



Smithsonian  
*Museum Conservation Institute*

# **Furniture Care and Handling**

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## Introduction

Furniture and wooden objects are part of our lives every day. Some are utilitarian, such as a chair at the dining table; others are aesthetic, such as an antique sculpture or carving; still others may have an emotional or symbolic importance as mementos, such as a chest that has been in the family for years. Whatever their nature or purpose, if they are important to us they deserve the best care we can provide for them - unlike the chair illustrated on the cover of the video case, which is being gently misused.

The information in this booklet is not about restoring or repairing furniture and wooden objects; it is about caring for and preventing damage to them. Understanding and dealing with the causes of damage are well within the abilities of nearly all caretakers of valued wooden objects, whether a collections manager at a major museum or an individual safeguarding family heirlooms. The aim of this booklet is to explain how to minimize the preventable damage to furniture.

## Preventable Damage

Damage to and destruction of furniture takes many forms and paths. We use the term "preventable damage" to describe those conditions and events over which a furniture caretaker has some influence. By far the most predominant damage to furniture is caused by poor choices its users and caretakers make through misunderstanding the nature of wooden objects.

Consider the major causes of preventable damage:

- Poorly controlled ambient environment (light, relative humidity and temperature)
- Careless use, handling, and maintenance
- Inadequate packing for transport or shipping

This booklet and the accompanying video discuss the first two of these three causes of preventable damage. (A subsequent booklet and video, [Furniture Packing and Transport](#), will deal with the practical aspects of packing.) While all things degrade, the process can be slowed through application of principles of care and maintenance based on understanding the nature of wood and artifacts made of wood.

## The Environment

In this context "environment" means the conditions under which the artifact exists. In all cases, the "best" environment for furniture depends on the caretaker's priorities and resources and is often a

balancing act between them. There is never a "perfect" environment for anything, only conditions that contribute more or less to the deterioration or preservation of the artifact. As with most materials, however, there is an "optimal" environment that provides the best balance. For furniture and wooden artifacts the "optimal" environment is about 40¼ Fahrenheit with roughly 50% relative humidity; the "optimal" environment is also dark, anaerobic (an absence of oxygen), and free from contact with anything (or anyone). Keeping furniture in a chamber under these conditions, even if technically and financially feasible, makes it pretty difficult to use. So we must at least try to understand the effects of light, varying temperature and humidity, and potential for damage from use in order to make the choices that best fit our desires for using or preserving furniture.

## Light

Probably the easiest environmental issue to understand and resolve for furniture is damage from light. What we normally call "light" is really just a very narrow portion of the phenomenon called "electromagnetic radiation" that corresponds to the sensitivity of our eyes.

Simply put, light is a source of energy. Light interacts with everything it illuminates, and light energy is directly translatable to damage to furniture surfaces. The amount of that damage depends on the intensity and color. Bright light is more damaging than dim light, blue light is more damaging than red light.

For the most part, light damage takes the form of discoloration, usually bleaching. Light induces bleaching and degradation in most components of furniture: coatings, whether transparent or polychrome; the wood itself; and especially upholstery textiles. Generally, light damage is cumulative and permanent.

Responding to the potential for light damage is relatively simple and can also be straightforward: when the furniture is not in use, it is best left in the dark. Even when furniture is in use and in the light, damage can be reduced through common devices like window shades, curtains, and screens for protection from direct sunlight or elevated light levels. Ultraviolet filter films can be used to block the most damaging light frequencies if there is concern over the color of the light, for example light from fluorescent bulbs or ultraviolet radiation from sunlight. For extended periods of non-use, opaque dust covers are recommended.

The most important thing to keep in mind is the relationship between light and damage to furniture surfaces. As long as there is light, there will be light damage proportional to its intensity and exposure time. But the application of simple measures can go a long way to reducing damage.

