Section 3 - Chemical Waste Management

Contents

A. HAZARDOUS CHEMICAL WASTE RESPONSIBILITIES

Hazardous chemical waste must be managed properly. The responsibilities of the laboratory worker and Office of Environmental Health & Safety (OEH&S) for hazardous waste are as follows:

1. Laboratory Workers

If laboratory workers generate chemical waste, they must be able to determine whether their chemical wastes are hazardous by using the guidelines in this chapter. For hazardous waste, they must identify the hazards of the waste and follow accumulation rules, which include labeling, storage and handling requirements. They must know how to request collection of hazardous waste by OEH&S and the rules for disposal of chemicals and contaminated items to trash and sanitary sewer. They must prevent the accumulation of “legacy chemicals” and “inherently waste-like chemicals” (defined in this section) by cleaning out their chemical inventory on a regular basis.

Training is required and is available through OEH&S in both classroom and online format.

2. CSU, EH&S Service Programs

EH&S Service Programs collects hazardous waste and manages its proper disposal. EH&S provides guidance and training for laboratory workers on proper hazardous waste management.

B. WHAT QUALIFIES AS HAZARDOUS WASTE?

A chemical or chemical mixture that exhibits any corrosive, flammable, toxic, reactive and/or “persistent in the environment” properties is by legal definition "hazardous". At the CSU, some additional chemicals are managed as hazardous waste because they are carcinogenic.

In order to determine whether or not your chemical is hazardous, use your knowledge, the chemical’s original label and/or the chemical’s Safety Data Sheet (SDS) to determine if the waste is corrosive, flammable, toxic, reactive, “persistent in the environment” and/or mutagenic or carcinogenic, as defined in the below subsections.

1. Flammable/Ignitable

A waste chemical is flammable if it is one of the following:

- A liquid having a flash point less than 140 °F (*e.g.*, ethanol, xylene, diethyl ether). The flash point is defined as the lowest temperature at which a chemical can form an ignitable mixture with air (by evaporating above an open beaker, for example.) SDSs typically include information about flash points if the chemical has one. (Note: The hazardous waste designation of “Flammable” includes not only those classified as “Flammable” per NFPA as described in Section 2.D.3, but also those classified as “Class II Combustible.”)
- A solid or gas capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and burns so vigorously and persistently that it creates a hazard.
- A solid, liquid, or gas that evolves oxygen at room temperature or under slight heating (*e.g.*, peroxides, chlorates, perchlorates, nitrates and permanganates.)

2. Corrosive

A waste chemical is corrosive if it has a pH of less than 2 or greater than 12.5 (note that a chemical is not allowed to be poured down the drain if it has a pH of less than 5.5 or greater than 12 – see subsection B.8 below.)

3. Reactive

A waste chemical is reactive if it is one of the following:

- Normally unstable compound that readily undergoes violent change (*e.g.,* acrylonitrile, butyl hydroperoxide).

- When mixed with water, the chemical reacts violently, forms potentially explosive mixtures, or generates toxic gases in sufficient quantities to present a danger to human health (*e.g.*, sodium metal, chloropropionyl chloride).

- The compound contains cyanides or sulfides that when exposed to pH conditions between 2 and 12.5 could generate toxic gases in sufficient quantities to endanger human health (*e.g.*, sodium sulfide, arsenic sulfide).

4. Toxic

Substances can be allocated to one of five toxicity categories based on acute toxicity by the oral, dermal or inhalation route according to the numeric table below. Acute toxicity values are expressed as (approximate) LD50 (oral, dermal) or LC50(inhalation) values or as acute toxicity estimates (ATE)

Table 3-1 lists five categories of toxicity: 1,2,3,4,5. The 1 category is the most toxic. If data is available for more than one toxicity test, use the data showing the severest toxicity.

