

Solving the Solvent Problem

Putting Your Workshop, Hobby Room and Wardrobe Into De-Tox

Most of the hazards we risk in our workshops and hobby rooms come from the use of highly dangerous chemical solutions called solvents. A solvent is a substance designed primarily to dissolve other substances — paint strippers or stain removers, for example. Solvents containing carbon are known as organic solvents and are both flammable and toxic.

When used, stored or disposed of incorrectly, organic solvents can cause environmental problems such as air pollution, water and soil contamination, as well as being harmful to wildlife. In addition to the risks of fire and poisoning, solvents can also cause skin damage, eye injury, allergies, nervous system disorders, and nerve, lung, liver and kidney damage.

Even though labels may not clearly state that the product contains an organic solvent, they do give indicators such as the terms 'flammable', 'combustible', 'contains petroleum distillates' or 'breathing vapours may be harmful'.

Generally, you can assume the following products are 100% organic solvents: furniture stripper, turpentine, charcoal lighter fluid, dry cleaning fluids, paint thinner, nail polish remover, degreasers, lubricating oils, and fuels.

Other products which may be partially solvent-based (some are water or detergent based) include: furniture oils, polishes and wax, shoe care products, spot removers, rug and upholstery spot cleaners, glues and adhesives, metal and wood cleaners, paints, and wood finishes such as varnish, shellac and stain.



Some examples of label key words indicating the presence of organic solvents: benzene, carbon tetrachloride, chlorinated solvents, diethyl or dimethyl phthalate, methylene chloride, paradichlorobenzene, perchloroethylene (or tetrachloroethylene), petroleum distillate, phenol, toluene, trichloroethane, and xylene.

So, what to do? You need to paint a room, build a deck, and strip some woodwork. You have a feeling the smelly liquids involved can't be good for you (and you're right), but you think there's no alternative. Fortunately, alternatives do exist for many of these jobs.

Many solvents are either unnecessary (if you don't wear nail polish, you don't need nail polish remover) or easily replaced (water rather than oil based paints). Unfortunately, some are almost impossible to avoid. The title of this fact sheet really should be Minimizing the Solvent Problem, as there are times this is the best we can do.

We've offered as many safe (or safer) alternatives as we could. When solvents absolutely must be used, we urge you to follow the 10 safety steps on the back page and never underestimate the risk.



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AND Environment Canada, Ministry of Environment, Lands and Parks

ART & HOBBY SUPPLIES

Creativity, if we are not careful, can come with a toxic price tag for us and for our children. Paints, glues and felt tip markers may all look innocent enough, but many contain harmful chemicals.

Labels do not always not disclose every ingredient, but they will help you know what to avoid.

Hazardous products use four different symbols on the containers: POISON, FLAMMABLE, EXPLOSIVE and CORROSIVE. These symbols are then enclosed in a frame: an octagon shape for DANGER, a square shape for WARNING, or a triangle for CAUTION. For example, a skull and crossbones inside an octagon means it has the highest POISON rating. Products with these warning labels should be avoided and should never be used by children.

“Masterpieces” created with water-based markers are a lot easier to remove from walls and woodwork.

Products containing any of the following ingredients should be avoided by everyone: cadmium, chromium or chrome, concentrated acid and bases, formaldehyde, hexane, lead, mercury, methyl alcohol (methanol), methylene chloride, phenol, styrene, toluene, trichloroethane, trichloroethylene, turpentine, and xylene.

Adhesives & Glues

Household glues and adhesives can be amongst the most hazardous products in the home.

Unfortunately, some special-purpose adhesives have no existing alternative and the best we can do is use caution when applying glue. However, there are some good general rules to follow - especially with children. Avoid the use of rubber cement, which contains hexane or heptane, both of which can cause nerve damage.

Better: Although still somewhat toxic, contact cement is much less dangerous than rubber cement.

Best: To avoid toxic solvents, use glue sticks, paste or wax instead of rubber cement, and white glue instead of any solvent based glue.

