Care of Corkscrews

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The goal of conservation is to preserve the original object: the original materials, the purpose, and the original appearance. However, conservation is not necessarily restoration so what will be discussed here is how to preserve your corkscrew but not necessarily how to make it look brand new.

As this is a brief overview, the materials that will be focussed on are in the following categories:

Metals: this will include the basic metals such as iron, copper and copper alloys such as bronze and brass, lead, pewter, aluminum, and surface finishes such as plating and painting.

Organic Materials: This includes wood, ivory, bone, antler, horn, leather and amber.

'Plastics': this includes some organic materials such as rubber and cellulose derivatives that have been modified to form plastic type materials as well as true plastics such as Bakelite

METALS

Since metal will always form a least the majority of your corkscrews I will start with them. Most metals corrode, forming corrosion products of oxides, carbonates, sulphides and other compounds. Corrosion occurs faster on surfaces that are contaminated with salts, acids, ammonia, or dust.

The metals in corkscrews are often mixed and metal can also be added as plating for protection or appearance's sake. The galvanic series of metal reactivity is a list of metals in a particular environment. It provides important information on which types of metal will be the most reactive with the environment and, therefore, will require the most care. The most unreactive, or noble metals, are placed at the very top. Gold and platinum are found here - they are the only metals that will not corrode. As you move down the scale, the metals become more reactive with the environment as well as with other metals that they may be in contact with. As you can see, cast iron and wrought iron are quite close to the bottom and this is the reason that iron will give you so many problems.

Another feature of this scale is that the farther two metals are spaced apart on this scale, the more likely and the faster the less noble metal will

corrode while in contact. This is due to the creation of a galvanic or electrochemical cell in which the two metals are connected by an electrolyte such as water containing salts. The less noble metal becomes the cathode and gives up electrons to the more noble metal. As a result, the less noble metal loses mass and corrodes away. This is a large problem with metals composed of alloys. When the less noble metal begins to corrode out of a blended metal, this is termed preferential corrosion. For example, lead is often added to bronzes and may corrode causing a white powder or residue on the surface.

We know the environments in which corrosion is most likely to take place: they are those that are wet or humid and environments where salts, chlorides, acids, (or pollutants that can be converted to acids) are present.

When looking at the corrosion of metals, it is important to make a distinction between active and inactive, or stable, corrosion products. Stable corrosion is generally unchanging and acts as a protective layer for the metal beneath. This often involves a colour change to the original material. On many materials this layer acts as a patina and may increase the value of an artifact by showing its age. Artificial patinas can be applied to protect the metal and change appearance.

Conversely, active corrosion involves a continuing loss of material from the object and action must be taken to stop the loss.

For each metal I will talk about, I will discuss the two different types of corrosion and how to identify them.

Iron/Steel

Uncorroded iron is a silver-grey colour however, due to iron's reactivity, this appearance does not last long. The stable corrosion products of iron form a compact, adherent layer on the metal surface and it varies in colour from blue-black to red-brown shades.

In contrast, active corrosion is voluminous and is often first identified by loose fragments surrounding an object. Actively corroding iron may be flaking and have pits or depressions with orange spots in the centre. This corrosion occurs between the metal core and the outer stable corrosion layer. Other types of corrosion include a sweating or weeping look to the object, caused by droplets of yellow, brown or orange on the surface. This is more common in an environment of high humidity.

Although it is a problem with most metals, the large volume change involved in iron corrosion presents a particular problem for composite objects such as corkscrews. The iron portion in the centre of the handle, for instance, will expand as the metal corrodes and this will cause splitting or cracking, not to mention staining, of the material used for decoration of the handle.

Iron corrosion is caused mainly by humidity, oxygen and the introduction of salts through use or handling. Iron is reactive and has a natural tendency to rust and the object can be completely consumed by corrosion. If kept in a dry environment, iron can be stable.

Copper and copper-alloys

The stable surface of copper and copper-alloys such as brass and bronze can have a wide variety of colours and may be considered a patina, or a desirable finish. These patinas are usually influenced by the makeup of the copper alloy. Bronze contains a large amount of copper mixed with varying amounts of tin and lead. Brass is a copper-zinc alloy. The stable corrosion products are usually compact and smooth and vary in colour from red, brown, back and blue to various shades of green.

