SKILL GUIDE · SANITATION & HYGIENE

Household Trash & Pet Waste Disposal

The Sanitation & Hygiene chapter names garbage containment in one line, and the pet chapter names pet-waste composting in one line. Human waste already has its own real how-to in Bathroom & Hygiene Without Running Water; this guide is the how-to for the other two waste streams that stop being routine once collection service does: household garbage and pet waste.

Household garbage

Left alone, accumulating trash attracts pests and starts smelling within days, and both problems compound the longer collection is out. Sort it as you generate it rather than waiting; separating a week's worth of mixed trash after the fact is a much worse job.

- **Wet or food-contaminated waste** (food scraps, anything soiled) is the most urgent, and there's a real clock on it: fly eggs laid on exposed or poorly-sealed waste can hatch into maggots in as little as 8 to 24 hours in warm weather, and within roughly 72 hours even in cooler conditions. Double-bag it and keep it in a leak-resistant, tight-lidded container, ideally outside, away from the living space, until it can actually leave the property, and don't let it sit unsealed overnight.
- **Dry, non-organic waste** (packaging, paper, plastic) can wait considerably longer. Crush or smash it down to conserve storage space, don't let empty boxes and containers take up volume they don't need to.
- **Burnable items**, if local rules allow it, can be burned outdoors as a last resort for volume you can't otherwise store, but only certain materials are actually safe to burn: dry paper, cardboard, untreated and unpainted wood, and yard debris are fine. Never burn treated, painted, or pressure-treated wood (CCA-treated lumber releases arsenic when burned), particleboard, rubber, foam, or vinyl, these produce dioxins at ground level, a worse outcome for anyone nearby than just bagging the plastic instead. Pick a safe, cleared spot, never burn on a windy day, and stay with the fire the entire time. Check restrictions before lighting anything: call both your local fire department (for burn permits and fire-safety rules) and your county or regional air quality district (for air-quality permits and any active burn ban), most jurisdictions require clearing both, not just one.

WARNING

Flies, mosquitoes, and rodents aren't just a nuisance, they're mechanical disease carriers

A fly that lands on exposed garbage or waste and then on food carries whatever pathogen it picked up along with it, one of the actual mechanisms behind disaster-related outbreaks. The good news: proper refuse sanitation alone does roughly 90% of the work of fly control and 65% of rat control, so the containment steps above are already most of the job. What actually pest-proofs a container is the container itself: a galvanized steel can with a deep-drawn, water-resistant lid is real animal resistance, plastic lids flex and crack under a raccoon's weight in a way steel doesn't; add a bungee cord or a locking lid strap sized to the can's diameter (commonly 12 to 24 inches) if raccoons or other wildlife are actually prying lids in your area. Keep storage containers away from the house itself, and check them daily. For mosquitoes specifically, empty or remove anything that collects standing water after rain, buckets, tarps, tire ruts, old containers; a single container left standing for about a week is enough for a new generation to hatch.

Pet waste

Dog and cat waste carries its own disease risk, roundworms and other parasites, and in cats, the toxoplasmosis parasite, which is a real hazard for anyone pregnant or immunocompromised in the household (the same population this site's water-budget guidance already flags for a higher personal ration). That risk is exactly why it can't go into a food-crop compost pile the way some other organic waste can.

If anyone pregnant is in the household, they shouldn't handle cat waste at all

The CDC's specific recommendation for toxoplasmosis is that pregnant individuals avoid handling cat litter or cat waste entirely, hand it off to someone else in the household. If no one else can do it, wear disposable gloves for the task and wash hands thoroughly afterward, every time, not just when visibly soiled.

- **Bag and trash it**, the simplest option: scoop into a bag, tie it off, and add it to the same non-organic waste stream above rather than the wet-waste stream, since it doesn't decompose the same way food scraps do.
- **Or bury it**, if bagging isn't practical long-term: dig a hole **6 to 8 inches deep**, at least **200 feet** from any water source, the same distance this site's own human-waste guidance uses. Never bury it near a vegetable garden or any food-growing area; ornamental, non-food areas of the yard only.
- **Or install an in-ground pet waste digester**, a real, commercially available product (functions like a miniature septic tank: enzymes and bacteria break waste down into liquid that percolates into the soil). Site it the same distance from wells and water sources as a septic system, check local rules on that setback, and expect reduced performance in heavy clay soil or in freezing conditions.

- **Never** add pet waste to a compost pile intended for food-crop soil, even one that's otherwise well-managed. The pathogens involved routinely survive typical home composting temperatures.

Is a pet-waste compost bin or digester even legal?

Generally, yes, on your own property, for non-food-crop use. There's no state law banning pet-waste composting or digesters; what actually exists is local ordinances (setback distances from wells, similar to septic rules) and the fact that most municipal yard-waste collection programs won't accept pet waste, a program-acceptance rule, not a ban on having a bin. The strong "never put it in food-crop compost" guidance throughout this page is a health recommendation, not a legal one, though it's every bit as important to follow.

