

Disposal of Used/Unwanted Chemicals at UW-Madison

Most research on campus involves the use of chemicals – many which potentially present a physical (flammable, explosive, pyrophoric) or health (carcinogenic, toxic) hazard. After use, these chemicals need to be disposed of properly. Laboratories in particular generate a vast and varied amount of used or unneeded chemicals. Below is a discussion on some key points you should know about getting rid of your unwanted chemicals at UW-Madison.

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What do we mean by “used/unwanted chemicals”?

Our definition of a used or unwanted chemical is very broad. It can be a chemical in its original container, either opened or unopened. It can be reaction by-products, mixtures, or solvents. It also may include items such as glassware or gloves contaminated with chemicals.

Why we are careful about using the word “waste”?

While you may consider many of your used or unwanted chemicals as “waste” we prefer you do not apply this label. “Waste” has a lot of different meanings and there are important regulatory implications to this word. This is especially true if the waste is categorized as “hazardous” by the U.S. Environmental Protection Agency (EPA). Labeling materials as “hazardous waste” requires specific actions to remain in compliance with regulations. The Chemical Waste Management group within the Chemical Safety Office has the responsibility to ensure that materials are disposed of properly and that the University is in compliance with both EPA and state regulations. Additional information about hazardous waste is provided in the next section of this document.

We should point out that some materials are obviously hazardous waste. The Chemical Safety Office provides carboys for your used halogenated and non-halogenated organic solvents. We also provide carboys for used silica gels and alumina as well as other resins. These come with the necessary “Hazardous Waste” labeling.

But what about some of the other unwanted chemicals – such as your containers of partially used chemicals, your aqueous or solid by-products, or your chemically-contaminated lab trash? While you may not want the material, you shouldn’t necessarily view these as “hazardous waste” because:

- We attempt to recycle or redistribute unused chemicals when possible in order to minimize the amount of chemicals sent to the University's hazardous waste vendor. We have our active Labscan redistribution system. Our website (<https://ehs.wisc.edu/chemical-redistribution/>) has a list of chemicals that are currently available to campus free of charge.
- It might not be hazardous waste as defined by the EPA. (See next section for a brief primer on what the EPA considers "hazardous waste".) Your chemicals, chemical residue, or chemically-contaminated items can sometimes simply be placed in a dumpster or put into the sanitary sewer under certain circumstances. The university believes strongly in environmental stewardship and disposes of many items using methods beyond what the regulations require.

What is the definition of "hazardous waste"?

The EPA has created lists (P and U) of specific chemicals and waste streams which must be considered as "hazardous waste" upon disposal, this includes many acutely toxic chemicals. It is important to note that these listed do not necessarily have to be pure chemicals, mixtures, by-products, or contaminated materials. Even if a material is not listed, it may still be hazardous waste if it has one of the characteristics listed below:

- Ignitability – This includes flammable liquids with a flash point below 140°F, solids susceptible to vigorous burning by friction, water absorption, or spontaneous chemical change, flammable compressed gases, and strong oxidizers.
- Corrosivity – This includes liquids with pH less than 2 or greater than 12.5, or that corrode steel faster than a quarter-inch per year at 55°C.
- Reactivity – Reactive wastes include materials that generate toxic gases in contact with water, wastes that contain cyanide or sulfide and can release toxic gases in contact with strong acids or bases, explosive materials, or materials that are explosive when heated.
- Toxicity – The EPA has identified 40 chemicals commonly found in wastes that are harmful or fatal when ingested or absorbed (e.g. containing mercury, lead, etc.). When toxic wastes are land disposed, contaminated liquid may leach from the waste and pollute ground water. Materials which fail the Toxicity Characteristic Leaching Procedure (TCLP) test must be treated as hazardous waste.

There are two other types of waste that deserve mentioning. "Universal waste" comes primarily from consumer products containing mercury, lead, cadmium and other substances that are hazardous to human health and the environment. This includes items such as batteries and light bulbs. The EPA has streamlined waste management standards for these types of materials. See our Recyclopedia page for more info on disposing of these items at <https://ehs.wisc.edu/recyclopedia/>. "Mixed waste" is waste that is both hazardous and radioactive. This waste is handled by the UW Radiation Safety Office.

Links to user-friendly EPA guidance documents can be found at <http://www.epa.gov/osw/hazard/refdocs.htm>. The Chemical Safety Office has the expertise to make a hazardous waste determination, so contact us if you have any questions (265-5000, chemsafety@fpm.wisc.edu).

How can I get rid of my unwanted chemicals?