### **Relative Humidity**

Perhaps the greatest environmental damage to furniture comes from wide swings in relative humidity (RH). Wood absorbs and desorbs water as relative humidity rises and falls, and in doing so it swells and shrinks. Making matters worse, it expands and contracts unequally along different grain directions. This characteristic remains as long as wood exists, whether it is new from the lumberyard or thousands of years old from an ancient tomb.

As humidity changes, the components of wooden objects are continually pushing and pulling against each other. This pressure often results in parts of furniture no longer fitting together closely or becoming distorted or breaking from their own internal stresses.

Wood is not the only furniture component to suffer from humidity swings. As they age and deteriorate, coatings become more inflexible. Since the wood continues to move with humidity changes, and the coating becomes increasingly brittle with time, humidity fluctuations eventually cause the coatings to begin fracturing or separating from the substrate. This problem becomes particularly severe when coatings are likely to be less flexible from the start, such as painted surfaces or gilding, which is often applied over a rigid ground called gesso.

The response to relative humidity changes begins with determining the annual average RH for your particular climate. Then try to keep the RH in the space where your furniture is as close to that average as possible, generally within about 10% up or down. This stability can be achieved through de-humidifying in the summer and humidifying in the winter.

Be aware that raising the temperature lowers the humidity and vice versa. Thus, modern heating systems, which can drive down interior RH in the winter, almost invariably cause problems for furniture. To counteract their effect, you can modify the RH by keeping furniture-containing spaces cooler in the wintertime. A humidistat automatically adjusts temperature to maintain a stable relative humidity.

## Biopredation

The third, and most often overlooked environmental problem is biopredation. Wood is subject to attack by both animals and micro-organisms, including insects, rodents, and fungi. The best protection against biopredation is to monitor your furniture regularly and keep food separate from your furniture, or at least stored in sealed containers.

## Insect infestation

Insect infestation, in particular, can destroy a furniture collection in a short time. Termites, carpenter bees and ants, powder post beetle larvae, and other insects can severely damage wood by eating channels beneath the surface.

The larvae tunnel through the wood until they are ready to emerge through exit holes at the appropriate time in their life cycle. At these exit holes the chewed and digested wood is often pushed out as the insect exits. These are important clues for you in monitoring furniture, as the sides of recent exit holes have the color of newly-cut wood.

Piles of insect excrement and wood dust, called frass (or frass), under or on your furniture may indicate an active infestation. Quarantine the suspect object immediately. If the infestation is confirmed, fumigation will be necessary. In addition, you will need to increase monitoring of objects near the affected furniture, for likelihood of their being infested is now greatly increased.

## Rodents

Rodents usually do not eat the wood for its own sake but rather gnaw through it to get to the food on the other side. The best way to prevent rodent damage is to not store any food, including condiments, in wooden furniture. Since food also attracts insects, it is a good idea to keep food as far from your collection as possible.

The presence of rodents in a piece of furniture are more symptomatic of problems with the building envelope, which must be sealed to keep rodents out.

## **Mold, Mildew and Fungi**

Mold, mildew and fungi are everywhere - on furnishings, walls, and in the air. But fungal infestation will occur only in the presence of an external moisture source or when the fiber saturation point (nearly 100% RH) is approached. Still air and high temperatures also encourage the rapid growth of these organisms. Molds and mildew growing on the surface of wood may stain it. Other fungi can completely destroy wood.

The control of mold and mildew is quite simple: do not let the relative humidity rise above 70%. Even if an active infestation exists, lowering the RH will cause the mold and mildew spores to become dormant. Similarly, cooler temperatures will also reduce fungi growth. Lowering the RH in a damp area should be done very slowly to prevent excessive stress and possible warping and splitting of wooden furniture.

Once the room is allowed to dry out to a humidity level below 70%, the dried, inactive mold residues can then be carefully vacuumed off furniture surfaces. Be careful not to breathe or scatter the dust, and clean the vacuum after use.

It is also important to locate any source of excess moisture and determine what can be done to remove it. Underground walls should be sealed and vapor-proofed. Leaks should be repaired in roofs and walls.