WARNING

Pyrolysis/biochar: a real advanced option, not a backyard shortcut

Heating waste to a sustained high temperature without oxygen, pyrolysis, does destroy the pathogens that survive normal composting, including the toxoplasmosis parasite in cat waste, and produces biochar, a usable soil amendment. This is genuine, actively used sanitation technology (the same principle behind commercial fecal-sludge treatment systems), not a fringe idea. But it only works if the equipment actually holds that temperature through the whole load: a backyard burn barrel or an improvised setup runs cooler in spots, and cool spots are exactly where hardy pathogens survive. If you own or build purpose-built pyrolysis equipment with a way to verify sustained temperature, this is a legitimate path for both pet waste and, per the manual's Tier 3 guidance, human waste. Without that verification, stick to bagging, burial, or the standard humanure method above, don't treat an improvised setup as equivalent to real pyrolysis.

WARNING

A method that works for human waste but not this: alkaline (lime) treatment

The manual's human-waste guidance covers hydrated lime treatment (raising pH above 12 for a couple hours) as a real, fast pathogen-kill method. Don't extend that to pet waste without caution: research on inactivating the toxoplasmosis parasite specifically shows most standard chemical treatments, including common disinfectants, don't reliably kill it; heat is the method with real evidence behind it for cat waste. Until better evidence exists for lime against this specific parasite, treat pyrolysis, not lime, as the validated option for pet waste.

Sources

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- EPA, pet waste management and water-quality risk: EPA
- Sanitation as the primary method of fly and rodent control (the 90%/65% figures), CDC: CDC
- Mosquito breeding in standing water and source-reduction guidance: Northern Nevada Public Health
- Leave No Trace, pet waste burial depth (6-8 inches) and distance from water: cited via American Kennel Club
- Roundworm and toxoplasmosis risk from pet waste: EPA
- Fly egg hatching timeframe under warm conditions: University of Florida IFAS
- Pest-resistant galvanized steel container and locking-lid strap design: Behrens Manufacturing; BearSaver / Bearicuda
- Toxic combustion products from burning treated wood and synthetic materials: EPA; Wisconsin Department of Health Services
- Burn-permit and air-quality-district approval requirements: Larimer County; San Diego Air Pollution Control District
- CDC, toxoplasmosis prevention guidance for pregnant individuals: CDC
- Pyrolysis of fecal sludge, pathogen destruction and biochar output: Faecal sludge pyrolysis as a circular economic approach, Environment, Development and Sustainability; Biochar as a novel technology for treatment of onsite domestic wastewater, Frontiers
- In-ground pet waste digester mechanism and siting: Doggie Dooley
- Toxoplasma gondii oocyst resistance to standard chemical disinfectants: Techniques for inactivating Toxoplasma gondii oocysts, systematic review; Chemical inactivation of Toxoplasma gondii oocysts in water, PubMed

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Death, Burial & Body Disposition

The Sanitation & Hygiene chapter's Tier 4 already debunks the biggest myth here (a body doesn't spread disease the way people assume) and stresses documentation. This guide is the practical layer underneath that: the legal paperwork that still applies, how to actually preserve a body without embalming, and the real rules around burial when a funeral home isn't reachable. The Act of Thriving names this directly as the one endpoint eldercare planning doesn't cover; this is that answer.

The paperwork still applies, even when normal life doesn't

A death certificate is required everywhere in the US, and someone has to sign it: the treating physician for an expected, natural death, or a coroner or medical examiner for a death that's sudden, violent, unattended, or where the person hadn't seen a doctor recently (the specific window varies by state, commonly around 20 days). Without a funeral home acting as the go-between, you'd typically present the case directly to the deceased's doctor, the coroner, or the medical examiner, whichever applies, to get the certificate completed. A **burial-transit permit** is also required before moving a body from where they died, obtained through the same office.

Northern Utah note: Utah's specific requirements

Utah Code § 26-2-13 requires the death certificate to be filed with the Utah Department of Health and Human Services within 5 days of death. A burial-transit permit is required before moving the remains anywhere. If burying on private land, the state's own guidance is to draw a map of the property showing the exact burial location and file it with the property deed, so the location stays known to future owners, heirs, and title searches, not just the people who were there.

Basic care of the body in the first few hours

Rigor mortis, the stiffening of the muscles, sets in roughly 2 to 4 hours after death and makes repositioning far harder once it does. Do this early, while the body is still supple:

- Gently close the eyelids by holding them down for a short time; if they don't stay closed on their own, a small weight (a folded cloth or a small bag of rice) placed over each lid for a while holds them shut.

