear clean cotton gloves when handling artifacts.

<u>Copper, Bronze, Brass</u>

1. Never use steel wool or a buffing wheel on any copper, bronze, or brass objects. With copper, bronze, and brass, one of the highly valued attractions of age is its patina. This patina, where possible, should be preserved and not buffed away with cleaning powders or rough methods.

2. Bronze and brass objects are subject to “bronze disease.” This is a sudden outbreak of

rapid corrosion in small areas producing rough green spots. It is caused by the presence of chlorides, which react with dampness and oxygen to cause corrosion and metal deterioration. The only treatment for bronze disease is the removal of the chlorides. Since the treatment can involve electro-chemical reduction methods and the use of abrasives, it can only be done by an expert conservator. The ordinary well-known patina of a rather beautiful green-blue is not bronze disease. This patina is a natural coating caused by the action of the air and atmosphere on the surface, which serves to protect and preserve the metal alloy. If the beautiful patina of an ancient bronze is removed, then the value of the piece often melts away with it.

3. Bronze objects, if exposed to the full effects of the weather, will need some protection, particularly on the coast where salt winds can reach them. They can be protected with a thin coating of beeswax and, when not on exhibit, a canvas cover. The unbleached beeswax should be dissolved in turpentine in the top of a double boiler. Extreme caution should be used. When the mixture has cooled to the consistency of butter, it can be applied with a soft cloth or brush. This process should be repeated at intervals. All objects should be cleaned with a weak solution of warm water and soap, thoroughly rinsed and carefully dried before applying the wax coating. Bronze objects should not be lacquered, since part of the beauty of the piece is in its patina.

4. As copper, bronze, and brass are soft, damageable metals they should be cleaned or treated only under the direction of a trained conservator appointed by the Division for Historic Preservation Collection Care Center.

Pewter

1. Pewter, an alloy of tin and a small percentage of copper and antimony, is quite soft and can almost be bent with the fingers. If it becomes dented or abraded, it should be turned over to a conservator/metalsmith for treatment.

2. Old pewter may sometimes have small spot-like growths appearing on the surface. These are probably caused by contamination with salts, or change in the crystalline structure. Don’t try to remove them. If spot removal is attempted the under layers of metal are exposed to the air and active fresh corrosion may take place.

3. A good commercial product for the care of pewter is Noxon. Do not be tempted to over-polish pewter objects. Pewter, like bronze and other metals, acquires a patina with age. Also, if the piece has a pattern engraved or a maker's mark necessary for identification, over-polishing can remove them.

4. Pewter does not require a preservative for display purposes. After an object is carefully polished, it will stay polished for several months before it begins to loose its lustre. It should retain a good appearance even after two years unless there is an unusual amount of dampness or sulphur in the air.

5. For storage, well-padded wooden shelves or cabinets are best. The relative humidity level in the storage area should be kept at about 40%.

6. Pewter should not be cleaned or restored unless such work is done under the supervision of a trained conservator approved by the Division for Historic Preservation C. C. Center.

Lead

1. Lead artifacts are normally coated with a thin film of oxide, which usually grows slowly in pure air, covering the artifact with a dull grey protective patina. When the oxidation occurs in impure air tainted with organic acids, paint fumes, etc., it is irregular in appearance, leaving a powdery white corrosive surface. This is a lead carbonate and if allowed to continue unchecked will cause severe damage to the piece.

2. As lead is an extremely soft substance it must be protected from harsh scrubbing with abrasives or brushes. It must be moved with extreme care to prevent bumping and damaging.

3. If a lead artifact has a stable patina, the only cleaning necessary is washing in a mild soap and warm water solution. Rinse thoroughly and dry carefully. After cleaning, lead may be waxed with a good, pure beeswax.

4. Lead is highly susceptible to attack by organic acids. Lead artifacts stored in oak cupboards are open to severe attacks by tanic acid,which will cause severe corrosion. Lead should be stored in metal cabinets with a constant relative humidity of about 40%.

Gold

Gold is an extremely stable metal that does not oxidize and so presents very few problems. The

greatest problem is that of security. Artifacts of this type are usually small and valuable so they should be kept under close security.

1. Gold artifacts should be studied and worked with on a clean padded surface under a good light. They should be handled with extreme care as they are easily dented and scratched.

2. Gold can be gently cleaned with soap and warm water or dusted with a soft brush. In some cases a small amount of household ammonia may be added to the warm water and soap solution. Any washing solutions should always be rinsed off carefully and thoroughly before the object is dried. This type of washing should not be attempted unless it has been done before under the supervision of a trained conservator appointed by the C. C. Center. Do not attempt to clean gold jewelry with vigorous scrubbing or polishing. In many cases this will loosen the mountings and can cause the stones to fall out. If a valuable piece needs to be cleaned, have a conservator handle the job.

