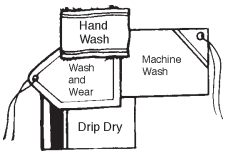
Quick 'n Easy
Stain Removal

Stain removal is a necessary part of clothing care. Quick and cautious stain removal keeps clothes in wearable condition longer and helps reduce clothing costs. This publication gives questions to ask yourself before removing stains and explains how to remove many stains from washable fabrics.

What does the clothing care label say?

Clothing manufacturers are required to attach a "permanent care label" to most clothing to indicate the care recommended. Labels may be in the back of the neckline, waistline, or a back or side seam. **Check the care label to see if the fabric is washable or dry-cleanable.**



Some items that are washable cannot be dry-cleaned. For example, some flocked fabrics or sequin trimmed garments have adhesives that dissolve in dry-cleaning fluid. The care label also may carry other warnings such as "Do not use chlorine bleach." Be sure to follow these recommendations.

What if the care label says "dry-clean only"?

The procedures described in this publication do not apply to garments labeled "dry-clean only." Stains on most of these items cannot be removed successfully at home. **If a stained garment is labeled "dry-clean" or "professionally dry-clean," blot up the excess stain and take the garment to the cleaners as soon as possible (within 24 to 48 hours).**

Tailored linens, silks, and wools often must be dry-cleaned. Tell the cleaner the fiber content of the clothing and the type of stain, if you know. Suede, leather, and fur require professional cleaning services not offered by every dry-cleaner.

A label's recommendation for dry-cleaning usually is based on the fiber content of the clothing, but may relate to other parts of the garment, such as interfacing, elastic, and trim.

Does fiber content matter?

Yes. Fibers with different chemical composition behave differently when stained and when treated with stain removal agents. Hang tags or other labels on clothing tell the fiber content. Knowing this information helps you make better judgments about stain removal procedures. Hang tags also may identify invisible durable press or soil release finishes that interfere with stain removal or make it easier. For example, oily stains bond more firmly to durable press fabrics than to untreated fabrics, making removal more difficult. Keep these points about fiber content in mind when choosing stain removal procedures:

- **Acetate fabrics** dissolve in fingernail polish remover (acetone). Triacetate and modacrylic fabrics can be damaged by acetone or paint thinner.

- **Acrylic, nylon, olefin, polyester, and blends of these synthetic fibers** make tough, durable fabrics, but also attract oil stains. Remove oil stains promptly. If oil stains dry in the dryer or are ironed into fabrics containing these fibers or finishes, removal is extremely difficult. If treated quickly, however, oil stains usually can be removed easily. Oil stains appear as darkened spots or splotches on most plain medium colors, such as light blue or khaki permanent press shirts, and on bright colors, such as red nylon athletic gear.

- **Synthetic fiber fabrics** are heat sensitive and deform, shrink, and melt at high temperatures. They can get more-or-less permanent wrinkles in the spin cycle of a washing machine set for a hot-water wash, or from an overcrowded dryer that runs too long. Steam pressing sometimes removes heat-set wrinkles, but the melting temperature of the fibers is so close to the temperature needed to iron out wrinkles that pressing must be done carefully to avoid melting and creating holes. Heat shrinkage may make the restored garment fit differently. To prevent wrinkling in washable blends and permanent press clothes:
  - avoid overloading the washer, as clothes should move freely;
  - set washer water temperature at warm, not hot, for the permanent press cycle;
  - dry clothing on the permanent press setting;
  - remove clothing from the dryer at the end of the cycle and do not overdry; and
  - hang garments on hangers after drying, as temporary wrinkles usually "relax" or fall out in a few hours.

Table of Contents

IOWA STATE UNIVERSITY
University Extension
Ames, Iowa

Pm-858 | Revised | July 1997

- **Cotton, linen, lyocell, rayon, ramie, and other cellulosic fibers** are weakened by repeated exposure to dilute solutions of liquid chlorine bleach. However, bleach can be used safely on cellulosic fibers for occasional stain removal. Undiluted bleach weakens fabrics so that they tear or wear out more quickly.

  Cellulosic fibers can be scorched when the ironing or drying temperature is too high. Scorching or yellowing occurs as the fiber begins to burn. Scorching is not reversible, but if the fabric is thick enough and the damage is slight, the spot may be "removed." (See page 6.)

- **Olefins** may be damaged by perchloroethylene solvent, but are resistant to trichloroethylene and fluorocarbon dry-cleaning solvents.