The most common active corrosion is characterized by the rapid development of light green eruptions of powder known as 'bronze disease', however, active corrosion may also appear as a general, loosely adherent powdery layer over the surface. Corrosion in copper alloys is usually induced by atmospheric pollutants containing chlorides and ammonia combined with high humidity.

Lead and pewter

The corrosion products on lead and pewter objects are a result of the corrosion of the lead component. The stable patina varies depending on the amount of lead present, going from a dark grey for pure lead to lighter shades for pewter. This patina will also depend on the past history of the lead or lead-alloy object.

Active lead corrosion consists of a white powder, either spread evenly over the surface or concentrated in pinpoint spots. Active corrosion is caused mainly by acidic vapours produced by materials used in storage or in cleaning.

Silver

The stable corrosion of silver is the well-known black tarnish covering many silver objects. This layer is dense and compact and produced mainly by exposure to atmospheric sulphide gases mixed with high humidity.

Silver objects are generally stable and do not actively corrode. Most damage to silver is due to over-zealous cleaning or leftover polish residue.

Aluminum

Aluminum objects resist corrosion because they readily form a protective layer of aluminum oxide when exposed to air. If this oxide layer is damaged or scratched, it reforms rapidly. Chloride ions, present in salts, can inhibit the formation of this protective layer and can cause pitting of the surface.

Plated metal objects

As mentioned above, two or more dissimilar metals in close contact require only an electrolyte to form an electrochemical cell and, through this, a corrosive reaction. It is difficult to identify the underlying metal and there is often a third metal between the metal core and the plating such as copper or nickel that may not be readily discernable.

Active corrosion usually occurs in areas where the plating has been damaged or disturbed in some way. This corrosion can be stimulated by the

presence of salts, foods, or by the presence of polish residues. The plating is then lifted as the corrosion products build up and add volume to the original metal. Corrosion products may also occur on the top of the plating as a compact layer.

Bronze Finish

Some of your corkscrews may have a thin bronze-coloured finish that may or may not be completely intact. This originally would have produced a gold-coloured finish and for this reason was termed gilt-bronze or bronze-dore but also may be under a number of different names. The gold colour would not last very long as the copper component tarnishes and the colour turns to a bronze or red-brown colour.

This finish may have been applied in a couple of different ways. One method includes suspending particles of bronze in a lacquer or other binder and brushing in onto the surface of cast iron or a white metal. This layer may then have been covered with a layer of lacquer. As you probably know, this finish is quite fragile and the lacquer can be scratched or chipped easily. The lacquer can also be worn down and removed through use taking the bronze particles with it. Other methods involve the application of a thin copper leaf, mercury amalgams, or the use of coloured lacquers or varnish to achieve the gold colour.

Conservation

Cleaning

The care of metals begins by keeping the surface clean. This not only improves the appearance, it also removes sources of corrosion such as grease, salts, dust, metal polish residues and fingerprints.

Cleaning begins with a gentle brushing of the surface. When using a brush, one should start with softer bristled brushes and move towards stiffer bristles. Good cleaning brushes include hog bristle brushes, natural bristle toothbrushes, and jewellers brushes. Artist's paintbrushes are also very good for this purpose.

Greasy residues can be removed with a mild detergent combined with distilled water or with a solvent such as mineral spirits. Only very small amounts should be applied to a metal surface and water mixtures should only be used on sound, stable metal.

Cotton swabs are a great way to apply cleaning products and allow for greater control when cleaning small areas.

Polish residues can be removed with a wooden toothpick or a soft cloth. These may need to be dampened slightly with water to loosen the hardened residue.

Corrosion removal

Objects suffering from active corrosion should be stabilized by removal of the corrosion product. The removal method depends on the soundness of the metal beneath. If the metal object is quite stable despite the active corrosion, the product can be removed with a stiff brush - ie an old toothbrush. If it is more

fragile or a softer metal, the brush should be a medium or soft-bristled brush. It's always wise to start with a softer material and move towards the harder. Always use a material that is not as hard as the material you are cleaning.

It is not advisable to remove all of the corroded metal. If a material is heavily corroded, the uneven surfaces of the exposed bare metal allow water and oxygen to penetrate to the underlying metal surface, causing further corrosion. The underlying metal may be fragile so be careful if chipping or flaking away corrosion.