Table 3-1 Chemical Waste Toxicity Categories

Toxicity Categories					
Exposure Route	**Category 1**	**Category 2**	**Category 3**	**Category 4**	**Category 5**
Oral (mg/Kg bodyweight)	5	50	300	2000	5000 See detailed note below
Dermal (mg/Kg bodyweight)	50	200	1000	2000	
Gases (ppm)	100	500	2500	20000	
Vapours (mg/L)	0.5	2.0	10	20	
Dust and Mists (mg/L)	0.05	0.5	1.0	5	

Chemical waste that qualifies for any of these categories is hazardous waste. Chemical waste that qualifies for toxic categories X, A, or B is “extremely hazardous waste” and is subject to additional requirements, such as a maximum waste accumulation volume of one quart (see below). Chemical waste with toxicity below the D category is not regulated as toxic, but may still be managed as hazardous waste if it is carcinogenic/mutagenic.

For mixtures such as diluted wastes and wastes containing more than one constituent, an Equivalent Concentration (EC) for the mixture must be calculated to determine the toxicity level

of the mixture. If the EC is greater than or equal to 0.001%, the waste is toxic. The formula for the EC is:

$$EC(\%) = \Sigma X\% + \frac{\Sigma A\%}{10} + \frac{\Sigma B\%}{100} + \frac{\Sigma C\%}{1{,}000} + \frac{\Sigma D\%}{10{,}000}$$

For example, a mixture of 0.01% aldrin (toxic category A), 1.0% endrin (toxic category A), 4.0% benzene (toxic category D), 2.0% phenol (toxic category C) and 5% dinoseb (toxic category B) in water (nontoxic) exceeds the toxicity:

$$EC(\%) = 0\% + \frac{(1.0\% + 0.01\%)}{10} + \frac{5.0\%}{100} + \frac{2.0\%}{1{,}000} + \frac{4.0\%}{10{,}000} = 0.153\%$$

If you are not confident enough or willing to use the above equation to determine whether your chemical mixture is toxic, please fill out and submit a Waste Evaluation Request, online at (insert link)EH&S staff will then evaluate your waste and advise you on proper disposal of your chemical.

5. Persistent

Persistent chemicals do not biodegrade quickly in the environment. There are two main categories of persistent chemicals, described below.

a. Halogenated Organic Compounds

A halogenated organic compound (HOC) is a molecule that includes one or more atoms of fluorine, chlorine, bromine, or iodine. When a waste mixture contains one or more halogenated organic compounds, the total halogenated organic compound concentration is determined by summing the concentration percentages of each halogenated organic compound. If a waste mixture contains more than 0.01% HOC, the waste is persistent and therefore hazardous. For example, a waste contains 0.009% carbon tetrachloride, 0.012% DDT, and 0.020% 1,1,1-trichloroethylene. The total halogenated organic compounds concentration calculation indicates the mixture is persistent, as follows:

Total HOC Concentration = 0.009% + 0.012% + 0.020% = 0.041%

b. Polycyclic Aromatic Hydrocarbons

The following polycyclic aromatic hydrocarbons (PAHs) are regulated: acenapthylene, acenapthene, anthracene, benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(q,h,i)perylene, benzo(a)pyrene, chrysene, dibenz(a,h)anthracene, indeno(1,2,3-c,d)pyrene, fluoranthene, fluorene, naphthalene, phenanthrene and pyrene. When a waste contains one or more of these PAHs, determine the total concentration by summing the concentration percentages of each regulated polycyclic aromatic hydrocarbons. If the waste contains more than 1% PAHs, the waste is persistent and therefore hazardous. For example, a waste contains 0.08% chrysene and 1.22% 3,4-benzo[a]pyrene. The total polycyclic aromatic hydrocarbon concentration calculation demonstrates the mixture is persistent as follows:

Total PAH Concentration = 0.08% + 1.22% = 1.30%

6. Trash Rules

Non-hazardous solid chemicals can go in the trash. Known, probable or suspected carcinogens, irritants and sensitizers cannot go in the trash

Deface labels. Bag and label chemicals as “non-hazardous.” Liquids and pressurized containers like non-empty aerosol cans can never go in the trash.

Uncontaminated or slightly contaminated items such as gloves, paper towels and empty containers can go in the trash. EH&S recommends double-bagging and labeling these items as “non-hazardous” if there is evidence of contamination. Manage very contaminated items, such as spill cleanup materials, as hazardous waste. Also, empty containers for extremely toxic chemicals are hazardous waste unless you triple rinse them and dispose of the rinseate as hazardous waste.