Fungal damage, or rot, can only occur in areas of extreme dampness at moderate temperatures. Unless your furniture gets wet and stays wet, this type of damage is not normally a severe problem. However, if your furniture is stored in areas where water incursion is a common problem, such as basements or attics, these areas must be surveyed every time it rains or snows.

## **Furniture Use and Care**

Careless and uninformed treatment of furniture is the second major cause of preventable damage. Damage to furniture is telltale: it is either caused by poor construction (over which the caretaker has no control) or it is the result of improper use or care. You don't have to be a specialist or scholar to treat furniture properly, all it takes is a basic understanding of the nature of wooden objects and of what furniture is and is meant to do, combined with common sense.

Here are some common-sense pointers:

- Protect surfaces from fire and excessive heat
- Sit only on structures designed for that purpose
- Be careful about what you place on a piece of furniture

Hot items, such as irons, coffee mugs, and steaming tureens can literally melt a finish away. Water from spills and condensation from vases and cold drink glasses can damage and deface coatings through "blooming," an effect that makes transparent coatings white or milky. Damage is even worse when the liquid itself stains the surface, such as when ink or coffee or tea is spilled, or if the coating is penetrated and the staining liquid enters the wood itself.

Organic solvents, such as fingernail polish and remover, perfumes, and alcoholic drinks can behave as paint and varnish removers on many kinds of coatings.

These problems are simple to address. Using coasters, oversized ashtrays, and writing pads can virtually eliminate the potential for damage.

## **Handling and Moving Furniture**

In addition to using furniture wisely, it is important to handle it carefully. Safe handling and moving of furniture begin with a basic understanding of how a piece is constructed. The second step is to plan carefully.

### **General Concerns**

- Before picking up a piece of furniture, determine how it is put together and if any of its parts are removable or detachable. Make sure you know where the furniture is its strongest - generally along a major horizontal element - and try to carry it from these points.
- Then examine the room and the route whereby the furniture is to be moved. Look around to make sure you know where everything is. Identify potential trouble. Light fixtures that hang low, for examples, or that extend out from the wall may be damaged or cause damage. Glass table tops are also easily damaged if bumped. If necessary, clear the way by moving or removing fragile or obstructive items. Protect the furniture to be moved with soft padding or wrap it in a blanket pad.

Padding, which will provide extra insurance against bumping and gouging, is especially important if an item is going into storage.

- Before moving an item, make sure you know exactly where it goes next. Plan ahead to adjust the temperature and relative humidity in the new location so they are the same as where the furniture presently is. Extreme changes in temperature and humidity can cause splitting of joints and veneers.
- Never hurry when you are moving furniture. Scratches, dents, and gouges from bumps against hand truck, doorways, and other furniture are always more likely in haste. Each item needs to be approached individually, without haste, and with sufficient manpower present.
- Make sure you have a firm grip on the piece with both hands. Do not wear cotton gloves. It is essential that hands not slip from a piece of furniture while it is being moved.
- Never slide or drag furniture along the floor. The vibration can loosen or break joints, chip feet, break legs, etc., to say nothing of what dragging does to the carpeting or finish on the floor. Whenever possible, use trolleys or dollies for transporting heavy pieces.
- Handling valuable furnishings requires a special attitude: in general, movement should be carried out at a slower pace. Here are some quick tips for moving furniture properly. Remember: If you don't break it, it doesn't have to be fixed!
- Just as gymnasts work with "spotters" to catch them when they misstep, have helpers on hand to guide the movers so they don't crash into walls or other pieces of furniture
- Anticipate trouble; think through every step; plan ahead; and do everything with care
- Make sure the route is clear and has no obstructions, such as narrow doorways or hanging chandeliers that might hinder the safe passage of furniture and movers

The following sections offer suggestions for moving specific types of furniture.

## Seating Furniture

When lifting a chair, remember that the seat rail is its strongest part, not the chair back. Frequently lifting by the back, especially the crest rail, will eventually result in breakage. For small chairs, lift by the side seat rails, one hand near the front on one side, the other near the rear on the other side.