Don't use commercial rust strippers as they may be too strong or may contain acids to dissolve rust. Thin even surfaces of rust can be removed with mineral spirits such as Varsol and followed with a protective layer of a hard wax, if desired. A commercial product called Renaissance Wax contains both mineral spirits and micro-crystalline wax. This can be applied with a cotton swab or lint-free cloth to remove dirt and corrosion and then followed by a light buffing.

Silver and silver plated metals

Silver and silver plated metals often only require a light polishing. Silver tarnish is composed of the compound silver sulphide and therefore when you polish, you are actually removing the original silver. For that reason, polishing should be done as infrequently as possible, especially for silver plated items as the underlying metal will eventually be exposed. There are methods of replacing the silver plate if lost, such as electrolytic reduction, however, one must remember that this silver is not original to the object and may not go on evenly.

If polishing is to be done, the silver should be cleaned beforehand to remove any particles or residues that may interfere with the process. Past polish residue should be removed with a toothpick. The silver surface can be washed or swabbed with a gentle detergent in distilled water and then dried thoroughly. Polishes are abrasives. The gentlest polishes include jeweller's polishing cloths, jeweller's rouge, and precipitated chalk.

If a commercial polish is to be used, choose one specially formulated for silver. This will more gentle than one formulated for a harder metal such as copper or for metals in general.

After polishing, the silver surface should be once again cleaned with a gentle detergent and distilled water, taking care to remove all polish residues.

Copper and Brass

Before polishing copper or brass objects, it should be determined whether the object was intended to retain its metallic appearance or a patina.
The instructions for polishing copper and brass are the same for silver. A gentle polishing product such as jeweller's rouge or precipitated chalk should be used if possible. If a commercial product is used, one formulated for copper or brass should be used over a general purposed polish.

All polish residues should be removed afterwards.

Plated or painted metals

The deterioration of plated or painted metals presents a complicated problem. The flaking plating or paint should not be removed from the surface of the object, as it is valuable historic information. Pieces that have become detached should be saved for the same reason. Treatments of these objects should be referred to a conservator.

ORGANIC MATERIALS

Wood

Wood often forms a part of corkscrews and this wood varies greatly between species. One problem with wood components is that they are often finished with a lacquer, varnish or paint layer. Wood never stops responding to its environment and does so by swelling in high humidity and shrinking in low humidity. This alone may cause physical damage to the wood. An overlying coating may also respond to the environment, but it is less flexible and it will not respond as much or as fast as the wood. As a result, the finish often becomes detached from the surface beneath and flakes or blisters off. To add to this problem, lacquers were often applied in several coats, making a thick heavy layer that may become detached easier.

Conservation

In general, conservation involves cleaning the wood surface. Bare wood surfaces requiring gentle cleaning can be cleaned with a soft brush or soft cloth. For more ingrained surface dirt, a white eraser or powdered white eraser can be gently rubbed into the surface. Residue left by the erasers should be completely removed afterwards.

A cotton swab dampened with distilled water can also be used to remove dirt, by gently rolling it across the surface. This allows the swab to pick up dirt without depositing water. The swab should be changed as it becomes dirty to avoid depositing dirt back onto the wood. More aggressive cleaning is not recommended as it can damage the softer cells of wood, exaggerating the difference between the softer and harder cells of the wood grain.

It is not recommended to add oil to finished or bare wood as it tends to attract dust. If a finish must be applied, a wax such as Renaissance wax or a wax containing carnauba wax can be used. Wax should be applied with a soft lint-free cloth and applied thinly and evenly. The wax should be rubbed in well. After it has dried to a matte appearance, the surface can then be gently buffed with a clean cloth. This finish can then be restored with occasional buffing.

Ivory, bone, antler, horn

Ivory, bone, antler, and horn can appear very similar in corkscrews and can be hard to tell apart without a cross-section of the material in question.

Ivory

Although technically only correctly used to denote elephant or mammoth tusk, the term ivory is generally used for any tooth-like material. This category, therefore, includes tusks and teeth from the walrus, sperm whale, hippopotamus, narwhal, and warthog. Walrus and elephant ivory are the two most common types found in North American collections.

All teeth and tusk have the same physical structures: inner pulp cavity, a core of dentine, an outer layer of cementum, and a tip or crown composed of enamel.

