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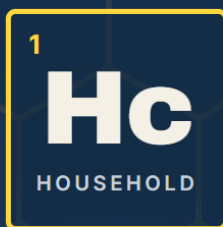
The Household Chemistry Bible

This file contains a few pages from the complete handbook (482 pages) so you can see the format before you buy. Cross-references and index links that point to pages outside this sample will not work here.

The complete package also includes a print edition and four printable bonus PDFs.

The Household Chemist

THE HOUSEHOLD CHEMIST



THE HOUSEHOLD CHEMISTRY BIBLE

*The Complete Guide to 150+ Household Uses, Cleaning
Solutions & Costly Mistakes to Avoid*



WHAT WORKS • WHAT DOESN'T • AND WHY

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Quick-Start Guide

If you read only one page before cleaning something new, make it this one.

The ten-second version

1. **Name the mess.** Grease, mineral crust, soap scum, a protein stain, rust and an odor are different chemistry problems, and they need different products.
2. **Name the surface.** If you don't know what it is, find out or test a hidden spot. Marble, many wood finishes, aluminum and some plastics are damaged by products that are harmless elsewhere.
3. **Use one product at a time.** Rinse before switching. Never mix.
4. **Start gentle.** Water and a soft cloth, then a mild detergent, and only then something stronger.
5. **Follow the label,** every time, for amount, surfaces, contact time and protection.

Five facts that prevent most damage

- **Acids etch calcium-based stone.** Vinegar, lemon juice and many descalers dull marble, limestone and travertine. See [Marble, Limestone and Travertine](#) (p. 302).
- **Cleaning is not disinfecting.** Wiping removes most germs. Killing them takes a registered disinfectant left wet for its full contact time. See [the vinegar myth](#) (p. 389) and Part VIII.
- **Fizzing is not cleaning.** When vinegar meets baking soda, the bubbles are the two products neutralizing each other. See Chapter 2.
- **More product is not more clean.** Excess detergent leaves residue and, in high-efficiency washers, oversudsing. Dose to the label.
- **Bleach plus almost anything is a bad idea.** It releases toxic gas with ammonia and with acids. See Figure 8.1.

Where to find things

You have...	Go to
A specific mess or stain	Part IV, quick-reference table
A product and want to know its uses	Part II, that product's entry
A surface and want to know what is safe	Part V, matrix, then the surface guide
A tip from the internet to check	Part VII, myths
An accident or exposure	Part VIII, Emergency Reference Page, or call 1-800-222-1222



CHAPTER 4 PRD-001

White Distilled Vinegar

Also sold as: distilled white vinegar, white vinegar, cleaning vinegar (a stronger, separate product)

ACTIVE CHEMISTRY
acetic acid

TYPE
Acid

ACIDITY
Acidic

What it is

White distilled vinegar is a dilute solution of **acetic acid** in water. In the US, the white distilled vinegar sold for the table is 4 to 7% acetic acid (SRC-PAN-001), and vinegar used for pickling must be at least 5% acidity (SRC-PAN-021). On the pH scale, household vinegar sits between 2.5 and 4.0 (SRC-CHM-003), and one teaching table lists it at 2.9 (SRC-CHM-001). Because pH is logarithmic, each step on that scale is a tenfold change in hydrogen-ion concentration (SRC-CHM-001). Vinegar is a genuinely acidic liquid, not a neutral one with a sour smell.

Cleaning vinegar is a different product. Penn State Extension reports cleaning vinegars of 11 to 30% acid, and one product at 75% (SRC-PAN-021). An Iowa State AnswerLine page puts some cleaning vinegar at 6 to 8% (SRC-PAN-022). Only the label tells you which one you are holding. Penn State says vinegars intended for cleaning or for horticulture must not be used for food (SRC-PAN-021), and Poison Control points out that with vinegar, the concentration of acetic acid matters as much as the amount when it comes to injury (SRC-PAN-001).

What vinegar does well follows from its acidity. Acids neutralize alkaline deposits such as hard-water scale, dissolve gummy buildup and remove tarnish (SRC-PAN-020). The US Geological Survey notes that this is why vinegar is run through coffee makers: its

acidity helps dissolve mineral buildup (SRC-LAU-008). Several appliance makers publish vinegar methods of their own, from dishwasher rinses (SRC-PAN-026; SRC-LAU-012) to kettles and coffee makers (SRC-LAU-021; SRC-LAU-020).