When lifting a large chair or sofa, the principles are the same. Grab underneath the side frame, making sure to lift with your legs rather than your back. For upholstered chairs or sofas, place your hands underneath the frame to avoid touching the upholstery. If upholstery must be touched, use cotton gloves. For chairs with slip seats, remove the slip seat and wrap and move it separately to prevent its being soiled or falling out during the move.

## Tables

The strongest part of a table is generally the apron. Whenever possible, lift the table carefully from the apron, never by the top or legs. Lifting on the top rather than the apron may break the glue-blocks that hold the top to the frame or strip out the screws that hold the top on. Grabbing the legs, particularly tables with long, unsupported legs, will cause unnecessary stress on the leg and the joint connecting it to the apron. Whenever possible, wrap padding around a table's legs before moving it to prevent chipping or breakage during the move.

If you are moving a drop-leaf table, first determine which support members move. Is the table leaf supported by a bracket or by a swing-leg? Fold the leaves down, and restrain them with padding and a tie band. If the support is provided by a swing-leg or gate-leg, tie it in place as well. The only safe place to grab a drop-leaf table is underneath the end aprons. Grabbing by the legs, especially swing-legs, will increase the chance of damage to them, and grabbing the table by the side leaves will often result in fracturing the long rule joint that allows the leaves to drop.

## Case Furniture

While case pieces, especially large ones, may appear very different from tables and chairs, the same rules apply. Never try to move a large piece by yourself. A case piece requires at least two people. While a case piece requires can be moved by carrying it carefully, holding on to the bottom as you would a table or chair, it is better to move the piece on a dolly. A dolly makes the move safer for both the movers and the object, and that is all the more true for large objects.

First, examine the piece. How was it put together? And how can it come apart? Take the piece apart as much as is possible. That is, remove the top piece of a cabinet from its base; remove the cornice or pediment, if there is one.

If the carcass is sturdy enough, remove the drawers to lighten the load and make the move easier. Carry the drawers separately to the destination. However, if the carcass is weak and shifts from side-to-side, leave the drawers in place to provide stability and prevent further damage to the joints. Tall pieces that do not come apart into separate sections need to be set on their sides on a dolly to prevent their tipping over.

If the piece has handles, wrap them with padding. Padding protects the handles, the furniture surface (if the handles have swinging bales or drops), the movers, and the surroundings in case you bump up against anything.

Never grab a heavy piece like a chest of drawers or bookcase by the cornice at the top. The attachment of the top to the base may be loosened and pull apart from the rest of the piece.

Lift the piece straight up, using your legs, not your back. Don't let it tilt, and do not grab it by its hardware or any other protrusions.

### **Large Clocks**

The moving project becomes increasingly difficult with objects that are large and complex. Objects that come apart into many pieces or are unwieldy require extra care and preparation. Because of their many parts grandfather and grandmother clocks are very difficult to move.

Always remove the pendulum and weights from within the clock before doing anything else. These pieces are heavy and will damage the clock case if they smash into the side of the case. They may also cause damage to the mechanism itself. Wear cotton gloves when you remove the pendulum and weights, to avoid corroding the metal pieces from skin contact.

Remove the hood from the top of the clock (they often slide forward), and lay it down to pack and move separately. Make sure the door to the case is locked or securely closed before moving the clock. Use bare hands, not gloves, for moving and packing the carcass of the case. For short moves, like those of only a few feet, it is permissible to lift by grabbing the narrow case from the underside of the molding at the top

of the waist, or center portion of the case, provided that the molding is firmly attached to the case itself. For longer moves, or if that molding is not secure, the clock case should be carried flat like a coffin.

## Furniture Maintenance

The guidelines for furniture maintenance are pretty simple. If the furniture is used wisely and handled carefully, it will need very little in the way of routine maintenance. But in cleaning and polishing furniture surfaces and hardware, and in re-upholstering, some well-intentioned caretakers introduce damage. In fact, a lot of what furniture conservators do is respond to destructive maintenance practices.