7. Local Sewer Limits

These rules determine what can be poured down the sink and sometimes supersede Hazardous Waste rules. Please also refer to the local sewer limits rules in Section F below.

8. Waste Evaluation Request

If you are unsure whether your waste is hazardous, (insert link). Fill out all information completely, and attach the SDS(s) for the chemical(s) to it. EH&S staff will evaluate your waste stream for you and advise you on proper disposal.

C. HAZARDOUS WASTE ACCUMULATION RULES

Follow the below rules for hazardous chemical waste accumulation.

1. Appropriate Containers

Accumulate waste in an appropriate container compatible with the waste. You may reuse containers, even containers that were used for other chemicals, if they have been rinsed and the original labels have been defaced (note that the rinseate may be hazardous waste according to the definitions in Section B, above.) Containers that were designed for solid chemicals should not be used for liquids. Use only containers that show no sign of damage or deterioration.

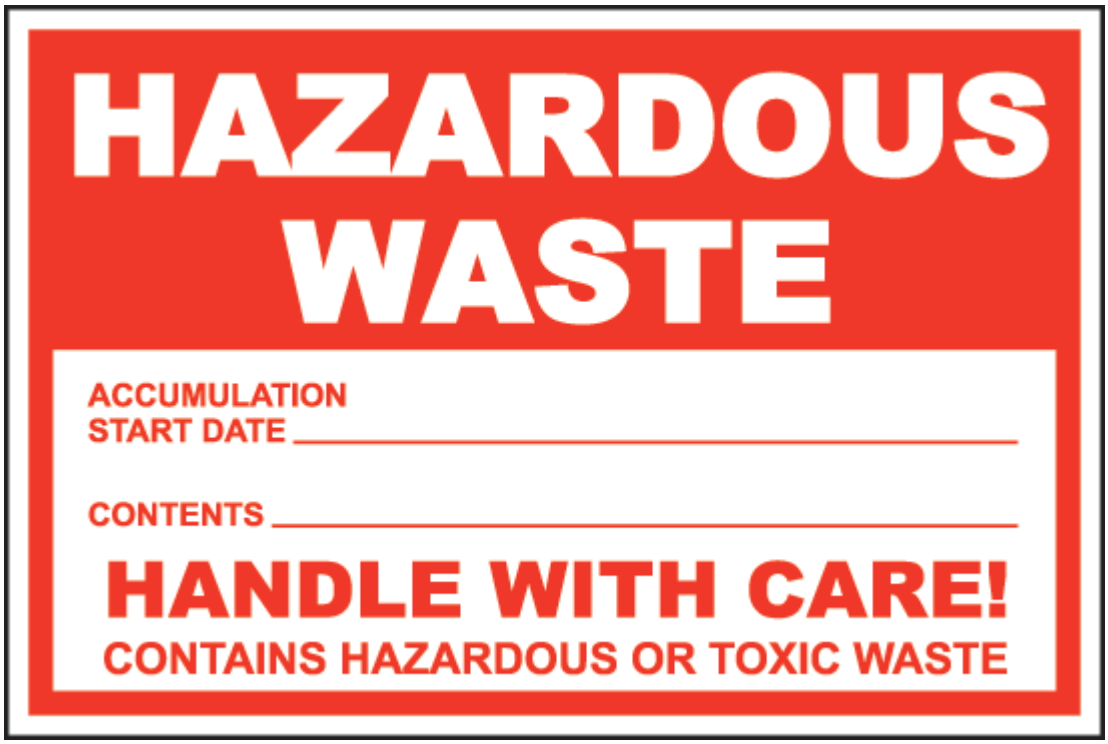
You must use containers with screw top closures. Waste containers must remain closed except when you are adding waste. Use spring loaded funnels for adding waste frequently to waste containers.

Finally, do not fill the containers completely. Each container must have at least a one inch of headspace above the waste when it is collected. Request collection of your waste ahead of time to avoid overfilling your containers.

2. Hazardous Waste Labels

Label the container using the Hazardous Waste Label, Figure 3-1, below.

Figure 3-1 Hazardous Waste Label



Fill out the label completely, including percentages of constituents, the hazards of the waste, and contact name. If you do not know the hazards of your chemical, use the SDS of the chemical to determine what they are. Do not date the container or label. Deface or remove any original labels remaining on the container to avoid confusion about the identity of the waste.