Crayons, Pens & Markers

If you've ever ended up with a splitting headache after a long meeting in a closed room, your boss's ranting probably wasn't the cause of the pain. It was probably the toxic solvent-based markers he was using to write notes.

Almost all markers fall into three categories: water-based, alcohol based and aromatic solvent-based. The latter, which could contain xylene, is the most toxic and should always be avoided. Pens labelled “permanent” will be either alcohol or solvent (again, probably xylene) based. Dry erase markers are either alcohol or ketone-based. The latter smells awful and should be avoided altogether.

Better: If for some reason a water-based marker just won't do, make sure you buy one that is alcohol-based. While still toxic, they are considerably less hazardous.

Best: children should always use Water-based markers. If you can't understand the label, pull the top off and sniff. Ink that has no odour or smells slightly of vinegar is almost certainly water-based. (An added benefit of giving kids water-based markers is that “masterpieces” which end up on the walls or woodwork are a lot easier to remove.) Mark freezer packages with grease pencils. Stick with known name-brand crayons, such as Crayola, which are made from paraffin or beeswax. (Several years ago some imported crayons were found to contain lead.)

Paints & Solvents

In addition to their use as paint thinners, solvents can also be found in the paint itself - used to dissolve pigment and allow the paint to spread. In oil-based paints, the solvents can be toxic and extremely flammable. These paints require the use



of other solvents, such as turpentine, which can cause skin, eye and respiratory irritation, headaches, central nervous system depression and kidney damage. Swallowing or inhaling methyl (wood) alcohol or absorbing it through the skin can cause blindness.

Even getting the colour right can pose a health risk. Whether in solvent or water-based paints, some pigments contain incredibly toxic metals such as arsenic, cadmium and lead. (The last two are known endocrine disrupting chemicals.)

Better: Acrylic paints are water based and much less toxic than solvent-based paints. However, they can contain chemicals such as formaldehyde, ammonia and acrylonitrile plastic, which may cause allergic reactions or other problems for some. If you absolutely must use a solvent-based paint, choose one of the least toxic. Ethyl or isopropyl alcohol, acetone and odourless mineral spirits are all considerably less toxic than methyl alcohol, toluene or turpentine, although they are still highly flammable.

Best: In water-based paints, plain water dissolves the pigment, so there are no solvents in the paint to inhale, nor is there a need to use turpentine or other solvents for clean up. Although these paints should, wherever possible, be the preferred option, as noted above, even water-based paints can pose problems. Children should only be given water-based children's paints with non-toxic pigments. Use brushes, as aerosol spray paints also contain toxic solvents.

Photographic Chemicals

If you do your own photographic development, you know it would take an entire book to deal with the myriad of chemicals involved. Basically, you're in the "Minimize Risk" category, as there really is no less toxic alternative to the substances required. Poor ventilation in most in-home darkrooms presents an unnecessary risk of exposure (to you, not the photos) from inhalation.

Best: Set up a ventilation system, which changes the room air at least 15-20 times an hour. And, of

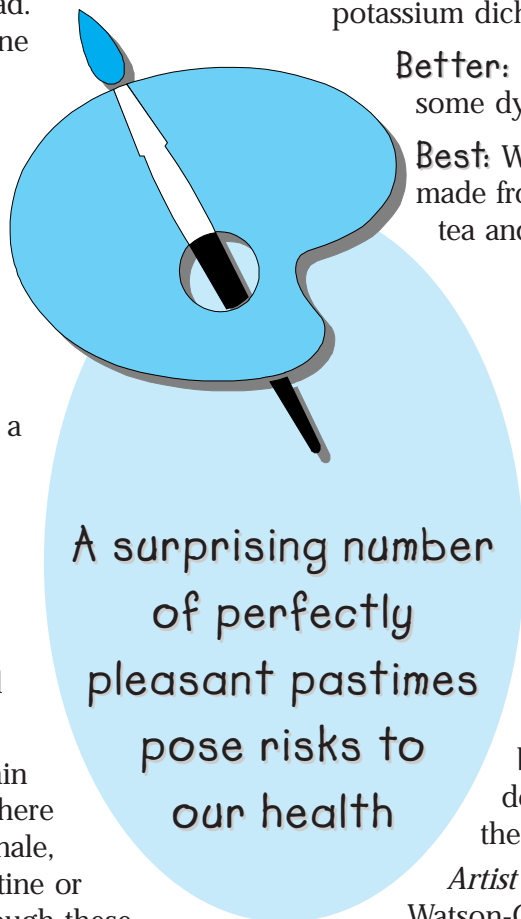
course, use tongs to avoid skin irritation. Use up all chemicals (or give unused portion to another photographer) — never pour them down the sink.