- Close the mouth by gently elevating the head (a rolled towel under the chin works) or by wrapping a soft cloth or bandage under the chin and around the top of the head; this can be removed once rigor has set the position.
- Straighten the limbs and position the body as you want it to remain, arms at the sides or folded over the torso, while it's still easy to move. Once rigor sets in, forcing a limb into a different position risks real tissue damage rather than just discomfort.

Preserving a body if burial or cremation can't happen right away

Without embalming or refrigeration, real decomposition sets in within about 24 hours in a warm climate. Dry ice is the practical substitute: start cooling within 4–6 hours of death if possible, and get the body down to and held at 34–40°F. Done correctly, this preserves a body for roughly **3 to 5 days**, enough time to complete the paperwork above and arrange burial or cremation.

What	Detail
Dry ice quantity	Roughly 16 lbs per day for an adult body
Replacement interval	Every 1–3 days as it sublimates
Placement	Under and around the torso, wrapped so it doesn't contact skin directly
Before burial	Remove all dry ice first; it sublimates into gas and shouldn't go into the ground with the body

WARNING

Dry ice is a real carbon dioxide hazard, not just a cold pack

Dry ice releases CO2 as it sublimates, which can build up to dangerous concentrations in a small or sealed room. Keep windows open or the room otherwise ventilated the entire time it's in use, and never store or use it in a low-lying, enclosed space where heavier CO2 can pool.

Home burial: real, but genuinely state- and county-dependent

Roughly 30 states allow home burial in some form, but two separate layers of law apply, and both matter. **State law** decides whether a family can legally handle the death, permits, and burial at all without a funeral director, Indiana, for example, effectively requires burial in a licensed cemetery, while Texas, Vermont,

Colorado, Montana, Maine, Oregon, and Washington are cited as some of the more clearly permissive states. **Local zoning**, a separate layer even in a permissive state, governs the specific parcel: setback distance from a neighbor's property, minimum burial depth (commonly 3–5 feet), and distance from any water source, since a shallow or poorly sited grave is a real groundwater contamination risk, not just a formality. Check your specific state and county before assuming either layer is settled by the other.

WARNING

Document the location, or the burial itself becomes the family's next problem

An unrecorded burial site is a real, recurring problem for the next generation: heirs who don't know a grave is there, a future sale that surfaces remains during construction, a title search with no record of what the land actually contains. Map it and file that map with the property deed, exactly as Utah's own guidance above describes, regardless of which state you're in.

What doesn't need to be feared

The common assumption that unburied bodies cause epidemics is largely a myth the World Health Organization and the Red Cross have specifically and repeatedly corrected: someone who died from trauma, drowning, or the disaster itself doesn't generally carry organisms that pose a public health risk, and survivors moving through the same area are a bigger disease vector than the deceased are. The real exception is a death from a communicable disease already spreading through the community, where standard precautions genuinely do matter. What actually causes lasting harm in the historical record isn't disease, it's undocumented, rushed mass burial: grieving families who never get closure, and estates, insurance claims, and legal processes that stall for years without a death record to point to.

Grief, and coordinating beyond your own household

The mechanics above are only part of this. See the Mental Health chapter's grief-support guidance for the part that isn't paperwork, and if a community structure already exists, coordinate through it rather than improvising alone, exactly as this chapter's own Tier 4 guidance on handling a death recommends: consistent documentation practice across every household matters more than any one family's choices in isolation.

Sources

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- Home burial legality by state, the state-law versus local-zoning distinction: Funeral.com; National Home Funeral Alliance
- Body cooling technique, dry ice quantity, timeline, and CO2 ventilation safety: My Mortuary Cooler; Peaceful Passage at Home
- Utah death certificate filing deadline (Utah Code § 26-2-13), burial-transit permit, and recording a private burial site: Nolo; LegalClarity
- WHO and Red Cross guidance correcting the dead-bodies-cause-epidemics myth: World Health Organization and International Committee of the Red Cross, management of dead bodies after disasters (field guidance)
- Basic body care and positioning before rigor mortis: Peaceful Passage at Home; Titan Casket

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Composting Toilets: Humanure, Vermicomposting & Incineration

The Bathroom & Hygiene Without Running Water skill guide covers the short-term bucket toilet: a liner, cover material, and temporary sealed storage. This guide picks up where that stops, the Sanitation & Hygiene addendum's Stage 3 goal of a real, permanent, no-power sanitation system: the actual science behind safely composting human waste long-term, plus vermicomposting, incineration, and pyrolysis as real alternatives.

The real mechanism: heat or time, not just a pile of waste

Thermophilic (hot) composting works because sustained heat kills pathogens directly. In an active pile that reaches 131–150°F, E. coli and salmonella die within 1–4 hours. Roundworm eggs, the most heat-resistant pathogen commonly found in human waste, need far longer: 1–2 months of sustained heat at that same temperature.