The cross-section of elephant ivory is characterized by a series of intersecting lines that are white and more opaque than the surrounding material. These are called Shreger lines and are limited to elephant and mammoth ivory. These lines are sometimes noticeable as longitudinal striations on the ivory piece if it has been cut across the tusk and the ends are visible. Another term used to describe these lines is an 'engine-turned' pattern.

The cross-section of walrus ivory is characterized by a central core with a marbled appearance surrounded by a smooth creamy white dentine layer. Again, often this is not apparent to the eye unless the piece was made with a cross-sectional cut of the tusk.

Bone

Although bone and ivory have a similar chemical make-up, their physical structures are quite different. Bone has a spongy central portion while ivory has no marrow or blood vessel system. Bone is lighter in weight, thinner and more brittle than ivory. Under magnification, bone will display Haversian Canals as well as black dots and holes that will not be present in ivory.

Antler

Antler is similar to bone in structure and this is because it is actually an outgrowth of the skull bones. Antler consists of a thick outer layer of compact bone and an inner section of spongy bone. Antler is denser and heavier than bone and the outer surface has a dark rough surface.

Horn

The composition of horn is entirely different that the other materials in this section. Horn is composed of the protein keratin - the same material as hair, hooves, and fingernails. Horn grows around a spongy core in layers. The spongy core is often removed to form a hollow object, or the horn is boiled, then cut and moulded to other shapes or used in flat sheets.

Although it is difficult, proper identification of these materials is important, as it will help you determine the proper care and storage required.

Degradation

Of the above organic objects, ivory is the most sensitive to changes in relative humidity while horn is the least sensitive. Ivory will never stop changing in response to the environment and will expand or shrink with changing humidity. Large fluctuations in humidity can cause severe cracking and warping. If broken, the two sections of ivory may warp immediately in opposite ways, making it virtually impossible to repair. These should be referred to a trained conservator. Horn is susceptible to attack by insects. It is also subject to splitting, delamination, and flaking of its layers.

Conservation

Cleaning

All of these materials are porous and very susceptible to staining if in contact with dirt or corroding metal. These stains should be removed by a conservator.

Surficial dirt and grime can be removed with distilled water and a mild detergent. The cleaning solution should be applied to a small area of the surface with either a cotton swab or a soft cotton cloth. The surface should be just barely dampened and then dried immediately with another swab or cloth. The cleaned area should be rinsed in the same manner.

Extreme caution should be taken while cleaning. Do not apply water to a cracked or porous surface. This is already a unstable material under immense strain - any change in dimension may cause severe damage.

Never soak a piece of bone or ivory in water.

Horn is more durable than bone, antler and ivory and can also be cleaned using the above method provided it is stable and not delaminating. The separate layers of horn can soften very quickly in water and may warp in response.

It is also important to remember than discolouration is part of the natural aging process of ivory and acts as a patina of age. There is not usually a reason to whiten an ivory piece. Ivory, such as Oriental ivory was often purposively stained. If you find a intentional staining, take care not to remove this through cleaning. Do not sand or bleach ivory.

When storing organic objects in particular, use archival storage materials. Rubber-based, sulphur containing materials may cause yellowing of ivory.

Leather

In the chance that leather forms part of your corkscrew, the main issues will involve a loss of flexibility and desiccation or dryness. In the past, flexibility and moisture has been restored through the use of leather dressings that contained oils. This is no longer recommended as the practice was not found to preserve leather and actually increased desiccation. Also, as seen in the photo here, the oils and fats in the dressings would often become mobile over time and make their way to the surface, resulting in a whitish bloom.

One type of chemical degradation of leather is ‘red rot’. Red rot results from reaction of the leather with pollutants released when fossil fuels are burnt and is often found on leather book bindings from the Victorian era so I thought

this may be a problem for some of your older corkscrews. If you suspect red rot, take a white cloth and wipe the leather surface. If a red colour comes off, you have red rot. Red rot is untreatable.

Leather is also subject to biological deterioration such as mould growth and insect attack in higher humidity environments.

Conservation

As mentioned, the application of leather dressings, oils, or saddle soap is no longer recommended. Leather portions of corkscrews can be surface cleaned with a soft brush or rubbed gently with a white eraser, powdered eraser, or a dirt sponge to remove dirt.

Amber

Amber is a tree resin and varies in both colour and transparency, ranging from a transparent gold to almost black. Amber can be cut, carved or turned on a lathe and it can be polished to a high shine. In some cases, amber is melted down and mixed with various fillers and additives to form a moulded product known as pressed amber. Pressed amber can be identified under magnification by the presence of fine surface cracking, known as crazing.