What vinegar does not do is disinfect. A 2020 laboratory study found that acetic acid, at the strengths used for cleaning, had no disinfecting effect on microorganisms (SRC-CHM-015). The CDC lists vinegar among home alternatives that are not registered with EPA as disinfectants (SRC-PAN-009). For disinfecting, see [Registered Disinfectant Sprays and Wipes](#) (p. 81).

Where acidity is useful, and where it does harm

The same acid that dissolves scale attacks anything built from calcium carbonate. Marble, limestone and travertine are calcium-carbonate stones, and lemon, vinegar and other acids may dull or etch them (SRC-BRD-022; SRC-PAN-006). Daltile warns that even a light solution of vinegar and water will etch and eventually damage natural stone (SRC-SUR-017), and Kärcher says not to use vinegar on stone tiles at all (SRC-LAU-009). The Natural Stone Institute does not recommend acidic cleaners on granite either, because it may contain acid-sensitive minerals (SRC-BRD-022).

Where the sources disagree

Bona says vinegar breaks down a wood floor's finish (SRC-BRD-025), while an Ohio History Connection guide to historic floors suggests a damp sponge mop dipped in hot water and white vinegar for floors whose coating is intact (SRC-SUR-014). Clemson Extension suggests wiping chrome and stainless steel with undiluted white vinegar (SRC-PAN-024), while GE says not to use acids on its stainless steel (SRC-SUR-009). Moen and Delta allow a 50/50 blend of vinegar and water on their faucets for a limited time (SRC-SUR-021; SRC-SUR-022), while Kohler says never to use acids on its faucets (SRC-SUR-023). LG allows vinegar in place of bleach for cleaning a washer gasket (SRC-LAU-016), while Bosch does not recommend vinegar in its washing machines because it may degrade rubber parts over time (SRC-LAU-017). When sources split like this, the maker of the thing you are cleaning has the final word.

Best-known functions

- Dissolving hard-water scale and mineral spots, because acids neutralize alkaline deposits such as scale.
- Descaling kettles and drip coffee makers by the appliance maker's own vinegar method (De'Longhi, Fellow and Mr. Coffee each publish one).
- A periodic dishwasher rinse by the method its maker gives (KitchenAid and GE each publish one).
- Deodorizing a refrigerator interior: Whirlpool lists white vinegar diluted 1:1 with water, rinsed after use.
- Removing the darkening that aluminum cookware picks up from minerals in water, per Ask Extension.
- Dissolving gummy buildup and tarnish on surfaces that tolerate acid.

Supported household applications

9. Remove a limescale mark from a Silestone quartz countertop · p. 145

21. Clean an acrylic tub or shower liner with a little vinegar in hot water · p. 152

60. Wiping stainless steel with white vinegar: check your maker first · p. 176

61. Wiping chrome faucets with vinegar: what Moen, Delta and Kohler each say · p. 177

65. Brighten aluminum cookware darkened by the dishwasher or hard water · p. 179

72. Keep vinegar, ammonia and detergent off a luxury vinyl floor · p. 183

91. Soak mineral scale out of a removable showerhead or faucet aerator · p. 196

92. Wipe hard-water spots off a fixed faucet body with diluted vinegar · p. 196

95. Limescale on glazed ceramic or porcelain tile: check the tile maker before using acid · p. 198

96. Remove hard-water spots from plain window or tabletop glass with vinegar · p. 199

97. Clear limescale from a Silestone quartz surface the maker's way · p. 199

100. Lighten aluminum cookware darkened by mineral-rich water · p. 201

123. Tell dishwasher film from etching on cloudy glassware, and prevent etching · p. 215

125. Run a vinegar rinse through the dishwasher, and know when not to · p. 216

128. Wipe a front-loader door gasket with LG's dilute bleach solution · p. 218

130. Steam-clean a microwave with its Steam Clean function · p. 220

131. Wash the refrigerator interior without damaging liners or glass shelves · p. 220

134. Clean and descale a drip coffee maker with vinegar (Mr. Coffee method) · p. 222

135. Descale an electric kettle the way its maker directs · p. 223

How to apply safely

soda is a mild abrasive (SRC-PAN-016) and abrasives dull laminate.