3. Location

Waste must be under the control of the individual(s) generating the waste. The waste should be in a physically safe area (*e.g.*, not on a windowsill.) Waste chemicals may be stored with unused chemicals as long as the containers are properly labeled and your laboratory personnel know the storage location.

Do not accumulate large amounts of waste in the fume hood.

Use flammable liquid storage cabinets for flammable waste over ten gallons in volume.

Store the waste away from emergency equipment such as safety showers and emergency access panels. Do not block exits.

Do not store the waste near or in sinks. If the waste is stored in an area that drains to a floor drain, the waste must be in secondary containment.

4. Segregation

Segregate regulated chemical waste by chemical compatibility. Refer to the segregation guidelines in Section 2 of this manual. Use secondary containment (tubs, basins or buckets) for segregation of incompatible wastes accumulated in the same area.

5. Accumulation Volume Limits

Accumulate no more than 200 liters (55 gallons) of chemical waste per waste stream or one liter (one quart) of extremely hazardous waste per waste stream. Extremely hazardous waste is waste that is highly toxic, and the one liter limit is designed to limit risk, especially in the event of a spill. See Insert link to webpage for how to determine whether your waste is extremely hazardous waste.

Also, any one type of flammable chemical (including waste) cannot exceed the limits specified by the controlling fire department.

Leave some headspace (at least one inch) in each container to allow for pressure changes due to changes in temperature.

Chemical waste must not be accumulated (*i.e.* stored) for more than one year.

6. Large Containers (Drums)

If you are accumulating wastes in containers greater than five gallons in volume, make sure that drums used to accumulate regulated wastes are in good condition and are approved by Department of Transportation (DOT) for highway mode transportation. If the drums were shipped to you in the first place, they are very likely DOT-approved.

Drums containing liquids must have ten centimeters of air space between the liquid surface and the lid.

Collection must be requested before the drum is full, especially in the case of 55 gallon drums.

7. Inherently Waste-like Chemicals

"Inherently waste-like chemicals" include expired chemicals, chemicals in deteriorating containers and chemicals that appear to be or are unusable. State inspectors may issue fines or infractions for inherently waste-like chemicals in your laboratory. Do not keep chemicals past their expiration date, and conduct cleanouts when you do your annual chemical inventory update.

Please also see the section on "legacy chemicals" in Section G.3, below. Legacy chemicals are those that are left behind by laboratory staff when they leave the university or move laboratories. They become the responsibility of the new space occupants.

D. HAZARDOUS WASTE COLLECTION REQUESTS

1. Hazardous Waste Collection Overview

EH&S collects hazardous chemical waste from all CSU owned and operated facilities. There are about 690 laboratories on our CSU campus. OEH&S may only be near your area once every week or every other week. Approximate collection time is two to four weeks at CSU. To avoid problems, plan ahead and request collection before your containers are full.

2. Collection Requests

Request collection of your waste by submitting a Hazardous Waste Inventory http://www.csuohio.edu/sites/default/files/hazardous_waste_inventory.pdf Fill out all information completely and fax or mail the form (information is on the form).

3. Waste Cleanouts

If you are moving or cleaning out your workplace and will need EH&S to collect a large volume of chemical waste, here are some guidelines.

If you think you have more than 100 containers of waste, call 216-687-9306 to arrange a cleanout appointment. Call at least a month before your deadline.

For fewer than 100 containers, fill out and send the copies of the hazardous waste inventory sheet to OEH&S, making sure to put your name on each of the pages. Place completed CSU Hazardous Waste Labels on each waste container (not needed for containers with an original label and original contents).

Finally, remember to update your chemical inventory.

4. What Happens to Hazardous Waste?

EH&S has a Waste Minimization Program that reuses, recycles and treats more than 50% of the total waste generated at Cleveland State University. Reuse, recycling and treatment takes place both in laboratories and at the OEH&S hazardous waste facility. Some waste streams, like batteries, paint and oil, are sent offsite for recycling by contractors.

All hazardous waste at the Cleveland State University that is not reused, recycled or treated is sent to permitted hazardous waste recycling and disposal facilities. Flammable waste is used as an alternative fuel to incinerate hazardous waste. Most of the other waste streams are incinerated at high temperature. A few waste streams are placed in permitted hazardous waste landfills.