- **Silk, wool, and other hair fibers,** such as camel or cashmere, are made of protein and dissolve in fresh liquid chlorine bleach. Dilute solutions of liquid chlorine bleach cause permanent yellowing and stiffening of wool fibers and cause weakening and color loss in silk.

- **Vinyl or natural rubber** fabrics or films are damaged by most oil solvents. Oil solvents tend to remove the plasticizer in vinyl film fabrics, stiffening them.

Can garment design affect stain removal?

Yes. Many garments are designed with dark fabrics and white trim or white fabrics and bright colored trim, such as red piping. When these fabrics are washed, colors can "run." A white shirt may become streaked with pink from its red trim. If this happens, try rewashing the garment with a heavy-duty detergent in hot or warm water, then air dry. If the staining remains, repeat the process. It is not likely that the excess dye from the trim is permanently set in the new location; it may easily wash away. Sometimes bleaching helps, but bleach may fade the other colors in the garment. If the bleeding continues in the second wash, the dye is probably a fugitive type that will continue to bleed with each wash.

What are the most important points in stain removal?

- Take care of stains promptly. Fresh stains are much easier to remove than those over 24 hours old.

- Blot up any excess liquid with a clean white cloth or paper towel. Remove excess solids by gentle scraping or chipping with a dull knife or metal spatula. With some solids, such as heavy amounts or surface mud, removal may be easier after the stain has dried. Brush off the excess before the clothing is submerged for washing.

- Avoid rubbing the stained area with a linty terry towel or a dark-colored cloth. You may complicate the problem.

- Never rub a fresh stain with bar soap. Soap sets many stains.

- Check laundry for stains before washing. Many stains need pretreatment.

- Inspect wet laundry before drying to be sure a stain has been removed. If a stain is still evident, do not dryer dry. The heat of drying makes the stain more permanent.

- Before starting on the stain, test stain removal agents on a seam or hidden area of the garment to be sure they do not affect the color or finish of the fabric.

- Avoid excessive rubbing unless the fabric is tough and durable. Rubbing can spread the stain and damage the fiber, finish, or color of the fabric. However, gentle to vigorous rubbing and agitation under running water helps remove dried food, protein, or oil stains from shirts or jean-weight fabrics made of cotton or cotton/polyester blends.

- Do not iron or press stained fabrics until the stain is completely removed. Heat sets most stains.

- Wash heavily stained items separately. Soil and stains can be redeposited on cleaner clothing during laundering if, a) too little detergent is used, b)water temperature is too low, c)washing time is too long, or d) the washer is loaded with too many clothes. **Never wash family clothes with pesticide-soiled clothes.**

- Avoid using hot water on stains of unknown origin. Hot water can set protein stains like milk, egg, or blood.

- Use the water temperature recommended on stain removal products and detergents. Hot water should be between 120 and 140°F, warm water between 85 and 105°F, and cold water between 65 and 75°F. Water below 60°F is too cold for detergents to be helpful.

What are the common stain removal chemicals?

Common name	Chemical	Brand Name
Alcohol (rubbing)	isopropyl	
Ammonia	ammonium hydroxide	Mr. Clean
Color remover	sodium hydrosulfite	Rit, Run Away
Commercial stain removers*	isopropyl alcohol or other unspecified ingredients	Easy Wash, Tech, Whizz
Dry-cleaning fluid or petroleum-based pretreatment solvent	perchloroethylene, trichloroethylene petroleum distillates	Aerosol Shout, Spray'n Wash, K2R Spot Lifter
Lemon juice and salt	citric acid and sodium chloride	
Nail polish remover	acetone	
Naphtha	Naphtha	Energine
Rust removers**	hydrofluoric acid, oxalic acid	RoVer, Whink, Yellow Out, Wow
Photo supply acid fixer	sodium thiosulfate	
Turpentine	terpene	
White vinegar	acetic acid	

*Limited testing on these products has shown them to be less effective than advertised.
**Do not use these products with chlorine or oxygen-type bleach.

What supplies are needed for stain removal?

Stain removal supplies are found in grocery, discount, drug, general merchandise, and paint stores. Many commercially available stain removal products have proprietary formulas that are protected by patent rights and not available to the public. Ingredients listed on the labels for safety purposes can help you decide if the product will be useful for the stain removal task you have. There is no miracle product that removes all stains.