### Cleaning Surfaces

For the most part, maintaining furniture simply means keeping it clean, carefully. Wood furniture usually needs to be cleaned only when there is a buildup of wax or dirt. Only unfinished wood, painted wood, or wood with a sturdy finish should be cleaned. The finish on giltwood is often applied with a water-soluble size, or adhesive; it should be carefully dusted, not cleaned, or cleaned only by a professional.

Before cleaning wood or coatings, the first and most important step is to evaluate the surface and make sure that the surface or coating is stable and not apt to be damaged by the contact required in cleaning and polishing. If the surface is unstable, the polishing could knock off loose portions. Damaged surfaces should be referred to a conservator.

After the soundness of the surface has been established, the next step is to find out what the dirt is and what the surface is. If you can't determine these exactly, find out what removes the dirt without affecting the surface underneath it. Often, dust can be removed with the careful wipe of a damp cloth. Oily dirt or waxy residue can be removed with a mild detergent and water solution or with mineral spirits. However, it is vital to make sure that the cleaning solution does not affect the underlying surface. Even when you determine a cleaning method that works successfully, proceed cautiously.

Loose dust on the surface can be removed with a soft, lint-free cloth, gently rubbed over the surface. Dust is an abrasive and can scratch the surface, so be careful. Uneven areas can be dusted with a clean, natural bristle paint or artist's brush. Again, do not try to dust a surface that is severely deteriorated. Cloth fibers can catch and tear away pieces of the finish, veneer or loose parts. Even rough edges can splinter. Carving, fretwork, and other delicate work can be dusted with a soft bristle brush, with a vacuum

cleaner held close enough to take in the dust once it is dislodged by the brush. Do not use feather dusters, as they can scratch and pull off loose fragments of veneer.

Surfaces in good condition but with a heavy accumulation of dust can be cleaned very carefully with a vacuum cleaner. Use the lowest suction available and the round brush attachment. Don't let the metal or hard plastic parts of the vacuum bump into the surfaces; they can scratch the finish or wood. Much damage, in fact, occurs as the feet and bases of pieces are hit with the vacuum cleaner.

Dirt that cannot be simply vacuumed off may be removed with cleaners mixed in a dilute solution, but only if the finish is in good solid condition. First, determine which solvent removes the dirt without removing the finish. Those to be tested include mineral spirits (white spirit), paint thinner, and naphtha. Second, test a small spot in an obscure area with the solution on a cotton swab. All areas that appear to be a different coating or material must be tested separately. Only if the solution does not damage the test area should it be used to clean the rest of the piece.

For finished wood, dampen a cotton cloth with the solvent or cleaning solution, and gently rub over a small area at a time. Avoid using too much liquid, as they can cause damage. Then, wipe the cleaned surface with a clean dampened cloth to remove any cleanser residues, followed by a dry soft cloth.

Following simple cleaning, further protection and aesthetic enhancement can be obtained through the application of a stable, hard furniture polish, such as a hard paste wax. The hard wax surface can be dusted more easily because it will be more smooth, and the dust will not be imbedded in it as it would in an unwaxed surface. Waxing need only occur infrequently because the wax itself is not readily removed and it does not degrade chemically. Waxing too often can result in a built-up, clouded surface.

This simple approach avoids the problems created by popular methods of "furniture polishing" - such as sprays and oily polishes - that may result in cumulative damage to furniture. Many polishes and residues continue to be a vexing problem for furniture conservators, as they can build up over time and with numerous applications, trapping and adhering airborne dirt onto the surface.

For a more in-depth discussion of furniture polishes, refer to the appendix at the end of this text.

## Cleaning Upholstery

Dusting upholstery can be accomplished by a vacuum cleaner. Place a soft screen on the surface to prevent any snagging or abrasion from the vacuum tip, and using a brush attachment, carefully vacuum the surface.

Stains and other damage to upholstery should be referred to an upholstery or textile conservator for further treatment.