E. TRASH DISPOSAL

1. Trash Disposal of Chemicals

The following are **prohibited** in the trash because of their chemical or physical hazards:

- Hazardous chemical waste as defined earlier in this section
- Known, probable or suspected carcinogens, irritants and sensitizers (see a current SDS for the chemical to determine if the chemical is any of these)
- Free liquids of any type
- Pressurized vessels, including non-empty aerosol cans
- Laboratory glass and sharps

- Radioactive waste
- Batteries
- Mercury, including thermometers
- Biohazardous waste

To throw away chemicals that are not prohibited in the trash, deface any labels, securely double-bag it and label it “non-hazardous” so that custodial staff know it is safe for them to handle the trash.

2. Trash Disposal of Empty Chemical Containers

"Empty" chemical containers may still contain enough chemicals in them to present a hazard to custodial staff. On the other hand, it can be difficult to completely empty a container.

The legal interpretation of the word "empty" acknowledges this difficulty. A container is legally empty when both of the following are true:

- Contents have been removed by "normal, no-nonsense means, such as inverting and draining, shaking, scraping, or scooping", and
- No more than 1% of the contents remain.

If the chemical is "extremely hazardous waste" or a pesticide marked with danger or warning labels, then the container must be triple rinsed before it is legally empty. The rinseate from this process is also considered hazardous waste by law. The definition for extremely hazardous wastes is on the OEH&S website at. Also, if your chemical is a known or suspected carcinogen, such as those listed in Appendix H of this manual, OEH&S strongly recommends that you have the container sent for disposal.

It is illegal to "dispose" of hazardous waste by leaving non-empty containers of chemicals in the fume hood or elsewhere to evaporate the chemical.

If you choose to dispose of the empty container, do the following:

- Dry the empty container, preferably in a fume hood. Ensure that there are no sources of heat or open flame in the fume hood when drying containers that contained flammable chemicals.
- With a pen or marker, cross out or black out the labels on the container.
- Leave the container uncapped. Throw the cap away separately.
- If the container fits in the trashcan, place it there. If it does not fit in the trashcan, place it next to the trash.
- Do not leave empty containers in public areas, such as hallways or loading docks, unless you have made an arrangement with Custodial Services or OEH&S for pickup services.

Consider reusing the empty container for accumulation of waste for that same chemical or other compatible chemicals. If you do reuse a container, deface or remove the label on the container and then fill out and affix a hazardous waste label to the container. Defacing and labeling are required by law and also help others in your workplace know that the container contains hazardous waste, not the original chemical.

Do not recycle glass or plastic containers that contained chemicals unless approved by OEH&S. Recycled glass and plastic is used for beverage and food containers, so the recycling industry does not accept chemical containers.

3. Trash Disposal of Contaminated Items

Used gloves and other commonly used items (besides empty containers) can be placed in the trash if they are not “grossly contaminated” with hazardous chemicals. If you have an item that is “grossly contaminated”, dispose of it as hazardous chemical waste.

Examples of "grossly contaminated" items include used spill clean-up materials, items such as gloves and equipment contaminated from a spill and used equipment that contains hazardous chemical residue.

Finally, EH&S encourages you to collect items that look like they might be contaminated by chemicals, such as weighing papers and gloves, in bags and then label the bags “non-hazardous waste” before you place them in the trash. Custodial staff members are sometimes understandably nervous when handling laboratory trash; a white residue or a few drops of water in the trash could be a dangerous chemical. Taking an extra step to bag these items can be a nice gesture.

F. SEWER DISPOSAL

All wastes discharged to the sanitary sewer system must be under the local Sewer Discharge Limits designed to protect surface waters and maintain the quality of biosolids from wastewater treatment plants.

1. Cuyahoga County Local Sewer Discharge Limits Easterly Plant

In Cuyahoga County, you may dispose of some chemicals down the sanitary sewer drain in some circumstances. This method of disposal is also known as "sewering". Records of this disposal must be kept as described in Section F.3 below. If your waste qualifies as hazardous waste (according to the criteria in Section B above) then you may not sewer the waste.