✕ Absorbent Materials

With many stains, the first step is mopping up the excess. Clean cloths and white paper towels are useful for this and also necessary for spot treatment. White or neutral colored sponges can be used. Be aware, however, that some colored sponges or paper towels are not colorfast and can bleed onto the fabric you are treating, creating a dye stain that may be difficult to remove.

✕ Detergents

Detergents help remove soils and stains. Most detergents now are concentrated so that less is needed per washload than in the past. "Ultra" is a term used to describe very concentrated detergents. Package directions explain the amount needed, which may be astonishingly small. Detergents may be fragrance-free or contain perfumes. Detergents that contain bleach or fabric softener may not be as effective in stain removal and/or softening as regular detergent plus the separate additives.

Heavy-duty liquid detergents dissolve easily regardless of water temperature and are convenient for treating oil stains. Powdered detergents may not dissolve if wash water is not warm enough. This can lead to powdery or dull deposits on dark clothing.

Most detergents contain enzymes to help remove food stains: amylase for starch; protease for protein; and lipase for fats. Many detergents also contain the cellulase enzyme that is designed to remove the fuzzy surface fibers and pills (fuzz balls) from the surface of cellulosic fiber and fabric blends. Detergent companies claim this removal of lint-forming fiber ends helps restore the surface color of the fabric.

Most detergent labels today indicate that the products contain very few or no phosphates. Although phosphates in detergents can boost cleaning power, regional and/or local bans on phosphates have been enacted for environmental reasons. In some locations, detergents containing phosphates may be available.

Companies may use the same brand name, (e.g., *Tide*) for both non-phosphate and phosphate-containing detergents. The label usually explains the code that is imprinted on the box to indicate which type of product it is. Sodium tripolyphosphate also may be found in some household cleaners, such as *Spic 'n Span.*

Powdered detergent brands: *Amway, Arm & Hammer, Bold, Dash, Dreft, Fresh Start, Oxydol, Purex, Rinso, Surf, Tide, Wisk, Woolite.*
Liquid detergent brands: *All, Amway, Arm & Hammer, Cheer, Dreft, Dynamo, Era, Purex Ultra, Surf, Tide, Wisk, Woolite.*

✕ Bleach

Bleach is available in liquid, gel, and powdered forms. The gel formulation is new and offered as a stain removal aid. Labels caution against letting gels dry on fabrics before laundering.

- Hydrogen peroxide is the mildest bleach. It also is used as a bleach for human hair. Brand names: *Shoppers Value.*

- All-fabric bleach may be liquid or powder. It usually is advertised as safe for all fabrics and colors. All-fabric bleach works more slowly than liquid chlorine bleach and may contain sodium perborate or sodium percarbonate. Companies change the names, purposes, and formulation of products frequently, so read labels carefully. For example Biz® "all-fabric bleach" used to be an "enzyme presoak."

Liquid brand names: *Vivid, Clorox 2.*
Powder brand names: *Clorox 2, Biz.*

- Liquid chlorine bleach is a 5.25 percent solution of sodium hypochlorite. It must be diluted with water for safe use on fabrics, but it is a much more powerful sanitizer and whitener for bleach-safe fabrics. Never use full-strength bleach (without dilution) on fabric. Without dilution, liquid chlorine bleach can dissolve silk and wool.

Do not use bleach on silk, wool, spandex, polyurethane foam, or rubber, or on garments with rubber or spandex elastic. Even when diluted, repeated use weakens cellulosic fiber fabrics.

Never pour full-strength liquid chlorine bleach into a washload; it can fade colors and weaken fabrics.

When using a bleach treatment, a stain should come out within 15 minutes, assuming the bleach is fresh; if not, the stain will never be removed, and further bleaching only weakens the fabric.

Liquid chlorine bleach has a limited shelf-life. Bleach more than six months old may have no effect on stains and needs to be replaced. Diluted fresh bleach whitens clothing in minutes.

To test a fabric's colorfastness to liquid chlorine bleach, mix one tablespoon of bleach with 1/4 cup of water. Use an eyedropper or cotton-tipped swab to put a drop of this solution on a hidden seam or pocket edge inside the garment. Let the garment stand two minutes, then blot dry. If no color change occurs, it is safe to use the bleach on the garment. Powdered bleach packages explain directions for doing colorfastness tests.

Liquid brands: *Clorox, Hilex, Chateau.*
Gel brands: *Spray 'n Wash.*

✕ Pretreatment products

Many products specifically designed for stain treatment before laundering now are available in stores. They come in sticks, gels, squeeze bottles, pump sprays, or aerosol sprays. In general, these are convenient and effective as advertised. Most are detergent or surfactant based, rather than solvent based. Aerosol sprays are solvent based and especially effective on old or set oil stains.