METHOD

1. Wipe the area with a damp cloth to remove loose residue.
2. Stir baking soda with a little water into a spreadable paste. Formica gives no exact ratio.
3. Spread the paste over the stain and leave it in place. Do not rub or scrub it.
4. Formica gives no contact time, so lift an edge of the paste now and then to check progress.
5. Wipe the paste away with a damp cloth, wipe again with clean water, and dry.

EXPECTED OUTCOME The stain may fade. Formica says these stains “may be reduced”, not that they always come out.

LIMITATIONS

- Formica’s guidance is written for its own laminate. Check the maker of yours.
- Dyes, povidone-iodine, hair dyes and peroxides can stain laminate permanently, so some marks will not lift.
- Rubbing the paste turns it into a scouring agent, which Formica warns can dull and scratch the surface.

WARNINGS

Warning: Do not switch to bleach, a rust remover or a limescale remover on laminate. Formica lists these among cleaners that cause permanent damage.

Evidence: Conditional · Sources SRC-SUR-006, SRC-PAN-016 · Related: No. 1, No. 3, Laminate, Baking Soda

3 Lift a stubborn laminate stain with acetone nail polish remover

CONDITIONAL

PROBLEM SOLVED A stain on laminate that routine cleaning has not shifted.

PRODUCT Dish Soap (Hand Dishwashing Liquid)

MATERIALS Laminate

WHY IT MAY WORK Acetone is a solvent: it dissolves some stains that water and detergent leave behind. Wilsonart permits it on its laminate for a short, gentle rub (SRC-SUR-007), and EPA advises extra ventilation when using solvent-containing products indoors (SRC-SAF-004).

METHOD

1. Try routine cleaning first (Wipe a laminate countertop with mild detergent without soaking the seams (p. 140)). Keep acetone for a stain that stays.
2. Open a window or run an exhaust fan before you start.
3. Saturate a cotton ball with acetone nail polish remover and gently rub the stain for up to two minutes, as Wilsonart describes.
4. Wash the spot with a damp cloth and a little mild detergent, then wipe with clean water and dry. Wilsonart asks for rinsing after any cleaner.

EXPECTED OUTCOME Many surface stains lift. A stain that has bonded with the laminate’s decorative layer may remain.

LIMITATIONS

- This is Wilsonart’s guidance for Wilsonart laminate. The Formica guide consulted does not address acetone, so check your brand.
- Test it on a hidden spot first if you do not know the maker.

WARNINGS

Warning: Keep acetone off quartz:

Cosentino lists acetone nail-polish removers among products never to use on Silestone. Bath Planet lists nail polish remover among chemicals that damage acrylic tubs.

Warning: Keep it off clothing. Acetate fabrics dissolve in acetone nail polish remover.

Warning: Do not use stronger solvents. EPA notes many cleaning and degreasing products contain organic solvents, and indoor levels rise during use.

PROBLEM GUIDE · PRB-001

Soap scum

WHAT THE PROBLEM PROBABLY IS

Soap scum is the dull, whitish, slightly greasy film that builds up on shower doors, tub walls and tile. It forms when the fatty acids in ordinary soap meet the calcium and magnesium in hard water. The minerals bond with the soap and it drops out of the water as a sticky curd that clings to surfaces and makes soap harder to rinse away.

Synthetic detergents hold up better in hard water than true soap does, which is one reason bar soap leaves more scum. In hard-water homes the film often sits on or mixes with mineral scale (see [Hard-water deposits and mineral scale](#) (p. 248)), and mold can grow on it, so a dark, spotty film may be more than scum (see [Mildew and mold on household surfaces](#) (p. 278)).

IDENTIFY THE SURFACE FIRST

- Glass shower doors and enclosures ([Glass](#) (p. 327))
- Acrylic or fiberglass tubs and surrounds ([Acrylic](#) (p. 332), [Fiberglass](#) (p. 335))
- Glazed ceramic or porcelain wall and floor tile, and the grout between ([Ceramic Tile](#) (p. 321), [Porcelain Tile](#) (p. 323), [Grout](#) (p. 325))
- Natural stone tile such as marble, limestone or travertine, which is acid-sensitive ([Marble, Limestone and Travertine](#) (p. 302))
- Chrome or other finished faucets and shower trim ([Chrome Fixtures](#) (p. 338))