The Cuyahoga County has published local discharge limits for commonly used chemicals. These limits are on the OEH&S website at (insert link)

2. Treating Hazardous Wastes

Notify OEH&S at 216-687-9306 or before treating hazardous waste. OEH&S recommends that no treatment be conducted at CSU.

3. Soaps, Bleach and Acetone

When you are washing glassware or equipment, you will likely use chemicals such as detergents and bleach. Standard household bleach and other cleansers may go down the drain.

Acetone may not go down the sink at any concentration. If you use acetone to rinse off items, you must collect any excess acetone in a securely capped, properly labeled waste container and dispose of it as hazardous waste (see the hazardous chemical waste page for more information.) You may not store acetone squeeze bottles near the sink.

Do not use chromate based cleansers. There are many less toxic and non-carcinogenic alternative cleansers that work just as well.

4. Scintillation Fluids

Do not sewer any Scintillation Fluid. Even though the manufacturer claims them to be Environmentally Friendly. Theses scintillation fluids may claim to be safer, but because they contain high concentrations of flammable surfactants, or have substances that damage aquatic life they are not approved for sewer disposal.

6. Dilution Prohibition

It is illegal to dilute your chemical waste solely to meet sewer discharge limits. However, you may sewer wastes such as equipment rinse water or any chemical treatment that you do as a normal part of cleaning up after an experiment, as long as it meets sewer disposal limits.

G. CHEMICAL WASTES OF CONCERN

1. Unknown Chemicals

Without an accurate chemical name and concentration range, unknown or unidentified chemicals cannot be safely handled or disposed of. The best way to prevent unknowns is to label all chemical containers and make sure that the labels stay in good condition over time.

If you have an unknown chemical, keep it where it is or store it temporarily in the fume hood, whichever you believe to be safer. Find out as much information as you can about the chemical by examining the container and interviewing anyone you think might know something about the chemical. If that fails, complete and mail or fax to OEH&S a Hazardous Waste Inventory Sheet, online at
http://www.csuohio.edu/sites/default/files/hazardous_waste_inventory.pdf.
Provide as much information about the waste as possible, such as the history, physical properties and the results of any analysis performed on the unknown.

Identification analysis performed by the approved waste disposal contractor could cost the chemical user roughly $80 to $1,250 per unknown. OEHS highly recommends that all chemicals be labeled to prevent this charge to your research funding source.

2. Potentially Explosive Wastes

Some common chemicals can become highly unstable explosives over time when stored improperly and cannot be collected as hazardous waste unless they have been deactivated and stabilized. The following segments highlight the most common of these troublesome chemicals.

a. Peroxide-Forming Chemicals

Peroxide-forming chemicals such as p-dioxane, diethyl ether, tetrahydrofuran and acetaldehyde that have exceeded the manufacturer's expiration date will not be collected for disposal until they have been tested for peroxides. These chemicals must be managed correctly. For more information, see section 2.G.2.b earlier in this manual and the O*EH&S Peroxide Forming Chemicals Management and Assessment Guidelines* online at insert link with doc.

Chemicals containing more than 10 parts per million (ppm) peroxides must be deactivated before they will be collected by EH&S.

b. Picric Acid and Other Polynitroaromatic Compounds

Polynitroaromatic compounds are commonly used in laboratories and are safe in the form in which they are sold. They are ordinarily sold with 3 to 10% water added to stabilize them. However, they will become explosive if allowed to dry out. Dry polynitroaromatic compounds must be wet with 10% water before they can be collected by EH&S.

c. Sodium Azide

Sodium azide, although not inherently unstable, can form highly explosive heavy metal azides if contaminated or used improperly. Do not pour sodium azide into the sanitary

sewer. Disposal of sodium azide solutions to the sewer can cause the formation of lead or copper azides in plumbing. Routine sewer disposal of sodium azide has caused several serious explosions.

d. Nitrocellulose

Several nitrocellulose products, primarily paper and tubes, are used in some laboratories. Nitrocellulose burns vigorously in ambient conditions and may explode when heated under confinement. When completely dehydrated, it is considered a low level explosive. As a result, these products should never be autoclaved for decontamination. Nitrocellulose products must be soaked in water before disposal through EH&S.