WARNING

A pile that never gets hot isn't automatically unsafe, it just needs time instead of heat

Most backyard humanure setups never reach true, sustained thermophilic temperature, and that's fine as long as it's treated honestly: given enough time, roughly 12 months minimum for cold composting, pathogen load drops to safe levels on its own. If the finished compost will ever touch a food crop, that minimum doubles to 24 months, the WHO, EPA, and every credible composting-toilet guideline agree on this figure. Skipping the cure time because the pile "looks like dirt" is the single most common real mistake.

The actual chemistry: why sawdust cover material isn't just for odor

Composting needs a carbon-to-nitrogen ratio of roughly 25:1 to 30:1 to work efficiently. Raw human waste alone is far too nitrogen-rich, about 6–10:1, which is exactly why a cover material matters: fine hardwood sawdust runs 300–500:1, so a consistent layer after each use is doing real chemistry, correcting the ratio toward the range that actually composts, not just masking smell. A persistent odor problem is a real diagnostic signal that the ratio is off, or the pile is too wet with too little air, not a sign that composting toilets are inherently unpleasant.

Element	Spec	Why
Cover material amount	A handful to a cupful after each use, enough to fully bury what's underneath and leave no waste visible	About one 20-liter bucket of sawdust per week for two adults and a child; too little leaves odor and flies, too much just runs out the supply faster than necessary
Cover material	Fine hardwood sawdust, wood shavings, or chopped straw (under 3–4 inches)	High carbon content corrects raw waste's nitrogen-heavy ratio toward the 25:1–30:1 target
Bin design	Sealed, above-ground container, isolated from soil and water contact	Contains waste safely while decomposition happens, and keeps it inaccessible to children or animals
Cure period	12 months minimum; 24 months if output will touch food-crop soil	Matches WHO/EPA guidance for pathogen die-off without relying on sustained heat

A real system needs at least two bins in rotation, ideally three: one actively receiving material from the toilet bucket, one resting and curing untouched, and a third fully finished and ready to use, so a bin is never both being filled and being counted toward its cure clock at the same time. When a toilet bucket fills, its contents get dumped directly into the active compost bin and immediately covered with a layer of the same carbon material, not left exposed; this is the actual mechanical link between the short-term bucket system and the long-term pile, and it's worth practicing the transfer before relying on it.

Size matters more than most instructions mention: a pile smaller than roughly 3 feet on each side (about a cubic yard) simply can't hold enough of its own heat to reach or sustain thermophilic temperature, regardless of what's in it, so an undersized bin will default to the slower cold-composting timeline no matter how well the carbon ratio is managed. And "reaches 131–150°F" isn't a guess to make by touch: check it with a long-stem compost thermometer with an 18 to 24 inch probe, inserted to roughly the center of the pile's depth, left in place for a minute or two before reading, and checked in the morning before the sun's own heat can skew the number. If attempting the hot-composting route, turn the pile every 1 to 2 days, moving cooler material from the outer edges into the hot core; a pile left untouched develops cool pockets at its margins that never reach a pathogen-killing temperature even while the center does.

Vermicomposting: a real pretreatment step, not a standalone finish line

Eisenia fetida, commonly called red wigglers, are the species used for this specifically; they process waste quickly and tolerate the conditions involved better than other earthworm species. Real research backs a genuine pathogen-reduction effect, including eliminating up to 99% of fungal pathogens found in test material. The honest limit: vermicomposting is a pretreatment step that meaningfully reduces pathogen

load, not a substitute for the same hot-composting or cure-time rules above, and the same food-crop caution still applies to its output.

A working bin needs real numbers too: roughly 1 to 2 pounds of worms per square foot of bin surface area, a bedding layer (shredded cardboard or coco coir works) a few inches deep kept damp but not soaked, like a wrung-out sponge, and a bin with drainage and airflow rather than a sealed, airtight container.

Incinerating toilets: the no-composting alternative

An incinerating toilet burns waste to sterile ash after each use rather than composting it at all, the most hands-off option in terms of ongoing management, at the cost of a real, continuous fuel or power dependency.

Type	Unit cost	Per-use operating cost
Electric	$2,000–$4,500	Electricity cost varies by local rate and unit
Propane	$2,500–$4,800	~0.25–0.35 gallons of propane per cycle, roughly $0.63–$1.23 at typical current prices

Weigh this against generator or solar/battery capacity if considering the electric version for a real Tier 3 plan; it's a real, continuous draw, not a one-time equipment cost.

These units aren't plug-and-use: every incinerating toilet needs dedicated exhaust venting, typically a 3 to 4 inch pipe routed to the roof or an exterior wall and terminating at least 24 inches above the roofline, never vented into an attic or crawlspace. Skipping proper venting causes indoor odor at best and a real fume or overheating hazard at worst. Ash left behind after each burn is sterile and can go into regular household trash or be used as a soil amendment in small amounts; let it cool fully before handling either way.