3. Never try to touch up a gold-leafed frame, mirror, or other piece of furniture using a bronze powder either in size or in cellulose lacquer. It is likely to look garish. It is best to leave this type of work in the hands of an expert. When cleaning gilding such as ormolu, great care must be taken because the layer o gilding may have been worn extremely thin with age. If simple polishing with a soft cloth will not suffice, then a weak ammonia solution may be applied with a Q-tip. Great care should always be taken that the ammonia or cleaning solution does not get on the surrounding wood because it will lift off the varnish and polish. This type of cleaning should not be attempted unless it is done under the supervision of a trained conservator appointed by the Collection Care Center.

4. Do not attempt to remove dents. This must be done by a trained conservator appointed by the Division for Historic Preservation C.C. Center.

5. Objects should be stored on well-padded shelves or in cabinets. Jewelry should be stored in velvet-lined trays in cabinets. Gold artifacts in storage should be kept under lock and key to prevent theft.

<u>Silver</u>

Silver artifacts include objects made solely of silver and artifacts that contain silver inlays.

These include jewelry, money, utensils, boxes, cases, etc. The following rules should apply when handling silver:

1. All work surfaces should be clean and well padded. As silver is a soft metal that can be easily scratched or damaged it should be handled with great care.

2. Avoid having silver come into contact with strong industrial fumes, citrus fruits, vinegar, or sulfurous compounds such as eggs, rubber, latex, and casein paints.

3. Display cases should only be painted as a last resort. Many of the modern paints help to promote tarnishing. If a case is painted on the inside, make sure it is done with an old-fashioned, oil-base paint that does not contain casein or rubber latex. Generally, the walls in rooms used for silver display should be painted with an oil-base paint that does not give off any type of sulphur fumes. Cellulose paints can also be used.

4. It is suitable to line cases used for silver display with a specially treated, tarnish-resistant fabric. Be careful when displaying textiles and silver objects in the same display case. Many of the chemicals used for treating textiles can be harmful to silver objects. If there is any doubt, always check with a trained conservator as well as conservation and treatment records.

5. A small piece of gum camphor in a relatively tight display case is effective for retarding oxidation and tarnish. And for those pieces not on display, excellent “tarnish-proof” bags are available.

6. When silver is received, always check for maker’s marks and special defects and note accordingly. If a piece is received in poor condition or is corroded, call in a trained conservator immediately.

7. In city atmosphere, silver objects readily tarnish through the formation of a thin surface of silver sulphide and so require regular cleaning. While tarnish is easily removed with plate powder or rouge cloths, repeated cleaning removes a certain amount of the silver and in time tends to damage the hallmarks and fine engraving or other ornamentation. Repeated cleaning of silver plate will eventually expose the base metal copper. This can necessitate replating. For solid silver, repeated abrasion changes the appearance of the object by exposing the fire-scale that lies dormant under the surface. The fire-scale is

actually a layer of oxidized silver, which was concealed by putting the object into an acid bath, boiling it, and thereby removing the oxidation only from the outermost layer of metal. Cleaning over the years wears through this layer of pure silver and exposes the black scale beneath. The treatment for this requires acid baths and must be done by a qualified expert.

8. Always be sure of what you are trying to clean. There is a method of decorating silver that is called "niello." A design is engraved deeply into the silver and then filled with a lead compound that forms an almost jet-black pattern on the silver ground. The niello method of decoration can sometimes be difficult to see in a heavily tarnished piece of silver. Therefore, if suspicion is aroused as to a certain piece having this type of decoration, extreme care should be used in handling the piece, and a trained conservator called in. With improper handling, niello is easily removed and the value of the object destroyed.

9. Silver plate that has had its copper base exposed can sometimes be replated, but replating is not a good solution. Silver plating that is done today results in a thicker layer of silver, so that the color is not the same, and the areas of decoration become less sharp or in some cases are totally obliterated. Replating invariably reduces the object's value, but if it can be done in a manner closely approximating the object's original appearance, it might be acceptable. This of course must be done by an expert, as must all forms of chemical electrolysis.

10. Never allow a piece of antique silver to be huffed for any reason whatsoever. For most cleaning of antique silver, it is desirable to use as mild a substance as possible. Never use detergents on silver objects. These can cause unsightly staining of the piece.

11. The best solution for the care of silver is to prevent tarnishing from occurring in the first place. This can be done by wrapping cleaned silver in several layers of soft dry tissue paper and covering with an outer layer of paper cloth containing tarnish inhibitors.

12. There are many forms of baths and cleaning methods that have not been mentioned because they require that a trained conservator be in full control.

Silver – Storage

1. The best humidity level is about 40%. The storage area should be kept clean and well

ventilated. Always protect the storage area from strong industrial fumes that may contain sulphur, which is particularly damaging to silver.

2. Silver can be stored in open shelving or closed cabinets. All shelves and drawers should be well padded to protect against scratching. It is always desirable to store individual items in separate wrappers or special “tarnish-proof” bags.

3. Silver objects can be wrapped in several layers of absolutely dry tissue paper and then enclosed in special commercially manufactured papers that have been treated with tarnish resistive materials, Never wrap silver in cheap wood-pulp paper tissues, which might contain a high percentage of sulphite.

4. Never stack silver objects in storage. Never tie spoons together with a rubber band or string.

5. Do not place polyethylene bags, aluminum foil, or plastic wrap in direct contact with silver.