Degradation

Amber can be damaged by heat and may be damaged by solvents. Amber is glass like and brittle and will break in a conchoidal fracture.

Conservation

Amber is not easily degraded and can be kept clean by brushing or wiping with a soft cloth.

PLASTICS

In the past, plastics and synthetic products were not looked down upon as they are today. As new materials with amazing properties were introduced, many household items were fashioned with the new material. It is very likely that corkscrews will contain at least some of these materials.
Unfortunately, these older rubber and plastics deteriorate continuously and any conservation you do concerns extending the lifetime of your objects. This deterioration is complex chemically and so I will just discuss the identification of degradation and conservation. Older plastics are at more risk than the newer varieties as their past degradation has led manufacturers to add stabilizing ingredients and improve their manufacturing techniques.

Rubber

Hard rubber products composed of natural rubber vulcanized with sulphur were used to create hard moulded materials from about 1850 on under commercial names such as Ebonite and Vulcanite. These hard plastic-type materials are usually black in colour but can be also found in a red-brown colour and a red-black rippled colour. These can be difficult to identify as hard rubber

objects were often meant to imitate another material. For example, a wood grain can be added during moulding.

Degradation

Degradation of rubber products involves the release of sulphur compounds as sulphuric acid and can result in a loss of strength and flexibility over time. Degrading rubber will eventually become hard and brittle. The beginning stages of degradation may be characterized by a change in the surface colour or the development of a chalky or dusty surface. The sulphuric acid produced can corrode surrounding metal.

Cellulose Nitrate

Cellulose nitrate is also known as celluloid or nitrocellulose it is formed by a reaction between cellulose and nitric acid in the presence of sulphuric acid. It can be found in objects beginning in the 1870's. Until the 1920's, cellulose nitrate was the only light-coloured transparent or translucent plastic available, however, cellulose nitrate can be found in almost any colour.

French Ivory is a synthetic ivory usually composed of a plastic such as cellulose nitrate and was common in the late nineteenth and early twentieth century. It is lighter than real ivory and although it has attempted to recreate the intersecting lines found in elephant ivory, the lines are more regular than the true ivory.

Cellulose Acetate

Cellulose acetate was commercially available in the 1920's and was used to make many moulded plastic materials in a wide variety of colours.

Degradation

The two cellulose esters described deteriorate mainly by hydrolysis, that is, they react with water. As they react they become increasingly acidic and will release acidic vapours. Deteriorating cellulose nitrate objects will have a strong acrid or chemical smell of nitric acid and cellulose acetate objects will emit a strong vinegar smell due to the release of acetic acid. These vapours not only accelerate the degradation of the plastic, they will also affect materials such as lead, iron, organic materials, and other plastics. Other indicators of degradation include interior cracking and formation of a whitish bloom on the surface.

Cellulose acetate degradation can also be characterized by shrinking, distortion and splitting due to the loss of plasticiser as well as a whitish bloom on the surface.

The surface of both plastics may become sticky due to plasticiser or other additives making their way to the surface.

The later versions of these plastics are much more stable than their early counterparts.

Bakelite and early synthetics

The term Bakelite refers to one of the most popular early synthetic plastics composed of phenol formaldehyde. They were the first completely synthetic plastic material and were commercially available in the early 1900's. These plastics were limited to mottled sombre colours.

Degradation

Bakelite and plastics show photochemical degradation with discolouration occurring when exposed to UV or sunlight. They may also show some surface degradation and loss of gloss.

Conservation

These objects should be examined regularly for signs of decay so that any degradation can be retarded as soon as possible.
Any cleaning of these objects should be mainly mechanical such as brushing, wiping unless the object is too fragile to sustain this. No solvents or water should be used in cleaning these items. No surface finishes should be applied to rubber or plastic objects as this will aid in internalizing the vapours released during degradation. Since the discolouration or loss of gloss is limited to the surface of these plastics, some collectors like to use abrasive polishes to restore the original appearance. This is not advisable from a conservation perspective as original material is removed and this new surface will discolour faster than the original moulded surface.

As these materials degrade, they can become surprisingly brittle and prone to breakage so take care in handling. Conversely they can also become sticky as additives such as plasticizers ooze out or in the case or rubber, completely liquefy.