Pyrolysis and biochar: faster than composting, but only with real equipment

Pyrolysis heats waste in a sealed, oxygen-free chamber, a retort, to roughly 930–1,200°F (500–650°C), destroying pathogens in minutes rather than the months a cold-composting cure needs, while cutting the waste's volume by about 90% and leaving behind biochar, a stable, carbon-rich material with real, documented use as a soil amendment. This is genuine, actively studied sanitation technology, not a fringe idea, and the output is credibly described in the research as pathogen-free when the process actually runs at temperature.

The gap between that and a backyard burn barrel is the entire point: real pyrolysis depends on the chamber staying sealed against outside air and holding true temperature evenly throughout the load, exactly what a gasketed, refractory-lined retort is built to do and an open or improvised burn setup can't reliably guarantee. A cooler pocket in an uneven burn can leave hardy pathogens, roundworm eggs among them, alive in material that looks fully processed. Treat this as a real upgrade path once you own or build equipment that actually verifies sustained temperature throughout the chamber, not a shortcut around the aging method above with whatever's already on hand.

Check before installing anything permanent

Utah's onsite wastewater rules (Utah Admin. Code R317-4) explicitly cover composting toilets, but a permanent installation, as opposed to a temporary bucket-toilet setup, is the kind of thing worth a call to your local health department before building, not after. NSF/ANSI Standard 41 is the real, recognized certification standard for a manufactured composting toilet unit if buying one rather than building from scratch.

Sources

- Joseph Jenkins' Humanure Handbook, the original documented methodology: Humanure Handbook
- Pathogen die-off temperatures and times, and 12/24-month cure guidance: The Off-Grid Workshop
- Carbon-to-nitrogen ratio math and cover material specs: Coconino County; NSF/ANSI 41 requirements: NSF
- Vermicomposting species, bin stocking density, and pathogen-reduction research: Red Worm Composting; National Library of Medicine; Urban Worm Company
- Incinerating toilet costs, operating specs, and venting requirements: Septic Tank Hub; Cinderella Eco; Incinerator Toilet Venting Guide
- Minimum pile size for thermophilic heat, and measuring pile temperature: Permies; Grow Your Pantry
- Bin rotation, cover-material amount per use, and turning frequency: Humanure Handbook; Appropedia; Compost Check
- Pyrolysis temperature, retort design, and biochar output: University of Colorado (Sol-Char toilet research); Waste and Biomass Valorization
- Utah onsite wastewater regulations: Cornell Legal Information Institute

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Soap Making: Lye & Oils

The Sanitation & Hygiene chapter's Tier 3 guidance calls for soap-making as the skill that produces an effectively unlimited hygiene supply once stocked soap runs out. This guide covers the actual chemistry and the real safety practice behind it: three real methods, why the fat-to-lye ratio has to be calculated, not guessed, how to handle lye without getting hurt, and how to make your own lye from wood ash once buying it isn't an option either.

Three real methods, and which one actually teaches the skill

"Soap making" covers three genuinely different processes, and only one of them is the self-sufficiency skill this chapter actually needs. Melt-and-pour starts from a pre-made soap base, already saponified by the manufacturer, that you melt and customize with color or scent; there's no lye handling and no cure time, which makes it the easiest and safest onramp, but it's still a manufactured input with a supply chain behind it, the same dependency this manual is trying to build away from. Cold process mixes fat and lye at a low temperature, 86–122°F; saponification finishes over the next 24 to 48 hours inside the mold, and the bar needs 4 to 6 weeks of curing after that before it's ready to use. Hot process cooks the same reaction with added heat, finishing saponification in a few hours so the soap is usable almost immediately, at the cost of less control over how the finished bar looks.

Cold and hot process are the real skill: both start from raw fat and lye, the two inputs a household can actually produce or stockpile without depending on a soap manufacturer. Melt-and-pour is worth knowing as a genuine first project, especially for introducing kids to the craft without lye in the room, but treat it as practice for handling a mold and fragrance, not as the skill this chapter is asking for.

The chemistry that makes the ratio non-negotiable

Soap is the product of saponification: a reaction between a fat (a triglyceride) and lye that produces soap and glycerin. Every fat has its own saponification value, the exact amount of lye it takes to fully convert that specific fat to soap, and the value is different for every fat because their fatty-acid profiles differ. Guess the ratio instead of calculating it and there are two ways to get it wrong in opposite directions: too much lye leaves unreacted lye in the finished bar, genuinely harsh and irritating on skin; too little leaves unreacted fat, a soft, greasy bar that spoils faster.