Aerosol sprays—petroleum-based solvent brands: *Clorox, Shout, Spray'n Wash.*
Gel brands: *Shout, Spray 'n Wash, Wisk-Away.*
Pump-sprays—detergent-based brands: *Clorox, Shout, Spray 'n Wash, Wisk-Away.*
Squeeze bottle brands: *Clorox Stain Out, Shout, Spray 'n Wash.*
Stain stick brands: *Spray 'n Wash, Wisk-Away.*

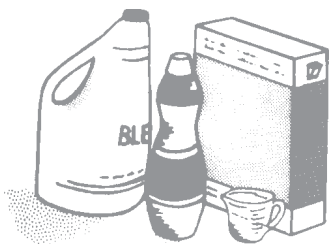
✕ Odor-reducing agents

Managing odor is difficult. Many air fresheners are on the market for use in homes and offices. When airing alone is not enough, activated charcoal, calcium carbonate, or soda may reduce odors. These chemicals may be helpful in treating carpets for pet urine and reducing skunk odor.

Are stain removal chemicals safe?

Yes. Stain removal products have been tested and labeled for safe consumer use. However, **they can be dangerous if improperly used or stored.** Some are flammable; others are toxic. Here are some rules to keep in mind regarding their use:

- Store stain removal materials out of the reach of children.
- Do not store stain removal supplies with food products.
- Store cleaning and stain removal chemicals in their original containers so label directions are available in case of an accident.
- Read all label directions and warnings.
- Use stain removal products according to label recommendations.
- Avoid getting the chemicals on your skin.
- Use dry-cleaning solvents and other chemicals in a well-ventilated room. Toxic fumes can cause illness.
- Do not use solvents near an open flame or electrical outlet.
- Seal containers so fumes cannot escape.
- Never mix stain removal products together (bleach and ammonia together form toxic fumes).



Can similar stains be treated alike?

Yes. Different sources classify stains in different ways. The stain classification system described on these two pages puts stains in groups that require similar treatment and are easiest to remove. Those requiring a combination of treatments are listed last. See pages 6 and 7 for stains needing special treatment.

✕ Protein Stains

Soak in cold water; rub fabric against itself under running water to dislodge stain. Launder in warm water with heavy-duty laundering detergent.

Baby food	Feces	Pudding
Baby formula	Gelatin	Urine
Blood	Ice cream	Vomit
Cheese sauce	Milk	White glue or school paste
Cream	Mucous	
Egg	Mud	

Fresh protein stains can be removed by soaking and agitating or rubbing the stain in cold water before washing. These stains contain other ingredients besides protein, but protein needs treatment first. If hot water is used first, it cooks the protein, causing coagulation between the fibers in the yarns of the fabric, making the stains more difficult to remove.

If protein stains are dried or old, scrape or brush off crusted matter (if any), then soak in cold water using a liquid detergent. After treating the stain, launder in warm (not hot) water with detergent, rinse, and inspect. If stain remains, soak an additional half-hour, then rewash. Bleach may be necessary if the stain was colored, such as with baby food beets, strawberry gelatin, or ice cream.

✕ Oil-based Stains

Pretreat. Wash using heavy-duty detergent with hot water.

Automotive oil	Cooking fats and oils	Hand lotion
Bacon fat	Diesel fuel*	Lard
Butter/margarine	Face cream	Mayonnaise
Car door grease	Gasoline*	Salad dressing
Collar/cuff greasy rings	Hair oil	

Stain-removal pretreatment products help remove oil stains. Stain sticks are convenient for collar soil. Solvent-based stain removal agents are especially effective for stains that are more than two days old or that have been set by dryer heat. If stain removal pretreatment products are unavailable, apply heavy-duty liquid detergent, or powdered detergent mixed with water to make a runny paste, to the stain. Work the detergent into the stain.

After pretreatment, wash the garment in hot water (if safe for the fabric) using the recommended amount of detergent for a regular laundry load. Rinse and inspect before drying. Repeat this treatment if removal is incomplete.

***Caution: Diesel fuel and/or gasoline stains make clothing more flammable than normal.** Most clothing is very flammable; when soaked with these fuels, it is even more dangerous if exposed to a flame or ignition source. Use detergent-based stain removers, not solvent-based ones. Air clothing thoroughly; do not place a garment in a dryer if you can still smell fuel.