Fibre-reactive dyes

Many fibre dyes contain corrosive or toxic ingredients that can cause serious health problems. Mordants — the materials that bind dyes into cloth — can include the irritant ammonia, corrosive oxalic acid, and toxic potassium dichromate.

Better: A less toxic mordant, suitable for some dyes, is potassium alum.

Best: Wherever possible, use natural dyes made from vegetables, onion skins, flowers, tea and other food dyes.



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our health

Recommended References

A surprising number of perfectly pleasant pastimes pose risks to our health — lead exposure in stain glass work and metal working solders, inhalation of dust while mixing clay, toxic pottery glazes, to name just a few.

Before taking up a hobby (and certainly before letting your child begin one), you might want to track down one of the following books at the library:

Artist Beware by Michael McCann, Watson-Guption Publications;

Health Hazards in the Arts, Bertram W. Carnow, American Lung Association Bulletin;

Health Hazards Manual for Artists, Nick Lyons Books;

Reproductive Hazards in the Arts & Crafts, Center for Occupational Hazards.

Ventilation: A Practical Guide for Artists, Craftspeople, and Others in the Arts by Nancy Clark, Thomas Cauter and Jean-Ann McGrane, Center for Occupational Hazards, Inc.

For more detailed information about various hobby hazards, contact:

Center for Safety in the Arts,
c/o New York Foundation for the Arts,
155 Avenue of the Americas,
14th Floor,
New York, New York 10011

<http://gopher.tmn.com:70/01/Artswire/csa>.

PAINTS AND WOOD PRESERVATIVES

Paints

As already noted in Art & Hobby Supplies, the main concerns about paints are both the solvents used in oil-based paint and the solvents needed to thin or clean up oil-based paints.

Wood homes built before 1950 contain the highest levels of lead.

Solvents commonly used in oil-based household paints include methyl and butyl acetates (both can cause eye, nose and throat irritation), and acetone and methyl ethyl ketone (volatile hydrocarbons, which can damage the digestive, neuromuscular, and central nervous systems).

Other toxic additives are mercury (banned for indoor use, but still used to combat mildew in exterior paints) and chromium, often a pigment in orange and yellow paints.

Better: Whenever possible, opt for latex (water-based) paints. In recent years, paint manufacturers have responded to demand by creating latex versions of paints such as floor paint, which at one time could only be purchased in enamel form. Water-based paints do not contain toxic or flammable solvents, although some considerably less hazardous solvents are present in most commercial brands.

Best: Several paint manufacturers have introduced solvent-free latex paint.

Special risks in older homes

You probably remember the warning Environment Canada issued a couple of years ago about the risk of lead dust leaching from PVC venetian blinds and being consumed by toddlers.

For many years the main pigment and drying agent in paint was lead a highly toxic metal. The use of lead in paint was severely restricted after it was discovered that children were being poisoned by eating flakes of leaded paint from walls and woodwork.

Unfortunately, the paint in older homes (built before 1950) almost certainly contains high levels of lead. Extra precautions must be taken during remodelling or paint removal to avoid placing children at risk from lead accumulating in household dust.