Fat	Approx. SAP value (g NaOH per g fat)	Note
Lard or tallow	0.14	The traditional base fat; widely available from a household already raising or processing livestock
Coconut oil	0.19	Produces a harder, more cleansing bar; used as a smaller fraction of a recipe, not the whole thing, since it's drying at high percentages
Olive oil	0.135	Produces a mild, gentle bar; the base of traditional Castile soap

These numbers are approximate and vary by source, growing conditions, and processing method. Run every real recipe through a lye calculator, SoapCalc is the standard, free one, rather than hand-calculating or reusing a ratio from memory; enter the exact fats and weights in the actual recipe and let it do the math. Set a superfat, sometimes called a lye discount, of 3 to 8 percent: intentionally leaving that percentage of fat unreacted is the real margin of safety against a lye-heavy bar, not an optional refinement.

Weigh every ingredient in grams on a digital kitchen scale, never measure by volume with cups or spoons. Fat density and lye density both vary enough that a volume measurement can throw off the whole ratio the calculator just worked out; the entire safety margin this section describes assumes weighed ingredients.

Handling lye safely

Lye, sodium hydroxide, is genuinely corrosive: it causes severe chemical burns on contact with skin, and worse damage to eyes, where it can destroy tissue before the pain even registers clearly enough to react. Treat every batch with real PPE: splash-proof goggles that seal around the eyes, not regular glasses; nitrile or rubber gloves that cover the wrist, not latex, which lye degrades; and long sleeves and pants, since a single droplet on bare skin can scar in seconds. Mix lye only in a well-ventilated space, outdoors or with real airflow, since the fumes released when lye first dissolves in water are sharp and genuinely irritating to breathe.

Mix lye only in heavy-duty HDPE plastic (labeled #2) or stainless steel, never aluminum, tin, or a thin or flimsy plastic container. Lye reacts with aluminum to release hydrogen gas, genuinely flammable and potentially explosive in enough quantity, while also eating through the metal itself.

A typical starting ratio is about 38 percent water relative to the total oil weight, which works out to a lye concentration (lye weight divided by lye-plus-water weight) of roughly 30 to 33 percent; SoapCalc will calculate the exact water amount for a given recipe, but that's the range a real batch should land in. Dissolving lye in water is a strongly exothermic reaction: the solution can spike to around 200°F within a minute or two of mixing, so let it sit somewhere safe for 1 to 3 hours, or set the container in a cold water bath, until both the lye solution and the oils are down in the 100–130°F range before combining them.

Combining while the lye solution is still near 200°F risks container failure and a real burn hazard, not just a lower-quality bar.

WARNING

Lye into water, never water into lye

Remember it as SNOW: sodium hydroxide over water. Always add the lye to the water, slowly, stirring as you go. Adding water to lye instead can trigger a violent, near-instant exothermic reaction that splashes caustic solution out of the container, a real, documented cause of serious injury. If lye contacts skin, flush immediately with cool running water for a full 15 to 20 minutes; never use vinegar to neutralize it, since the acid-base reaction between vinegar and lye releases its own heat and can worsen the burn. For eye contact, remove contact lenses and flush continuously with water for at least 20 minutes while arranging emergency care immediately. If swallowed, do not induce vomiting; call Poison Control (1-800-222-1222) or seek emergency care right away.

Store any lye that isn't used immediately in its original container or another airtight HDPE container, clearly labeled, somewhere cool and dry below 85°F, and locked away from children, pets, and other chemicals. Never store it in a metal container: lye pulls moisture out of the air over time, and that moisture reacts with bare metal.

Combining and reaching trace: how you know when to pour

Once the lye solution and oils are both in the 100–130°F range, combine them and mix, alternating short pulses of a stick blender with periods of hand-stirring, rather than running the blender continuously. What you're watching for is called trace: the point where the oil and lye solution have emulsified into a smooth, thickened batter that leaves a visible trail on the surface when drizzled from the blender or a spoon. Thin trace looks like a light pudding and is the earliest usable stage, medium trace holds a visible trail longer, and thick trace holds its own shape when mounded. Watch for false trace too: solid fats or butters that were still slightly cool can make a batch look thickened before it's actually emulsified; if in doubt, keep pulsing a little longer rather than pouring early.

Have the mold ready before you reach trace, not after: line a wooden or silicone mold with parchment paper or freezer paper if it isn't already silicone, sized to the batch's total volume. Pour at your target trace stage, tap the filled mold on the counter a few times to release trapped air bubbles, and cover it loosely for the first 24 to 48 hours while saponification finishes.

Going deeper: making your own lye from wood ash

Store-bought lye is itself a supply-chain dependency, which is exactly why the traditional method matters for a real Tier 3 or Tier 4 plan: leaching hardwood ash through water produces potassium hydroxide, a real, historically used lye. Oak, maple, and hickory ash work best, since hardwoods concentrate more potassium than softwoods do. Screen the ash through a colander to remove unburned chunks.