✕ Tannin Stains

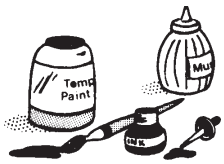
Do not use natural soap. Wash in hot water with detergent.

Alcoholic beverages	Cologne	Tea
Beer	Felt-tip water color pen or washable ink	Tomato juice
Berries (cranberries, raspberries, strawberries)	Fruit juice (apple, grape, orange)	
Coffee	Soft drinks	

Fresh tannin stains usually can be removed by laundering the fabric using detergent (not soap) in hot water (if safe for the fabric), without any special treatment. Natural soap (bar soap, soap flakes, or detergents containing natural soap) makes tannin stains more difficult to remove. Old tannin stains may need bleach treatment.

✕ Dye Stains

Wash in hot water with heavy-duty detergent and bleach (if safe for the fabric).



Cherry, blueberry
Color bleeding in wash (dye transfer)
Felt-tip pen (permanent ink may not come out)
Grass
India ink
Kool-Aid
Mercurochrome
Mustard
Tempera paint

Dye stains are difficult to remove. First, pretreat the stain with a heavy-duty liquid detergent, then rinse thoroughly. Soak the stained garment in a dilute solution of all-fabric powdered bleach. A few highlighter (marker) stains may be removed or lightened by rubbing immediately with isopropyl alcohol and flushing with hot water.

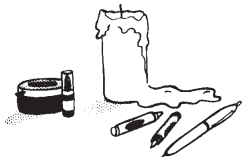
If the stain persists, and the garment is white or colorfast, soak in a dilute solution of liquid chlorine bleach and water. Be sure your bleach is fresh. Bleaching damage to colored garments is irreversible. To decide if a fabric can be bleached safely, use the test described on page 3. If the stain is not removed in 15 minutes, it cannot be removed with bleach; further bleaching will only weaken the fabric.

Caution: Since bleaches can alter the color of a fabric as well as the stain, bleach the whole garment; do not try to bleach just the stain.

✕ Combination Stains

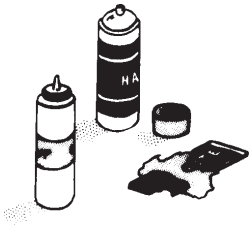
Use a two step treatment: (1) Remove the oily/waxy portion of the stain, then (2) remove the dye portion using bleach (if safe for the fabric). Combination stains contain a variety of ingredients, but all usually have an oily/waxy component and a dye/pigment component. Use the procedures recommended for removing oil stains first.

Step 1 procedure depends on whether the stain is in Group A or B, as follows.



Group A. Spray or sponge with a dry-cleaning solvent (perchloroethylene, trichloroethylene) or treat with a stain stick. Then rub with heavy-duty liquid detergent and scrub in hot water.

Ballpoint ink
Candle wax
Carbon paper
Carbon typewriter ribbon
Crayon
Eye makeup (mascara, pencil, liner, shadow)
Floor wax
Furniture polish
Lipstick
Livestock marker
Pine resin
Printer ink
Shoe polish
Tar



Group B. Rub heavy-duty liquid detergent into stain before washing.

Barbecue sauce
Calamine lotion
Catsup or tomato sauce
Cocoa or chocolate
Face makeup (powder, rouge, foundation)
Gravy
Hair spray

When Step 1 procedures are complete, follow Step 2 to remove the dye stains using bleach. Try an all-fabric bleach which is less damaging to colors and fabrics. Use liquid chlorine bleaches for tough dye stains on fabrics that are colorfast to bleach.

What if you don't know what the stain is?

The stain's odor, location, and color may give you clues. Old oil stains may smell rancid, but appear dry. Food stains are often on the front of garments; perspiration stains around collars and underarms; black grease is often on pants or skirts at car door latch levels.

Stain color may be misleading. Rust-colored stains may be tea, coffee, lemonade (caramelized sugar), cosmetics containing benzoyl peroxide (which can bleach many colors to look rusty), felt marker, or many other things. If a heavy waxy or gummy residue is present, the stain may respond best to spot treatment with a dry-cleaning fluid.