COMMON CAUSES

- Bar soap or other true soap used with hard water
- Hard water itself: calcium and magnesium bond with soap to form the curd
- Water and soap left to dry on surfaces between cleanings
- Infrequent cleaning, so thin films layer up with mineral deposits

SUITABLE PRODUCT CATEGORIES

- Mild dish detergent and warm water
- Mild acids such as white vinegar or citric acid, on acid-tolerant surfaces only ([White Distilled Vinegar](#) (p. 50))
- Baking soda as a mild abrasive on fiberglass, porcelain, acrylic and ceramic ([Baking Soda](#) (p. 55))
- pH-neutral stone cleaner for marble, limestone and travertine ([Natural Stone Cleaner](#) (pH-Neutral) (p. 110))
- Acidic tile cleaners, only where the tile maker allows acid cleaning

SAFE CLEANING OPTIONS

1. For an acrylic tub or surround, Bath Planet's care guide says a little vinegar and hot water is usually all it needs. Rinse thoroughly afterwards. (see [No. 21](#) (p. 152))
2. On glazed ceramic or porcelain tile, a vinegar or citric acid treatment can loosen soap scum. Kärcher leaves a vinegar paste on the film for 10 to 15 minutes before scrubbing. Sources disagree here: Floor & Decor recommends acidic cleaners for soap

Surface	Vinegar	Baking soda	Hydrogen peroxide 3%	Rubbing alcohol	Dish soap	Washing soda	Chlorine bleach	WD-40	Glass cleaner	Degreaser	Descaler (CLR type)	Oxygen bleach	Oxalic cleanser (BKF type)	Ammonia
Granite	✗	⚠	Ⓐ	Ⓐ	✓	Ⓐ	✗	–	✗	Ⓐ	✗	Ⓐ	✗	✗
Marble, Limestone and Travertine	✗	⚠	Ⓐ	Ⓐ	Ⓐ	Ⓐ	✗	–	✗	Ⓐ	✗	Ⓐ	✗	✗
Quartz (Engineered Stone)	Ⓐ	⚠	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ	–	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ	✗
Laminate	✗	⚠	✗	Ⓐ	✓	Ⓐ	✗	–	Ⓐ	Ⓐ	✗	Ⓐ	✗	✗
Stainless Steel	Ⓐ	⚠	Ⓐ	Ⓐ	✓	Ⓐ	✗	Ⓐ	⚠	Ⓐ	Ⓐ	Ⓐ	Ⓐ	✗
Painted Wood and Painted Walls	Ⓐ	⚠	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ	✗	✗	✗	Ⓐ	✗	Ⓐ
Finished Hardwood	Ⓐ	✗	Ⓐ	Ⓐ	✗	✗	Ⓐ	Ⓐ	–	Ⓐ	✗	Ⓐ	✗	Ⓐ
Vinyl and Luxury Vinyl Flooring	✗	✗	Ⓐ	⚠	✗	Ⓐ	Ⓐ	–	Ⓐ	Ⓐ	Ⓐ	Ⓐ	✗	✗
Ceramic Tile	Ⓐ	✓	Ⓐ	Ⓐ	⚠	Ⓐ	Ⓐ	–	–	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ
Porcelain Tile	Ⓐ	✓	Ⓐ	⚠	⚠	Ⓐ	Ⓐ	–	–	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ
Grout	Ⓐ	✓	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ	–	–	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ
Glass	Ⓐ	Ⓐ	Ⓐ	Ⓐ	✓	Ⓐ	⚠	–	✓	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ
Mirrors	✗	✗	Ⓐ	⚠	Ⓐ	Ⓐ	Ⓐ	–	⚠	–	✗	Ⓐ	✗	✗
Acrylic	✓	Ⓐ	Ⓐ	✗	✓	Ⓐ	Ⓐ	Ⓐ	✗	Ⓐ	Ⓐ	Ⓐ	✗	✗
Fiberglass	Ⓐ	✓	Ⓐ	Ⓐ	Ⓐ	✗	Ⓐ	–	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ
Chrome Fixtures	Ⓐ	✗	Ⓐ	✗	✓	Ⓐ	✗	Ⓐ	Ⓐ	Ⓐ	✗	Ⓐ	✗	✗
Aluminum	⚠	Ⓐ	Ⓐ	Ⓐ	Ⓐ	✗	✗	✓	Ⓐ	Ⓐ	✗	Ⓐ	Ⓐ	Ⓐ
Copper and Brass	Ⓐ	⚠	Ⓐ	Ⓐ	Ⓐ	Ⓐ	✗	Ⓐ	Ⓐ	Ⓐ	✗	Ⓐ	Ⓐ	✗
Household Plastics	✓	✓	Ⓐ	Ⓐ	✓	Ⓐ	Ⓐ	Ⓐ	✗	Ⓐ	Ⓐ	Ⓐ	Ⓐ	Ⓐ
Screens and Electronics	Ⓐ	✗	✗	⚠	Ⓐ	–	✗	✗	Ⓐ	–	–	–	✗	–