Whether you are doing the work yourself or hiring a contractor, the need to take the following precautions cannot be overestimated:

1. Ideally, toddlers and pregnant women should remain out of doors during paint removal and remodelling.
2. Remove rugs, furniture and curtains before beginning work. Carpets that cannot be removed should be covered with a non-skid tarp and sealed with duct tape at the edges.
3. Seal off work area as much as possible and avoid tracking dust from the remodelled area.
4. Use high quality dust mask and a water spray bottle when doing spot sanding or removing old or peeling paint.
5. Clean up dust at the end of each working day and prevent the track-in of foundation soil disturbed by remodelling.
6. Make sure you or your contractor have been trained in lead abatement.



Wood homes built before 1950 contain the highest levels of lead.

Cleaning up

Thinners and strippers — used to dissolve or thin oil-based paint, clean brushes, dilute varnishes or clean up after painting — are almost 100% solvents.

Although it may seem obvious, it's worth stating: solvents are all poisonous if ingested. They also

pose risks if inhaled or absorbed through skin, including eye, nose and throat irritation, nerve and internal organ damage, as well as a narcotic effect on the central nervous system.

The most hazardous are aromatic and chlorinated hydrocarbons such as benzene, methylene chloride (an ingredient in most paint removers which is very dangerous to anyone with a heart condition), toluene, trichlorobenzene, and xylene.

Most are suspected of causing kidney and liver damage or cancer. Do not buy products containing chlorinated solvents (identified by the prefix “chlor” in their name).

Paint rags can also be a hazard. Rags soaked in oil-based paints or solvents can spontaneously ignite and should be kept in sealed, non-combustible containers until you are ready to dispose of them.

To reduce your use of these products, used thinner and turpentine contaminated with paint can be recycled at home for reuse

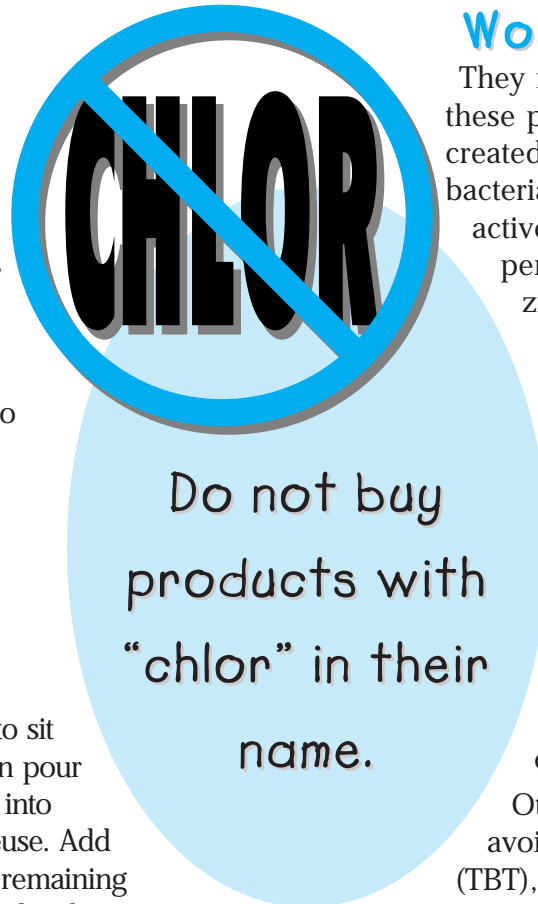
Do this very carefully, preferably outside. Allow the ‘dirty’ solvent to sit until the paint particles settle, then pour or strain the clear liquid carefully into another labelled container and reuse. Add an absorbent (eg cat litter) to the remaining sludge and let it dry in a well-ventilated area away from pets and children, then wrap in newspaper and dispose with your regular trash.

Never burn any wood treated with preservatives, as this will release toxics into the air.

Better: Non-chlorinated solvents such as rubbing alcohol, grain alcohol, nail polish remover and turpentine are less toxic. However, they are still highly flammable and combustible, and can irritate or damage skin. If you must use solvents, take the precautions listed on the back page.

Best: Eliminate the need for thinners by buying water-based paint. To get paint and grease off your hands, rub then with butter, margarine or baby oil, wipe dry, then wash with soap and water.