Consider how you are going to get rid of unwanted or used chemicals before beginning work with them. There are four primary disposal routes for chemicals at UW: 1) have Chemical Safety Office pick them up free of charge; 2) throw them out in the normal trash; 3) segregate them from normal trash and put them directly into the dumpster; or 4) pour in the sanitary sewer. Below is a brief discussion of these four main options. Remember, the Chemical Safety Office has the expertise to determine the best disposal route so contact us if you have any questions. Additional information about specific chemical disposal routes is also available in the UW [Laboratory Safety Guide](#).

- **Pick-up by EH&S. This includes:**
 - Chemicals in their original containers;
 - Waste flammable solvents (separated into halogenated and non-halogenated);
 - Process by-products, including reaction mixtures (solids and liquids).

The Chemical Safety Office will sort through the chemicals and either redistribute them, store until the hazardous waste contractor picks these up, put down the sanitary sewer (if they meet strict criteria), or (for waste considered to be non-hazardous) place safely into the trash. See the section on page six for chemical pickup instructions.

- **Sanitary Sewer Disposal.** The vast majority of pure unwanted chemicals should go directly to UW Chemical Safety Office. However, sewer disposal in the lab is allowed for small quantities (less than a liter) of specific types of chemicals. Under no circumstances can any hazardous wastes - as defined by the EPA - go down the drain. See below for a discussion on sewer disposal. Contact the Chemical Safety Office if you have questions about sewer disposal.
- **Segregate and Trash.** This is for minimally contaminated waste that still poses a hazard risk to an uninformed person because of the toxicity of the chemicals. While items in this class can go into a landfill with regular trash you want to ensure that staff (e.g., custodial staff) are not accidentally exposed. This trash should be collected in a trash bag separate from normal lab trash in your workplace and labeled with contents. When the bag is filled it should be placed in a sturdy box for disposal.
- **Regular Trash.** Items such as lab wipes, gloves and items not minimally contaminated with low hazard chemicals.

Contact the Chemical Safety Office (265-5000 or chemsafety@fpm.wisc.edu) if you have questions or would like advice on how you should handle your outgoing chemicals.

Why can stuff go down the drain?

Sewer disposal is allowed for aqueous solutions under strict limits. Under no circumstances can any hazardous wastes - as defined by the EPA - go down the drain. The University is also subject to requirements of the Madison Metropolitan Sewerage District (MMSD) with which the Chemical Safety Office communicates periodically. Contact the Chemical Safety Office for approval for sewer disposal. Below are a couple of key notes concerning sewer disposal:

- We do not allow dilution to make a hazardous material non-hazardous and therefore sewer-disposable. For example, you cannot dilute ethanol to the point where it is non-flammable for the sake of putting it down the drain. However, it is acceptable to use a large amount of water to sewer a non-hazardous material.

- Under limited circumstances you can neutralize acids and bases and dispose of them down the drain. We do not recommend you do this for amounts greater than one liter unless you have an established procedure (see the UW Laboratory Safety Guide) or received guidance from us.
- If the chemical is not water soluble it cannot be put down the drain.
- Contact the Chemical Safety Office if you have additional questions regarding sewer disposal not covered in the UW Laboratory Safety Guide.

How and where should I store my unwanted/unused chemicals before pick-up?

The answer to this question depends on the type of material. Certain items, such as used solvents and chromatographic gels, must be placed in the designated carboys. Used silica gels and alumina are automatically designated as hazardous waste. These need to be placed in the Satellite Accumulation Area (SAA) of your laboratory or work area (see next section for SAA information and requirements).

After generating spent chemicals from manipulations, the material can be transferred directly into a container that is appropriate for that type of material. If the material is toxic or malodorous, you may bring the container inside the fume hood for transfer purposes. Once the transfer is complete, remove the container to the designated area. We don't recommend leaving the container inside the fume hood if the hood is used for research manipulations since it can clutter the fume hood and potentially cause an increased hazard in the event of an accident in the hood. However, fume hoods can often be used for containers with unwanted chemicals if the hood is not used for any manipulations and if there are not any hot objects present.