Build the leaching barrel itself with a few real drainage holes drilled in the bottom of a wood or food-grade plastic barrel, a layer of pebbles over those holes, then 2 to 3 inches of straw over the pebbles to keep ash from washing through, then fill the rest with the sifted ash. Elevate the whole barrel 3 to 4 feet up on blocks or a simple frame, positioned over a lye-safe collection bucket underneath. Pour hot water through slowly rather than cold, hot water draws more potassium out of the ash, at a rough working ratio of 10 cups of ash per gallon of lye water produced. Run the collected liquid back through the same ash a second time rather than using it straight off the first pass; a first pass typically comes out weak, roughly one quart of usable-strength lye per gallon of ash run through, and the second pass concentrates it closer to soap-making strength.

The traditional strength test is a fresh egg or a chicken feather: if it floats with about a thumbnail's-width above the surface, or the feather actually dissolves, the lye is concentrated enough to make soap. This is a real, functional field test, but it isn't a substitute for knowing the actual concentration the way a bought lye's labeled purity does.

> **Wood-ash lye doesn't drop into a store-bought recipe's ratio**
>
> A recipe calculated for pure, known-concentration sodium hydroxide from a lye calculator assumes a specific strength. Wood-ash lye's concentration varies by wood species, burn temperature, and how much water was run through the ash, so it won't match that calculation. Traditional wood-ash soap recipes lean on generations of practiced judgment (the float test, the eventual feel of the finished soap) rather than a precise calculated ratio; treat your first several batches as calibration, made in small quantities, not a batch-sized bet.

Curing: why a fresh bar isn't a finished one

A cold-process bar is chemically finished saponifying within a few days, but it isn't ready to use. Over 4 to 6 weeks of curing, the bar loses roughly 20 percent of its water content through evaporation, which is what turns a soft, tacky bar into a hard one that lasts. The same period lets pH drop by roughly a full point, commonly from around 11 to under 10, meaningfully reducing how harsh the bar feels on skin. Skipping the

cure isn't dangerous the way skipping lye safety is, but a bar used at one week will be softer, shorter-lived, and noticeably harsher than the same bar used at six.

Quick Reference

Method	Lye handling	Time to usable	Best for
Melt-and-pour	None (pre-saponified)	Under an hour	First projects, kids, learning molds and fragrance
Hot process	Full lye safety practice required	Same day to a few days	Faster turnaround; the real self-sufficiency skill
Cold process	Full lye safety practice required	4–6 weeks (cure time)	Traditional method; most control over final bar

Full checklist:

- Real recipe run through a lye calculator (SoapCalc or equivalent) before every batch, not calculated by hand or reused from memory
- Every ingredient weighed in grams on a digital scale, never measured by volume
- Superfat set to 3–8 percent
- HDPE plastic or stainless steel mixing container on hand, never aluminum or tin
- Splash goggles, nitrile/rubber gloves past the wrist, and long sleeves on hand and used every time
- Well-ventilated space confirmed before mixing lye
- SNOW rule (lye into water) understood by everyone handling it
- Cool running water available at the workspace for immediate flushing
- Lye solution and oils both cooled to 100–130°F before combining
- Mold lined and ready before mixing starts, not after reaching trace
- Leftover lye stored labeled, airtight, and locked away from children and pets
- At least one practice batch made and fully cured before treating this as a reliable hygiene-supply source
- If pursuing wood-ash lye: hardwood ash sourced, leaching setup built, and the float/feather strength test understood before batching

Sources

- Saponification, superfat, and cold vs. hot process mechanics: School of Natural Skincare; Sea Witch Botanicals

- SAP values and lye calculator: SoapCalc Oil Chart
- Lye safety, PPE, SNOW rule, and first aid: Learn Soap Making; Certified Lye; CDC/ATSDR Medical Management Guidelines
- Mixing container material (aluminum reacts with lye) and lye storage: Certified Lye; SoapIndex
- Lye-water concentration and ratio: The Nova Studio; Classic Bells
- Lye-solution reaction heat and cooling before combining: Nature's Garden; Brambleberry
- Reaching trace, thin/medium/thick stages, and false trace: Soap Queen; Learn Soap Making
- Wood-ash leaching barrel construction and re-leaching to concentrate: Soap Legacy; Wood Work Science
- Wood-ash lye leaching method and strength testing: Soap Legacy; Soapy Stuff
- Melt-and-pour process: Soap Guild
- Curing time, water loss, and pH change: PetalMade

SKILL GUIDE · SANITATION & HYGIENE

Greywater Disposal Basics

The Sanitation & Hygiene chapter's addendum calls for a real greywater plan once a no-power, no-sewer sanitation setup is running, but the manual itself doesn't cover the technique. This guide covers which household water actually counts as greywater, the simple underground disposal method that keeps it from becoming a contamination or mosquito problem, and which soaps are actually safe to use with it.