Avoid paint strippers by stripping or sanding the paint off. (Make sure you wear a mask to avoid inhaling dust particles.) Some paint removers are available which don’t contain organic solvents, for example, Safest Stripper by 3M. Although this semi-paste can irritate the eyes on contact, it is water-based and doesn’t contain methylene chloride. 3M stripping pads should be used, as steel wool will cause dark spots on the wood.



Wood preservatives

They may be called ‘preservatives’, but these products are really pesticides, created to protect wood from fungi, bacteria and insects. Most commonly the active ingredients are pentachlorophenol (penta), creosote, zinc or arsenic compounds.

Penta and creosote are so toxic; many countries have banned their use indoors and restricted outdoor uses. These compounds can leach easily into the environment both during and after application and should be avoided completely. Never use old railroad ties or telephone poles in your garden, as they will almost certainly have been treated with either penta or creosote.

Other compounds that should also be avoided are folper and tributyltin oxide (TBT), used in several brands of commercial wood preservatives. Folper is a suspected carcinogen. TBT is so toxic to fish its use in paints for boat hulls has been banned, with certain exceptions, in BC.

The fact that arsenic is known to cause cancer, birth defects and genetic mutations might cause you to think twice about using it in a solvent. The manufacturers of pressure treated lumber are quick to point out that arsenic compounds such as chromated copper arsenic pose a comparatively small risk, as they appear to bind tightly to the wood.

Even so, regulators advise against using arsenic treated wood for cutting boards or countertops — advice, which probably should be extended to include picnic tables, deck railings and floors. (If you know that wood already in your home was treated with one of these compounds, you can

reduce surface residues of arsenic by periodically applying two coats of clear wood finish.)

Better: Copper or zinc naphthenate and copper-8 quinolinolate are certainly the least acutely toxic wood preservatives. However, their long term health effects have yet to be studied. Borax-treated woods are now available which are good for preventing insect damage indoors.

Copper, zinc and borax are seldom effective on wood which comes into contact with soil.

Best: Start by asking yourself if you really need a wood preservative. In many cases you can avoid these or minimize the use of these products by choosing the right wood for the job. Use untreated wood for raised garden beds (either naturally resistant or scrap which you can replace. Use naturally weather-resistant wood such as cedar or redwood for picnic tables, decks and fences (pressure treated wood for load-bearing members), and protect with a water repellent, paint or linseed oil.

NB: When using pressure treated wood, try to work in full lumber lengths to minimize cutting, wear a mask while sanding and sawing, catch all sawdust and dispose of it in trash.

Dry Cleaning

It may seem odd to include a section on dry cleaning in a document largely devoted to workshop and hobby room hazards. However, most of these hazards come from solvents and the one solvent we've almost all been guilty of thoughtlessly using is perchloroethylene. 'Perc' (also known as tetrachloroethylene) is the chemical most commonly employed by dry cleaners. So, before you next cart your suit, tie or silk shirt

off to be cleaned, please acquaint yourself with the following information.

There is nothing "dry" about dry cleaning. Instead of water, the process uses a chlorinated solvent to dissolve other substances. Usually the solvent is perc, which, like all chlorinated chemicals, is toxic and persistent in the environment.