Unfortunately, once degradation is too far advanced, the plastic portion of the object cannot be saved.

Special storage conditions

Undegraded plastic and rubber objects should be stored separately from the rest of the collection is a well-ventilated, cool, dark, and dry environment. The degradation of natural rubber can be retarded by storage in an oxygen free environment.

Cellulose nitrate and acetate objects should be stored separate from your collection with acid scavengers that will absorb the released acids and retard the degradation.

These objects respond to humidity changes with changes in dimension such as swelling and shrinkage and this can lead to cracking.

The best storage overall for these unstable objects is dry, cold and dark.

Do not enclose these objects in boxes or bags - adequate ventilation keeps the acidic vapours from building up and accelerating degradation. If ventilation is not possible then enclosure with an acid scavenger is recommended.

Care of collections

Corkscrews are composite objects and as such are difficult to store properly. The most important care that you can give your collection is to limit fluctuations in humidity and temperature. A good guideline is ~20-25ºC and 45-55% relative humidity but more important, as mentioned, is to limit dramatic fluctuations

As mentioned above, materials such as wood and ivory do not stop responding to the environment. These responses include shrinkage and expansion of the material and the related strain on the interfaces with dissimilar materials because the attached material (for example: metal) is not changing or changes at a different rate

Good housekeeping is also important. An invisible layer of dust will hold water and pollutants close to the surface and begin corrosion.

Pollutants such as sulphur dioxide, combine with water to form sulphuric acid with then affects both metals and plastics.

Limit light. Materials such as cellulose nitrate undergo photochemical degradation with exposure to light radiation. Once degradation starts in cellulose plastics, it is difficult to retard and its degradation products will affect the entire collection.

This is also the reason why air circulation is very important for these materials. These degradation products increase the rate of deterioration and lack of circulation keeps these products close to the plastic. This is why cellulose nitrate may appear stable one minute and completely gone the next or why one side will be degraded and the side facing out will seem ok.

Materials used in storage should be chemically stable and acid-free. This includes materials used for shelving, cupboards, padding, and wrapping. These materials will not only last longer than the alternative, they will also not cause damage to your collection. Avoid wood and wood-pulp products as they release sulphur and organic acid compounds.

In conclusion, a good guideline for storage is a temperature of 20-25ºC and 45-55% humidity but more important, as mentioned, is to limit dramatic fluctuations. Any humidity over 65% brings the possibility of mould or fungal growth. Ideally, there should be no direct sunlight, hot light sources, exterior walls or cold windows in your storage area.

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Care of Corkscrews - Cleaning materials and website information

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Supplies:

CLEANING

Brushes
- Hake brush
- artists' paintbrushes
- hog bristle brushes
- natural bristle toothbrushes

Cleaning Sponges
- white eraser (ie drafting erasers)
- SCUM-X powdered eraser
- Dirt Sponge
- Groomstick

Distilled water

Mild detergents
- Ivory Snow
- Orvus WA Paste

Solvents
- Acetone
- Ethanol
- Mineral Spirits

Soft, lint-free cotton cloths
Cotton swabs
Wooden toothpicks

POLISHING

- Precipitated Chalk
- Jewellers' Cloth
- Jewellers' Rouge
- Silvo (for silver)
- Brasso (for Brass)

CONSERVATION FRIENDLY FINISHES

Wax
- Renaissance Wax - contains mineral spirits and micro-crystalline wax
- Carnauba Wax

Lacquers
- Incralac
- Acrysol

STORAGE

Storage Materials
- Pacific Silvercloth
- Acid-free tissue - buffered and non-buffered
- Acid-free matboard
- Coroplast, corrugated plastic
- polyethylene foam
- polyethylene plastic sheeting

Environmental Controls
- silica gel, Artsorb- humidity control
- activated charcoal - pollutant scavenger
- Zeolite - acid scavenger for cellulose ester objects
- Ageless - oxygen scavenger

Websites for further information:
Canadian Conservation Institute, CCI
Preserving My Heritage Website
URL Address: www.preservation.gc.ca

National Parks Service, USA
Conserv-o-gram
URL Address: http://www.preservation.gc.ca

Talas Conservation Supplies
URL Address: http://talasonline.com/

Conservation Emporium - conservation, restoration and preservation materials
URL address: www.consemp.com