Use the least destructive removal method first. If the whole garment can be submerged, soak it in cold water (as for protein stains). If it cannot be submerged, try a spot treatment technique. Next, use liquid detergent and lukewarm or hot water, rinse, and air dry (as for oil stains). If you suspect the stain is iron rust, treat with rust remover before bleaching. If the stain persists, use a pretreatment spray or solvent (as for combination stains) and an all-fabric bleach. Finally, if all-fabric bleach doesn't remove the stain and the garment is colorfast or white, try a dilute solution of liquid chlorine bleach.

What is spot treatment or "sponging"?

Spot treatment, sometimes called "sponging," confines the stain to a small area and keeps it from spreading. You need absorbent material, such as clean rags or white paper towels, and a dry-cleaning solvent, spot remover, or aerosol pretreatment spray.

Follow these steps:

1. Pad the working surface with clean rags or paper towels that can absorb stains.
2. Place the stained area or spot on the garment face-down over the padded surface.
3. Dampen a small white cloth with solvent.
4. Use the dampened cloth to pat the stain from the wrong side. Feather the edges of the stain working from the outside toward the center to keep the stained area from getting larger.
5. As the stain transfers to the absorbent material beneath the fabric, move the stain to a clean place on the absorbent material so the stain has a clean place on which to transfer.
6. Repeat this procedure until all traces of stain are gone. Launder to remove any ring that might be left by the solvent.

What about more difficult stains?

Stains that do not respond to the methods described on pages 4 and 5 may need special treatment. Here are some tips for difficult stains.

Chewing gum: Apply ice to harden gum. Crack or scrape off excess. Treat with gel, stain stick, or aerosol pretreatment spray. Rub with heavy-duty liquid detergent. Rinse with hot water. Repeat if necessary. Launder.

Deodorant: Apply liquid detergent; wash in warm water. Aluminum or zinc salt buildup from deodorants may be impossible to remove.

Fingernail polish: Do not use nail polish remover (or acetone) on acetate, triacetate, or modacrylic fabrics; nail polish remover will dissolve these fabrics. Take these fabrics to professional dry-cleaners and identify the stain. For other fabrics, use nail polish remover, acetone, and the spot treatment method.

Hog confinement odor: Wash clothes with heavy-duty detergent and add 1/4 to 1/2 cup household ammonia to each load. Do not mix ammonia and bleach in same washload; together they produce toxic fumes. Ammonia can be used on colored fabrics, but it occasionally alters a garment's color.

Iodine: Iodine is removed quickly with sodium thiosulfate, which is sold in photo supply stores as "acid fixer." If the photo supply fixer solution contains chemicals other than sodium thiosulfate, do not use it. Iodine also may be removed with some commercial stain removers.

Lead pencil: Use an art gum eraser to lift off excess, but avoid rubbing the fabric. For delicate fabrics, use spot treatment methods. For most durable, washable fabrics, use a pretreatment aerosol product, stain stick, or stain removal gel. Then rub in heavy-duty liquid detergent. Rinse in warm water and launder.

Mildew: Mildew is a growing organism that must have warmth, nutrients, and moisture to survive. Mildew eats cellulosic fibers, damaging and weakening fibers and fabrics. To remove mildew, first shake or brush item outdoors. Pretreat darkest stains with heavy-duty liquid detergent. Launder in hot water with a heavy-duty detergent. Bleach as safe for fabric. Mildew attacks and destroys fibers, so bleaching may not restore fibers to white.

Odor: Most odors are removed by laundering. For persistent odor problems, place calcium carbonate crystals, activated charcoal, or baking soda in an open container and store with clothes. Or sprinkle baking soda directly on fabric and let stand; then shake or vacuum and launder.

Paint—latex: Treat while wet. Soak in cold water; wash in cool water with heavy-duty detergent. After paint has dried for 6 to 8 hours, removal is very difficult. Treat as combination stain. Wash in hot water. Rinse. Repeat if necessary.

Paint—oil based: Treat while wet. Use thinner recommended for paint. Use spot treatment technique and thinner on spots until paint is softened and can be flushed away in a heavy-duty detergent wash. Usually turpentine, paint thinner, or alcohol work as solvents.

Perspiration: Apply liquid detergent or soak in warm water with presoak for 15 to 30 minutes. Launder in hot water if safe for fabric.

Pesticides: If full-strength liquid concentrate spills on clothes, handle only with rubber gloves. Discard clothing immediately. Laundering does not remove concentrate to a safe level for reuse of clothing, even for reuse as rags. Launder other pesticide-contaminated clothing separately. If visible staining from diluted spray of pesticide residues remains after laundering, rewash using hot water, heavy-duty detergent, and a full water level. Then line dry. Read ISU Extension publication *Family Pesticide Safety: What to Do When Clothes Are Soiled With Pesticide,* Pm-1663b, for more detailed laundering instructions.