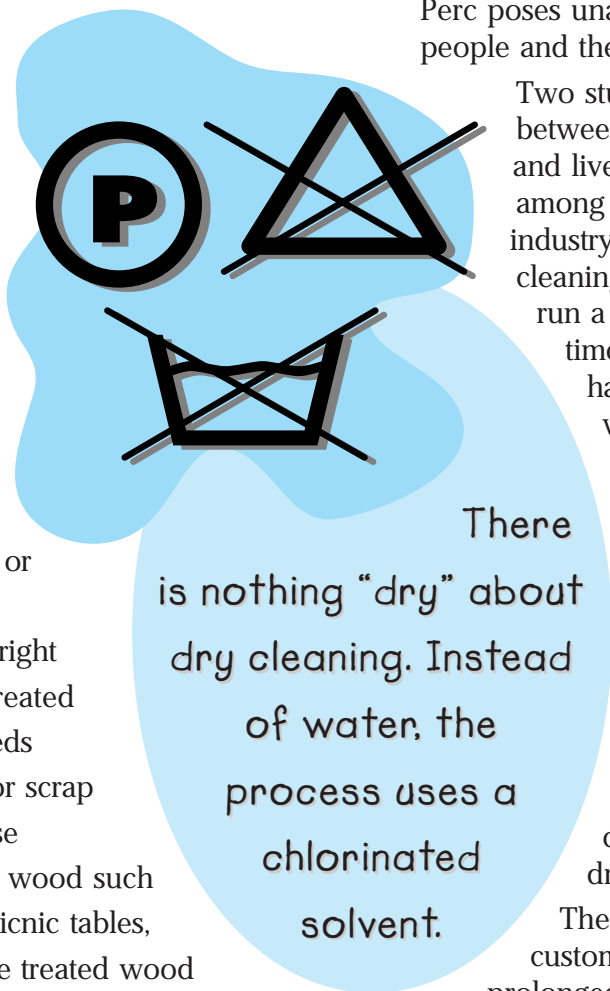
Perc poses unacceptable and unnecessary risks to people and the environment.

Two studies have demonstrated a link between cancer and the use of perc. Breast and liver cancer are particularly prevalent among workers in the dry cleaning industry. A study of 3000 pregnant dry cleaning workers showed these women run a risk of miscarriage three to four times higher than the norm. Scientists have carried out brain scans of workers exposed to solvents and found clear evidence of irreversible damage to brain tissue.

Workers, consumers and those living near dry cleaners are likely to exhibit symptoms of general ill health — fatigue, irritability, persistent headaches, dizziness, eye and skin irritation. Emissions are often high enough to detect measurable levels in the breath of children and adults living above dry cleaners.

There have been extreme cases of customers dying in their homes after prolonged proximity in an enclosed space to not-quite-dry items such as curtains and blankets. Even driving home with dry cleaning in the car can cause problems. Dry cleaned clothes placed in a closed car next to a bag of groceries can contaminate food in less than one hour. Fumes build up quickly in a closed car and may, within as little as a half hour, produce a narcotic effect on the central nervous system. This has the same effect on the driver as consumption of several alcoholic drinks.

New evidence indicates perc is entering the food chain. Studies found high concentrations of perc in food, particularly in dairy and fatty foods, sold in stores near dry cleaning establishments. This is a serious discovery as perc is toxic if ingested and accumulates in the body, especially in fat tissue, mother's milk and blood.



Perc in dry cleaning machines is supposed to be recycled for repeated use, then distilled before disposal. But researchers recently discovered that closed system distillation processes produce toxic dioxins. Used solvents are eventually discarded in landfills or incinerators. If landfills leak, perc can contaminate groundwater. When it is incinerated highly toxic dioxins are formed and released from incinerator stacks. All forms of solvent cleaning should be avoided.

Better: New methods of dry cleaning are being developed which clean clothes by drying, vacuuming, steaming, local spot removal and pressing. Such methods are as efficient as solvent cleaning and have a number of other advantages. A big plus is the fact that these methods are more labour intensive than chemical dry cleaning and offer great opportunities to create employment

which does not expose workers to toxic chemicals. The cost savings on equipment and chemical purchasing, combined with increased productivity by workers who are not always slightly (or seriously) ill combine to make alternative operations no more expensive to run than current establishments.

Encourage your local dry cleaner to convert.

Best: Avoid buying clothes which require specialised cleaning. Most clothes with 'Dry Clean Only' labels can actually be hand or (carefully) machine washed. Before the advent of solvent-based "dry" cleaning, clothes were spot-cleaned, brushed and steamed. Effective and inexpensive means of removing stains and grease include salt, water, vinegar, corn flour, baking soda and lemon juice.