A few other reminders:

- Avoid mixing incompatible chemicals. Numerous accidents have occurred in academic laboratories due to inadvertently mixing of spent chemicals. For instance, never mix oxidizers with organic solvents, cyanides with acids, azides with acids or oxidizing reagents with reducing agents.
- **Always** label any container with the contents. Be as detailed as you can. This will help you avoid mixing incompatible chemicals and is also critical for the Chemical Safety Office's classification and disposal of the material. A sample label is listed below:

| Unwanted Chemicals | % |
|--------------------|----|
| Phenol | 10 |
| Chloroform | 20 |
| Pyridine | 25 |
| Tetrahydrofuran | 40 |
| Dimethylformamide | 5 |

- Spent chemical products should be collected separately and labeled accordingly. For example, mixing mercury-containing compounds to other spent chemicals can increase disposal costs by creating a larger volume of toxic waste.
- We do not recommend leaving any chemical containers on the floor since these can readily be knocked over and the contents spilled.

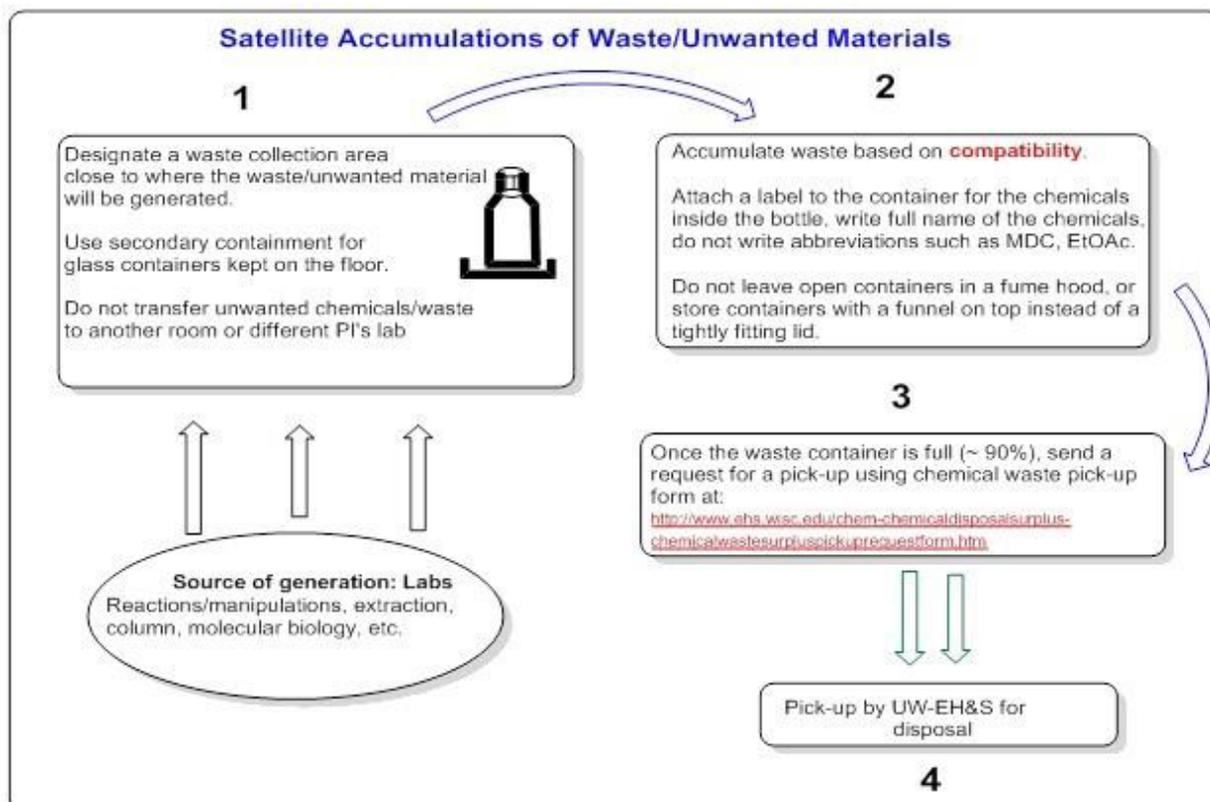
- Use secondary containment such as a tray for storage of unwanted chemical containers containing any liquids.
- The waste container should remain closed except when filling. Do not use a fume hood to purposely evaporate unwanted solvents.

What you need to know about Satellite Accumulation Areas

All waste that is designated as hazardous must, by EPA regulations, be stored in a Satellite Accumulation Area (SAA) within your laboratory or work area. Other materials destined for pick-up by the UW Chemical Safety Office can also be appropriately stored in your SAA even though they may not be determined as hazardous waste.

Choose an appropriate location for your SAA. Here are some considerations:

- It must be in the lab or work area at or near any point of generation.
- Never store in public areas such as corridors or lobbies.
- Find a safe place for your SAA so that the carboys or containers do not present a tripping hazard or block access to emergency equipment or exits.
- Do not store near electrical panels.
- Store in low traffic areas that are away from incompatible chemicals and ignition sources.
- Do not store your carboys in a cold room! These are typically not explosion proof and are therefore incompatible with any flammable liquid.