Rust: Commercial rust removers found in grocery stores are effective and safe for most fabrics; however, rust removers that contain hydrofluoric acid are extremely toxic and can burn the skin and damage appliance finishes. A solution of oxalic acid crystals in water also removes rust stains, but the crystals are often difficult to find.

Lemon juice and salt are readily available and sometimes remove rust. Sprinkle salt on the stain, squeeze lemon juice on it, and spread the garment in the sun to dry. A word of caution: Lemon juice can bleach some colors, and many washable garments are not colorfast to sunlight.

Rust stains cannot be removed in normal laundering. Chlorine bleach makes them permanent. However, you can treat an entire load of iron-stained clothing using commercial rust removal products. Be sure to follow label directions carefully.

Many rust-colored stains are not rust from iron oxide; rust removers will not help these stains. For example, caramelized sugar and benzoyl peroxide stains may be rust colored, but are not really rust.

Scorch: Excess heat on cellulosic (cotton, linen, lyocell, ramie, rayon), wool, or synthetic fibers can damage garments permanently. If fabric is thick and fuzzy, brush to remove charring. Rub liquid detergent into scorched area. Launder. If stain remains, bleach using an all-fabric bleach. Fabric will be weakened permanently in the scorched area. Melted or glazed synthetic blends cannot be restored fully.

Skunk: In time, skunk odor dissipates with outdoor airing. Soak in washing soda solution or detergent and warm water, if clothing is washable. Wash clothing in a heavy duty detergent with all-fabric bleach (if colored fabric) or with liquid chlorine bleach (if white). Or else soak clothes in a dilute solution of ammonia. **(Never mix bleach and ammonia together. Toxic fumes form.)** Air dry-cleanable clothing thoroughly, then take to the dry-cleaner. Dry-cleaning chemicals should reduce odor. Commercial carpet and upholstery cleaning companies can treat your home with ozone treatments that mask odor. For small spaces, activated charcoal, room deodorizers, or commercial odor-masking fragrances may help.

Smoke, soot: Shake off excess soot outdoors. Launder in washing machine using heavy-duty liquid or powdered detergent as recommended by the manufacturer, one cup of water conditioner, and 1/2 cup of all-fabric bleach. Use water temperature appropriate for the fabric. Air dry. Inspect for smoke odor. Repeat as necessary. Three or four washes may be needed for cottons and cotton blends. If garments are excessively sooty, small pinholes where the fabric was burned may show after washing.

Urine: Rinse in cold water and launder. For stains on mattresses, (1) sponge with cloth using detergent solution, (2) rinse with cloth using vinegar solution, (3) let air dry, and (4) if odor remains, sprinkle with washing soda or calcium carbonate; wait one day, then vacuum.

Water spots: Launder. Dry-cleaning may not provide the desired results on tailored rayon suits that are water spotted. For dry-cleanable draperies, consult a professional cleaner. Water marks on drapes are water soluble and cannot be removed with dry-cleaning solvents.

What about other remedies?

Many sources of stain removal information exist. Some are more reliable than others. Some methods require unnecessary risk, and some make stains worse. For example:

Dishwasher detergent: These are intended for use in closed dishwashers with very hot water. They are highly alkaline and can irritate your skin if used for stain removal. They also may fade colors or damage wool, silk, or nylon fibers.

Hair spray on ballpoint ink: Hair spray may alter color in some fabrics or leave a gummy residue and perfume, which must be removed. The alcohol in hair spray helps remove the oily part of the ballpoint stain.

Ironing candle wax: Ironing candle wax between blotting paper drives the stain deeper into the fabric. This process is widely used, but not recommended. It more permanently sets the dye from the candle and makes it difficult for the detergent or solvent to reach the wax portion of the stain.

Milk on washable ink: Milk does not remove ink and leaves an additional protein stain.

Salt to make dyes colorfast: Soaking clothes in salt water does not improve colorfastness. If a salt water soak decreases bleeding in cotton, rayon, or ramie fabric, the effect will not be permanent and the dye will bleed again when wet unless there is salt in the solution. The colorfastness of synthetic fiber fabrics or their blends is unaffected by salt due to the chemical composition of their dyes.