Try these options for stain removers*

BLOOD:

- Pour hydrogen peroxide on the stain and rinse in cold water.
- Immediately pour salt or club soda on the stain and soak in cold water. (It's a good idea to keep a bottle of soda water in the fridge.)
- For more stubborn stains, mix cornstarch with talcum powder or cornmeal in water and apply mixture to stain. Allow to dry, brush away.

CHEWING GUM:

- Rub with ice—gum will flake off.

COFFEE & CHOCOLATE:

- Soak in cold water, rub with soap and a mild borax solution, rinse, then wash in very hot water.
- Mix egg yolk with lukewarm water and rub on stain.
- For stains on coffee cups or pots: moist salt or salt and ice.

FRUIT & WINE:

- Immediately wet the stain and pour salt or club soda on it, let sit for awhile, then soak in water or milk before washing.

OILS OR GREASE:

- For white cottons, pour boiling water through the fabric and follow with dry baking soda, or rub with washing soda in water. (NB: Check washing instructions before applying boiling water or choosing washing temperature.)
- For other materials, blot with towel, dampen stain with water and rub with soap and baking soda. Follow by washing in water as hot as possible, using extra soap.
- Borax on damp cloth will remove many grease stains.
- White chalk rubbed into stain before washing will help remove oil stain.

INK:

- Ballpoint: sponge with rubbing alcohol, rub with soap, rinse and wash.
- Soak in milk.
- Felt-tip: rub with soap, rinse and wash.

LIPSTICK:

- Rub with cold cream or shortening to dissolve the colour, then rinse with solution of soap and washing soda in warm water to remove the grease. Wash in soapy water as hot as the fabric will stand.

PERSPIRATION:

- White vinegar and water.

MILDEW:

- Pour soap and salt on the spots, rinse and dry in sunlight.
- Spray with vinegar or lemon juice and place in sunlight. Keep spots moist and repeat as often as necessary.
- Soak in equal parts white vinegar and salt, rinse and dry in sunlight.

RUST:

- Saturate with sour milk, buttermilk or lemon juice, then rub with salt. Place in direct sunlight until dry, then wash.

SCORCHES:

- Gently boil scorched article in 250ml soap and 2 litres of milk.
- Rub with grated onion, wash.

SOILED DIAPERS:

- Pre-soak in 45ml baking soda dissolved in warm water in a tub or washing machine.

* Reprinted from "What Does Clean Really Mean" Georgia Strait Alliance, Mid-Island Community Household De-Tox Challenge, Phase 1

TOP 10 PRECAUTIONS TO TAKE

As we have noted throughout this fact sheet, sometimes there simply is no alternative to the hazardous products we need for certain hobby and workshop projects. On those occasions, the following steps should be taken to minimize the dangers posed by these products,

1. Read the label and follow all directions carefully.
2. Buy the most appropriate product for the job and the least hazardous. Use the product in its safest form - pick liquid rather than powder, brush-on rather than spray.
3. Ventilation is vital. Opening one window is not enough. Make sure there are two windows open and use a fan. If this is not possible, wear a respirator with the right cartridge for the specific toxic substance.
4. Never use solvents or strippers during pregnancy.
5. Avoid skin contact. Wear gloves. Special glove materials are needed for some solvents.
6. Remove soft contact lenses.
7. Keep containers sealed and different classes of products separated. Label secondary containers. Keep lids tightly closed when not in use.
8. Make sure all sources of flame are extinguished when working with flammable materials.
9. Never eat or drink in the work area.
10. Never use toxic products on items which may contact food: cutting boards, bowls, kitchen counters, etc.

And, finally, a few words about disposal...

The greatest environmental threats posed by solvent use are the result of thoughtless disposal. Never pour solvents down the drain or throw them in the garbage. As few communities have adequate disposal options for household hazardous waste, it is best to avoid creating it.

Buy only what you need.

Check to see if you already have the product on hand before buying more.

Ask if a neighbour has some of the leftover product you can use up.

Offer your leftovers to neighbours or community groups.