## Metal Hardware

One never-ending concern of furniture caretakers is for the hardware, including handles, brackets, hinges and escutcheons attached, usually with nails, to the outer surface of a piece. The metal in hardware might be brass, silver, gold-plated bronze, depending upon the style, date and country of origin. Contemporary hardware attachments sometimes have a clear lacquer finish that gives them a shiny appearance. Antique hardware is also sometimes coated by restorers and conservators to eliminate the need for constant polishing. There is currently a lot of debate in the conservation field as to whether metal hardware should be lacquered or polished. Neither is an option if there is evidence of an original varnish or if abrasive polishing would remove some other original surface treatment.

Furniture hardware may become dirty and tarnished with use and exposure to the atmosphere. In such cases, polishing it can be justified. However, even this step is sometimes a poorly informed one. One common example of the damage is created by polishing hardware supposed to be brass, when it is really gilded bronze that is simply dirty. Polishing removes the gold, damaging the surface of a beautiful sculptural element.

If you choose to polish, remove the hardware from the piece, noting the exact location of each screw and nut. Polishing the hardware while on the piece damages the surrounding finish and also allows polishes to run beneath the hardware that can further damage both the metal hardware and the finish.

Clean hardware carefully with a 50/50 mix of acetone and alcohol to remove any dirt and oil residue, scrubbing the piece with a soft bristle brush. After drying, the surface can be polished with a fine, lint-free cloth of felt block charged with a very fine abrasive, such as calcium carbonate or jeweler's micro polish, in an alcohol or mineral spirits slurry. Commercial polishes can contribute to the deterioration of the hardware, as they frequently contain harsh cleaners that corrode the metal.

If the hardware cannot be removed safely from the furniture it can be polished and coated on the object provided the following precautions are scrupulously followed. First, the surface of the wood and varnish must be completely protected. Acetate sheets, such as those found in office supply stores, can be notched and slid under the hardware from both sides to form an overlapping barrier. Without this precaution, attempts to polish the hardware will likely end in disaster.

Since this hardware cannot be doused with the acetone and alcohol mixture, cleaning must be done by dipping swabs in the solution, then rubbing the metal surface with the swab. Polishing must also be done more carefully, perhaps on a smaller scale.

After polishing, remove all residues. The surface of the hardware that has been removed from the furniture can be easily coated with a transparent resin before the hardware is replaced on the piece. Particular care must be used in applying any coating when the hardware cannot be removed, to make sure that no protective varnish for the hardware gets on the furniture piece itself.

### **Reupholstering**

One final consideration of maintenance is reupholstering. Upholstering, by definition, always causes some damage to the frame from the tacks and nails driven into it. If repeated often enough, the damage from traditional upholstery methods is eventually destructive to the object.

A new field in furniture conservation - minimally intrusive upholstery - is dedicated to developing alternative upholstery methods that eliminate or diminish the damage caused by using nails and tacks. For a description of these alternative methods, see [Upholstery Conservation](#), listed in the bibliography at the end of this booklet.

### **Summary**

Preserving the furniture contributes to the future understanding of our particular moment in history. Furniture preservation is not always exotic specialized activities by "experts," but is more often the result of careful use and maintenance. In many instances this care is accidental or happenstance, but that needn't be the case. By adopting informed practices regarding the use, care, and maintenance of furniture, the odds are far greater that it will reach our successors intact and in good condition.

## Appendix

### Furniture Polishes

There are several factors to weigh when deciding to use polishes and waxes on furniture and other wooden objects. One critical factor is that the ingredients in commercial polishes and cleaning products are rarely disclosed. Moreover, these ingredients can be, and frequently are, changed without warning or notification. These ingredients may be harmless or harmful to the furniture (and to you) and you have no way of knowing in advance.

Polishing products are available in three forms: aerosol (spray); liquid; and semisolid. Here is a quick look at their benefits and drawbacks.