Not all wastewater is the same

Greywater is the relatively lightly contaminated water from bathroom sinks, showers, tubs, and clothes washers. Toilet waste is blackwater and needs the dedicated treatment covered elsewhere in this chapter, not this guide. Less obviously, kitchen sink water is also effectively blackwater: it carries emulsified fats that clog soil pores and food particles that attract flies and rodents, the same vector problem this chapter's waste-management guidance exists to prevent. Route kitchen water to the same disposal system as toilet waste, not the lighter greywater system this guide describes.

Why greywater can't just run onto the surface

Greywater carries real pathogens, from skin, trace fecal contamination in shower and laundry water, and general household bacteria, even though the concentration is far lower than blackwater. Left standing on open ground, it also breeds mosquitoes and can carry contamination toward a well, garden bed, or neighboring property. The fix isn't complicated: get it below the surface and let soil do the filtering work, rather than letting it pool or run off visibly.

The mulch basin: the simplest system that actually works

A mulch basin is a shallow depression, dug below grade, filled with coarse woodchips or bark and connected to a greywater outlet by a short length of pipe. A single basin is commonly dug 2 to 4 feet across and 6 to 18 inches deep, and one basin of that size can handle roughly 40 to 80 gallons of greywater a week, in clay soil, figure on about 1 square foot of basin per gallon discharged per day; sandier, faster-draining soil needs less. The water disperses into the mulch layer and soaks down into the soil beneath, rather than pooling on top; the coarse organic material supports the aerobic bacteria that do the actual pathogen breakdown, and it also controls odor. Run the outlet pipe (1-inch inside diameter is standard for a washing machine line) into

the basin and keep it covered by at least 2 inches of mulch, rock, or soil, an exposed outlet just creates a wet, visible pool right at the pipe's end instead of dispersing the water properly. Because most of that biological activity happens near the surface, a well-built mulch basin can process greywater more effectively than a much larger and more complex system.

Site the basin at least 10 feet from the house's foundation and any property line, and at least 50-100 feet from any well (check your specific local health department's setback, since these vary by jurisdiction and soil type), well downhill or away from any spring or garden bed growing food that gets eaten raw, and never let outflow reach standing water or a shared water source. Rotate between two basins if the household is generating meaningful volume day after day, giving each one a rest period to fully drain and re-aerate.

WARNING

Never spray or pour greywater directly onto food crops eaten raw

Subsurface dispersal into a mulch basin or drip line is the safe method; watering vegetable leaves or root crops directly with greywater risks depositing pathogens onto food that won't be cooked before eating. Water ornamental plants, trees, or fully cooked-crop gardens this way instead, or route it well clear of any food garden entirely.

Which soaps are actually safe for this

Not every soap or detergent is greywater-compatible. Look for biodegradable, phosphate-free, low-sodium, pH-neutral products; a simple liquid castile soap (olive oil, coconut oil, water, and potassium hydroxide) is a reliable, widely available option. Avoid anything containing bleach or chlorine, borax, petroleum distillates, or products marketed with "whitener," "softener," or "enzymatic" claims, since these either damage soil structure over repeated use or interfere with the bacterial breakdown the system depends on.

Pathogens don't linger forever in healthy soil

Under normal aerobic conditions, pathogens in dispersed greywater degrade to safe levels within roughly three days. This is exactly why the mulch basin's aerobic, well-drained design matters: a waterlogged or anaerobic basin doesn't break contamination down nearly as fast, another reason to keep the system draining freely rather than overloading a single basin.

Quick Reference

Source	Treat as	Note
Bathroom sink, shower, tub	Greywater	Route to mulch basin or subsurface disposal
Clothes washer	Greywater	Use a greywater-safe detergent (see above)
Kitchen sink	Blackwater	Route with toilet waste; fats and food scraps attract vectors
Toilet	Blackwater	Covered by this chapter's bucket-toilet/composting guidance

Full checklist:

- Kitchen sink water routed with blackwater, not treated as light greywater
- Mulch basin sited well away from the foundation, any well or water source, and any raw-eaten food garden
- Basin filled with coarse woodchips or bark, not left as a bare pit
- A second basin ready to rotate into if the first needs a rest/drain period
- Soap and detergent checked against the greywater-safe list before it becomes the household default
- No greywater ever sprayed or poured directly onto raw-eaten crops

Sources

- Mulch basin design and function: Teaspoon Dwellings; Water Wise Group
- Kitchen water as blackwater and vector risk: UC ANR (Alameda County)
- Safe soap and detergent selection: Water Wise Group; Harvesting Rainwater (Brad Lancaster)
- Pathogen die-off timing in soil: National Library of Medicine
- Mulch basin dimensions, weekly capacity, and outlet pipe spec: Greywater Action; Santa Cruz County Environmental Health
- Foundation, property-line, and well setback distances: UpCodes; Permit Sonoma