

## THE CARE OF METAL OBJECTS

Tools, jewelry, toys, sculpture, tableware, furniture, kitchenware, and almost any other item can be made from metal. Metals—gold, silver, copper alloy, pewter, and iron to name just a few—are produced from ores that are found in nature and are processed, or smelted, from a stable mineral state to a less stable metallic state. Almost every metal material you will encounter will be an alloy—a mixture of more than one metal. Metals are mixed to achieve certain qualities, like colour, strength, or corrosion resistance in the finished alloy. Metals are also often layered together, as in the case of silver plate on a base metal substrate or tin plate on an iron substrate. The primary means by which metals deteriorate is through corrosion. Most metals corrode on contact with water, acids, bases, salts, oils, aggressive metal polishes, and other chemicals. They will also corrode when exposed to gaseous materials. Other sources of deterioration for metal objects include breakage, dents, and scratches from accidents or mishandling. Noble metals like gold and silver corrode less readily than baser metals like iron, tin, and lead. Gold, for example, truly does not corrode. Silver can suffer from sulfide-related tarnish and can corrode under very aggressive conditions such as in archeological contexts, but is fairly stable. Less noble metals, like copper alloys, corrode more readily; base metals like iron corrode very easily. Because metal is electrically active, galvanic corrosion can occur when two metals are in direct contact with each other. The base metal will contribute electrons to the more noble metal creating an electric circuit. This causes preservation of the more noble metal and corrosion of the more base metal.

## Cleaning and Handling

One of the sources of damage to metal is improper handling and carelessness. Oils and acids that are continuously secreted through human skin are deposited on metal surfaces during handling, where they cause corrosion and pitting. As experienced gun collectors and jewelers can attest, the actual pattern of a person's fingerprint can corrode into a metal surface. Metal objects should always be handled with clean, white cotton gloves, or vinyl gloves with a pair of cotton gloves over them to further prevent sweat from passing through to the object. If items are handled, or are used, as in the case of tableware, they should be carefully cleaned before storage or display to remove these deposits and prevent corrosion from skin acids and oils. White gloves are recommended because it is easy to determine when they become soiled and need to be washed.

Careless handling can also lead to denting, bending, or breaking metal artifacts. It is best not to overestimate the strength and resiliency of metal pieces. They are often weaker or more brittle than one anticipates. Extra caution in handling can prevent serious damages that can be expensive to repair. Metal objects should be kept free of dust, debris, and oily residues. In general, it is not a good idea to routinely polish or aggressively clean metal pieces. Each time a piece is polished or cleaned, a thin layer of the surface is ground off by the cleaning tools, the abrasives in the polish, or is dissolved away by strong chemicals in cleaning solutions. Repeated polishing or cleaning with chemicals such as dipping solutions will gradually eat away plating, surface decoration, engraving, maker's marks, and monograms. Eventually holes will form in

the body of the metal object. As an example, many people will use a wire brush on an electric drill to clean away rust on old iron objects like tools. This is very aggressive and may remove important surface features like the maker's stamps or historically important signs of use. It is best to use the most mild and non-abrasive methods for cleaning metals. Never use products such as Brasso or Silvo to clean any metal object

## The Environment

A controlled environment is one of the most important elements in the preservation of your metal objects. Excessive humidity is a leading contributor to the corrosion of metal. It is important to keep the relative humidity below 55 percent in areas where you keep important metal artifacts. You can use dehumidifiers and air conditioning to limit the amount of moisture in the air. Avoid storing your items in the basement, where the relative humidity is often far too high. Metal artifacts from an archeological context such as bronze and iron should ideally be kept at an even lower relative humidity, below 40 percent.

Another aspect of the environment that is critical to the preservation of metals is air pollution. Fine dust and debris in the air can accumulate on metal surfaces, where it attracts moisture and encourages corrosion. Keeping metal objects dust-free or carefully covered with dust covers can prevent this type of corrosion. Gasses in the air also attack metals. Gasses from car exhaust, rubber products, and cigarette smoke cause silver and copper alloys to discolor and corrode. The characteristic tarnish on silver is black silver sulfide. Acidic gasses from wooden

cabinets and cases can also cause metal corrosion. Vapors produced by plywood and other products that off-gas formaldehyde cause lead alloys and other metals to corrode, forming wispy white crystals often confused with mold growth. Keeping metal objects in a clean, dry, safe environment can prevent deterioration from environmental sources.

## Storage and Display

Metals, in general, should be stored with inert storage materials. For example, metallic cabinets and shelving should be used rather than wood cabinets and shelving as many woods and wood products, like plywood, emit acids and other gasses that cause metals to corrode. Acidic newsprint and cardboard boxes also should be avoided. Acid-free, lignin-free wrapping paper and boxes are better. Clean, soft cotton cloth can also be used. Silver, for example, can be stored in “silver cloth” available through jewelers’ and some hardware stores. Silver cloth will drastically slow the rate at which your silver will tarnish by preventing sulphur gasses in the air from reaching the surface of your silver piece. Silver cloth, however, should be changed every few years to remain effective. As the compounds in the cloth complex with gasses, they become used up and may eventually be holding the over-saturated pollutants in close contact with your silver. Washing and re-using silver cloth is not effective so it is advised to buy new. Storage containers, should also provide adequate physical protection for your objects. They should be suitably padded to prevent direct contact with other metal surfaces that can lead to corrosion. Padding also prevents denting, scratches, and other physical damage. For example, silver cloth is soft and will not scratch. It is thick, like flannel, and provides

padding that will help prevent small dents and dings. Metals objects, even large ones like farm implements or automobiles, should always be covered to protect from dust build up. Clean cotton sheeting can be used to make removable dust covers.

## When Disaster Strikes

For metal objects, the most serious threat from a disaster is water damage. Metal objects that have become wet during an emergency should be rinsed with clean distilled or deionized water as soon as it is practically possible. If distilled or deionized water is not available, tap water will suffice until the object can be examined by a conservator. The rinsed objects should then be dried as quickly as possible to prevent corrosion. Clean cotton or paper towels can be used. If conditions are such that dry towels are not available, objects can be placed in the warm sun to dry. Be very careful not to scratch objects by wiping off grit or soil or by using towels that are dirty or gritty. Metal objects should not be left wet; they will quickly corrode. Other questions about preserving your metal objects after a disaster can be answered by a conservator.

## When to Consult a Conservator

If your object requires special intervention like repair, or replacement of missing parts, you should contact an objects conservator. They will give you advice about the safest means by which to conserve and restore your special items. The AICCM website can provide you with a list of qualified

conservators in your area. If you have trouble locating a suitable person, please contact us direct.