#### Aerosols (Spray Polishes)

Aerosols are convenient. However, they have been among the worst offenders in introducing silicone oils and other contaminants onto furniture. In addition, they may contain solvents that attack varnishes and lacquers. While some of the "dusting" aerosols appear to be benign when applied to a cloth and not the piece of furniture, the result is similar to using a damp, clean dust cloth.

#### Liquids

Like aerosols, liquid polishes are easy to use. There are two primary forms of commercial liquid products for "furniture care": emulsion cleaner or polishes and "oil type" polishes. Emulsion polishes are waxes, oils, detergents, organic solvents, and other materials suspended in water for ease of application. These products can be extremely powerful cleaners that leave a desirable sheen on the surface. However, the visual effect usually diminishes as the liquid dries. Moreover, like aerosols, emulsion polishes can introduce contaminants onto the furniture, but because they are liquids they place much more volume than sprays on the furniture surface.

Oil polishes are even more troublesome. Much like emulsion polishes, oil polishes can be a complex blend of ingredients including oils, waxes, perfumes, colorants, "cleaners," and organic solvents. They can render extremely pleasing surfaces and are used frequently as final finishes by themselves. However, oils used as polishes or cleaners can be very damaging.

Nondrying oils (paraffin, mineral, and "lemon oil," which is usually mineral oil with colorants and perfumes added) tend to be more benign than drying oils, but even so some oil remains as a liquid on (or in) the object. Dust and other airborne contaminants readily stick to wet surfaces, especially oils. But nondrying oils don't undergo chemical reactions or directly damage the furniture.

Drying oils, on the other hand, such as linseed, tung, or walnut oil, are a different matter altogether. These materials solidify, or "dry" through a chemical reaction with the air called oxidation. Over time this reaction makes them increasingly difficult to remove. Their permanence is fine if the oil is employed as the finish, but not good if it is used as a maintenance polish. By

itself, having a polish that is difficult to remove would be an irritating but not an insurmountable problem. Unfortunately, as drying oils age they tend to

yellow and in the presence of acids they are chromogenic (become Colored), turning a dark, muddy brown or opaque black.

Traditionally, cleaning and polishing concoctions comprised of linseed oil, turpentine, beeswax, and vinegar (acetic acid) were widely used even in the museum field until recently. They turned out to be a disaster waiting to happen. The results of their use are readily apparent to even the casual observer: a thick incrustation of chocolate-colored goo that is neither hard enough to be durable nor soft enough to wipe off easily. The furniture is left with an unsightly coating that is very difficult to remove without damaging the underlying surface.

### **Semisolids**

By virtually any measure semisolid polishes are the least damaging to wooden objects. Frequently called "paste waxes," these products are actually a very concentrated solution of waxes. Provided the ingredients do not include undesirable contaminants like silicone or high concentrations of damaging organic solvents such as alcohol, xylene, or toluene, paste waxes are an excellent polish for the surfaces of most wooden objects. Because waxes are exceedingly stable and don't cause many of the problems inherent in the previously mentioned polishes, they are the material of choice for furniture conservators and other caretakers of furniture and wooden objects. But paste waxes have their faults too: unfortunately, they require the most active contact with the surface of the furniture, and also need the most physical labor for proper application. Buffing out a wax polish can be very hard work, and in general, the better quality the wax, the harder the buffing that is needed. However, the results and benefits to the furniture are worth the extra effort.

Fortunately, as the most durable and stable polishing material, paste wax needs to be applied much less often than aerosols or liquids. Ideally, wax polishing should be conducted no more than twice a year for areas of extremely heavy wear (desktops, chair arms, etc.) and once every three or four years for table and chair legs, cabinets, and similar areas.

If a surface can no longer be buffed to the sheen appropriate for a waxed surface, it is likely that the wax has worn off. In that case, apply another light coat of wax to the affected area in accordance with the product instructions. Wax that is applied too frequently or improperly can build-up and cause an unsightly surface. When the wax is used correctly, however, the solvent content of the new wax will "clean off" any previous wax remaining on the surface and will simply integrate the old into the new.

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