Textiles follow the same logic, with one addition: the label sewn into the item. Clothing care labels must give a washing or drycleaning instruction (SRC-SUR-034), and upholstery carries a cleaning code, W, S, WS or X, that says whether water, solvent, both or neither may be used (SRC-SUR-031). Where the tag and the matrix differ, follow the tag.

Stone and Countertops

1

Using vinegar on a marble vanity

WHAT PEOPLE DO Spray a vinegar solution on a marble vanity or countertop to cut soap film and water spots, because vinegar is sold as a safe all-purpose cleaner.

WHY IT CAUSES PROBLEMS Marble, limestone and travertine are mostly calcium carbonate, which reacts with acids. The Natural Stone Institute says vinegar, lemon and other acids may dull or etch these stones, and Daltile says even a light vinegar-and-water solution will etch natural stone.

WHAT CAN RESULT Dull or etched patches that do not wipe away, because the polished surface itself has been attacked.

BETTER Clean calcareous stone with a neutral cleaner, stone soap, or mild dish detergent and warm water. Leave mineral deposits on stone to a stone professional.

PRECAUTIONS Use coasters under glasses, particularly those holding alcohol or citrus juice. Blot acidic spills immediately with a paper towel.

Sources: SRC-BRD-022, SRC-SUR-017, SRC-PAN-006, SRC-PAN-008

2

Assuming granite shrugs off acidic cleaners

WHAT PEOPLE DO Use vinegar or an acidic bathroom cleaner on granite because granite is known as the tough stone.

WHY IT CAUSES PROBLEMS Granite resists most kitchen acids far better than marble, but the Natural Stone Institute still does not recommend acidic cleaners on it, because granite can contain trace acid-sensitive minerals. Iowa State Extension also warns that acidic cleaners may damage granite.

WHAT CAN RESULT Gradual dulling, as acid works on the acid-sensitive minerals the stone contains.

BETTER Treat granite the way you treat marble: a pH-neutral stone cleaner or mild dish soap and warm water.

PRECAUTIONS Granite still needs periodic resealing; Iowa State Extension says several times a year.

Sources: SRC-BRD-022, SRC-PAN-007, SRC-CHM-025

Emergency Reference Page

Possible poisoning or chemical exposure? Call Poison Control. Free and confidential (SRC-SAF-012).

1-800-222-1222

Call 911 immediately if the person collapses, has a seizure, has trouble breathing or cannot be awakened (SRC-SAF-012).

911

Pet exposure: your veterinarian, or ASPCA Animal Poison Control (SRC-SAF-032). The source consulted does not say whether a fee applies; ask when you call.

(888) 426-4435

First steps while you call (Poison Control, SRC-SAF-012)

- **Eyes:** irrigate with lots of room-temperature water for at least 15 to 20 minutes (SRC-SAF-012).
- **Skin:** remove contaminated clothing. Rinse skin with lots of room-temperature running water for at least 15 minutes (SRC-SAF-012).
- **Breathed in:** move to fresh air immediately. Open doors and windows to ventilate the area (SRC-SAF-012, SRC-SAF-013).
- **Swallowed:** do **not** induce vomiting. For a burning or caustic product, a person who is awake and able to swallow should drink a small amount of water or milk immediately (SRC-SAF-012).

Products mixed by accident? Leave the room, get to fresh air, and keep children and pets out. Do not add anything to “neutralize” it.

When you call

Have the product container in your hand, so you can read the product name and ingredients from the label exactly as printed.

Local numbers

Who	Number
Family doctor	
Nearest emergency room	
Veterinarian	
Emergency vet clinic	
Neighbor or family contact	

Save Poison Control to your phone: text POISON to 301-597-7137 (SRC-SAF-021).