Shampoo: Clear, gel-like shampoos are sometimes suggested for stain removal. They usually do not harm fabrics and may remove light oil stains, but laundry detergents are less expensive. Colored opaque or milky-looking shampoos may stain fabrics or foam so much that they are difficult to rinse out. Stain removal gels are currently available.

Stain wipes: Individual towelettes for travelers claim to be effective on many stains and are convenient to pack. They may spread and/or drive the stain deeper. Prompt followup treatment is important.

White vinegar: Vinegar (acetic acid) may weaken cotton, rayon, acetate, triacetate, or silk fibers and may alter color. If white vinegar is used to remove stains, test it first on a hidden seam allowance for colorfastness. Vinegar will not remove or set creases in today's synthetic or permanent press fabrics, as is commonly believed.

Can staining problems be explained or avoided?

Yes. With some stains, the only successful remedy is prevention. This section describes some common consumer complaints about staining and its causes.

Greasy-looking fabric softener splotches: Excessive use of fabric softener sheets in the dryer can deposit softener unevenly, causing greasy-looking, splotchy stains on silk-like polyester and blends of cotton/polyester broadcloth. This problem is especially noticeable on medium-colored fabrics such as khaki and medium blue. Avoid this problem and control static by using a fabric softener that is added to the final rinse. Fabric softeners are highly concentrated. Dilute according to the label. If using fabric softener sheets, add them to a cold dryer.

Odd colored or rusty looking stains on collars, sheets and pillow cases, bedspreads, towels, or washcloths: These stains often are caused by the benzoyl peroxide used in cosmetic products (including acne medicine). This chemical acts as a bleach and is insoluble and hard to rinse off the body. It can change colors of some dyes permanently.

Stiff, coarse textures and/or dull colors in freshly laundered fabrics: Nonphosphate granular detergents combined with hard water can leave a residue that stiffens fabrics and makes them feel harsh. Avoid the problem by using a heavy-duty liquid detergent. Stiffened clothing may be softened partially using a solution of white vinegar and water (1 cup vinegar per gallon of water). First test clothing for colorfastness to vinegar on a hidden seam allowance. This clothing also can be restored by treating as for yellowing, graying, or general discoloration.

White powdery streaks on dark clothes: Powdery streaks on dark clothes probably are caused by undissolved detergent and/or lint. Some nonphosphate detergents deposit mineral residue that shows as streaks. Avoid this problem by changing detergents or by adding detergent to the wash water before clothes. Using a higher wash water temperature may prevent this problem by dissolving detergent more completely. Usually a repeat rinse and spin cycle with clear water removes these streaks.

White streaks on blue jeans: White streaks on blue jeans are probably not caused by undissolved detergent. Blue jeans are often dyed with indigo dye, which is a fugitive dye that bleeds in a water solution. As the washer spins, the edges where the fabric is folded receive more abrasion and rougher treatment, causing the fibers to wear off and color to escape. Turning jeans wrong side out before laundering reduces white streaks and fades garments more evenly. To avoid the natural fading that accompanies use of indigo, look for polyester/cotton jeans that are labeled colorfast. They retain their dark blue color.

Yellowing, graying, or general discoloration: This condition occurs when insufficient detergent is used for proper cleaning, when wash water temperature is too low (especially for oil stains), when too much detergent is used and insufficiently rinsed out, when synthetics are washed with a light-duty detergent in cold water, or when color is transferred from other non-colorfast items in the wash.

To refurbish discolored clothing, wash in a permanent press cycle with hot water and a cool-down rinse, adding a cup of water conditioner instead of detergent. If discoloration persists, repeat this procedure or wash again using the correct amount of detergent, an all-fabric bleach, or a diluted liquid chlorine bleach if safe for the fabric.

As a last resort, treat white items with a commercial color remover (sodium hydrosulfite). This reducing bleach must be used carefully, as it easily fades colors in all fabrics.

If the yellow color is on silk, wool, or spandex, it may be caused by fiber alteration from improper use of chlorine bleach; this discoloration is not removable.

Stains in Alphabetical Order

No endorsement of companies or their products mentioned is intended, nor is criticism implied of similar companies or their products not mentioned.

Prepared by Janis Stone, textiles and clothing extension specialist, Iowa State University. Reviewed by Sara Kadolph, associate professor of textiles and clothing. Special acknowledgement to Brecca Farr, textiles and clothing graduate assistant, for laboratory testing. Editing and layout by Lily Auliff, extension communication graduate assistant, and Carol Ouverson, extension communication specialist.

File: Textiles and Clothing 1