The EPA regulations allowing a hazardous waste generator to accumulate waste in an SAA is a benefit since it allows the generator to avoid some of the more burdensome EPA requirements (such as recording keeping, reporting, placarding, and manifesting). But there are some specific requirements for SAAs:

- Only 55 gallons of non-acute hazardous waste or one quart of acutely hazardous waste (P-listed) can be stored in a SAA. Since most of the solvents placed in the carboys are flammable liquids fire code regulations will typically be more restrictive in the quantities that are allowed.
- All waste must be collected in containers with a tight fitting cap.
- Close all containers except when necessary to add or remove wastes. Do not overfill containers.
- Funnels must be removed from containers when not in immediate use.
- Label the contents of all containers
- And DO NOT USE THE CARBOYS AS DOORSTOPS.

What is the process for getting my unwanted chemicals picked up?

- Identify chemicals that are ready for pickup.
- Consult the [LABORATORY SAFETY GUIDE](#) to determine if there are items that can be disposed of in your laboratory.
- Set aside items that should be collected by Chemical Safety.
- Fill out a [SURPLUS CHEMICALS FORM](#) online for the unwanted chemicals or a [CHEMICAL INVENTORY OF WASTE SOLVENTS IN CARBOYS FORM](#) online for carboys and place the form with your items.
- Submit a [REQUEST FOR PICKUP](#) and check the [PICKUP SCHEDULE](#) for your building.

Links

- LABORATORY SAFETY GUIDE - <https://ehs.wisc.edu/laboratory-safety-guide/>
- SURPLUS CHEMICALS FORM - <https://ehs.wiscweb.wisc.edu/wp-content/uploads/sites/25/2017/01/SurplusChemicalsForm.pdf>
- CHEMICAL INVENTORY OF WASTE SOLVENTS IN CARBOYS FORM - <https://ehs.wiscweb.wisc.edu/wp-content/uploads/sites/25/2017/01/InventoryWasteSolventsInCarboysForm.pdf>
- REQUEST FOR PICKUP - <https://ehs.wisc.edu/chemical-disposalsurplus-pickup-request-form>
- PICKUP SCHEDULE - <https://ehs.wisc.edu/disposal-pickup-schedule/>

Some Dos and Don'ts of Packing and Labeling Chemicals

Don't: Label anything as “solid waste,” “aqueous waste” and “waste” or “flammable” on a container that does not have anything flammable in it.

This gives us no information about what is actually in the container and it makes the container out of compliance with state and federal regulations. Just because you have a roll of flammable stickers that you have been dying to use does not make it appropriate.

Do: Label the container with the constituents and approximate volume in the container.

Don't: Label a container as "unknown."

That container could have literally anything in it.

Do: Please give any inclination of what it could be. We understand that one of your predecessors left it behind and you don't know what it is, but you also have an understanding of what type of reactions or work that takes place in your lab. (It would also be a good practice to have departing lab personnel dispose of their own chemicals.) Give us some information of what it isn't (e.g., This lab doesn't work with cyanides, dioxins or mercury compounds).

Don't: Label items with abbreviations, nicknames or chemical formulas.

"Steve's reagent" leaves many questions unanswered regarding what is in the reagent. Mainly, who is Steve and why didn't he label it properly?

Do: All containers in your lab must have a label of its contents whether you wish to dispose of it or not. Someday when your work is finished someone will have to know what is in that container.

Don't: Consolidate products of your reactions without approval from Chemical Safety.

Mixing products can create unforeseen reactions and make disposal of these items costly and difficult.

Do: Consult with Chemical Safety to see if it is a possibility to consolidate these products. If you are uncertain, keep each product separate and label each accordingly. Be aware that mixing other chemicals (e.g., mercury compounds) with anything should be avoided to minimize the amount of contaminated items.

Don't: Put any chemicals into a biohazard bag.

By placing items in a biohazard bag you are stating that there is something infectious in the bag.

Do: Use a clear zip-lock bag if you feel that secondary containment is necessary. Items in the bag must be checked by UW Chemical Safety staff.

Don't: Mix sharps with chemical bottles into a container.

Keep in mind that someone is going to have to sort through the container to retrieve the chemical containers.

Do: Put sharps in their own rigid biohazard containers and place them in the buildings sharps bins. If you are unaware if your building has sharps collection containers, contact your building manager.