3. Legacy Chemicals

Principal investigators are required to completely clean out laboratories before they leave, including all hazardous chemicals and waste (see Section 10, Moving In/Moving Out.) However, sometimes people leave without disposing of chemicals properly.

Legacy chemicals are unwanted chemicals that are sometimes left behind after a move. If you move into a laboratory that has legacy chemicals in it, you should tell your department administrator immediately. If your department cannot, for whatever reason, solve the problem, then these legacy chemicals are “yours” to manage. Unless you think that you will use them, arrange to request their collection as hazardous waste and follow all waste accumulation rules, including hazard identification, labeling and segregation.

H. HAZARDOUS WASTE MINIMIZATION

On average, EH&S collects and processes about 200,000 kg of hazardous chemical waste a year. Since 2002, EH&S has developed several programs to reduce the amount of hazardous waste that must be incinerated or landfilled. For the last five years, the CSU reused, recycled, or treated about 40% of our hazardous chemical waste. This section outlines some of the basic elements of this effort and how you can participate.

More information is at http: insert link. There you will find an extensive and detailed list of services and resources.

1. Chemical Procurement and Chemical Exchange

Purchase only what you'll use, especially if you're purchasing a hazardous chemical. One recent study suggested that up to 40% of the hazardous waste produced by laboratories is actually unused and expired chemicals.

Shop for chemicals in the Magnus Mart at: .
https://mssso.csuohio.edu/adfs/ls/idpinitiatedsignon.aspx?LoginToRP=https://solutions.sciquest.com/
For more information, see the EH&S website about chemical Procurement at
http://www.csuohio.edu/sites/default/files/Chemical%20Procurement%20Program%202013.pdf
:

2. Treatment and Recycling in the Laboratory

You are encouraged to treat or recycle your own waste. EH&S staff are available to help you get started. Please see http://www.csuohio.edu/sustainability/sustainability for more details.

3. Hazardous Materials Recycling

EH&S and Property Control manage the recycling of materials that would otherwise be disposed of as hazardous waste.

for all the common (and sometimes uncommon) items recycled at the CSU, from batteries to computer monitors to elemental mercury to scrap metal.

I. SOLID WASTE AND RECYCLING

Below are guidelines for recycling a number of common non-chemical items in laboratories.

1. Paper and Cardboard

EH&S encourages you to recycle boxes and packaging as soon as possible unless you have sufficient storage space for them. Storing boxes in aisles or in front of emergency equipment or exits, or necessary fire panels, is illegal and dangerous. Paper, cardboard and other common recyclables are managed by FAST Movers. For more information, see CSU Recycling's procedures webpage at .

2. Plastic and Glass

Plastic and glass chemical containers are not recyclable at this time. The glass and plastic recycling industry uses recycled material to make food and beverage containers and bans chemical containers, even if rinsed clean, from their recycling streams.

3. Packaging Materials

CSU Movers also coordinates the recycling of wooden pallets, packaging "peanuts", plastic wrap and other packaging materials. Styrofoam packaging is handled on a case-by-case basis.

4. Printer Cartridges

Most types of printer cartridges and components can be recycled. For more information, see CSU mail room services for more information .

5. Batteries

Battery collection is collected by CSU EH&S . Small amounts of batteries can be recycled through the e.Media system . Large, heavy, and/or unusual research or clinical batteries, as well as large volumes of batteries, are handled two ways.

a. Routine Battery Collection

If you have a routine number, request a pickup with the online Routine Collection Request at insert ink.

J. "SHARPS" AND "LAB GLASS"

The following are guidelines for the disposal of "sharps" and "lab glass."

1. "Sharps"

Sharps are a regulated waste classification. The "sharps" definition specifically includes:

- All syringes
- All hypodermic needles
- IV tubing with attached needles
- Lancets
- Scalpel blades

"Sharps" also includes the following if contaminated with a biohazardous material (including recombinant or synthetic DNA/RNA):

- Broken glass
- Razor blades
- Pasteur pipettes
- Pipette tips
- Glass tubes
- Glass slides and cover slips
- Other, similar items

"Sharps" must be disposed in a red plastic sharps container which is leak proof, rigid, and puncture-resistant. It must be labeled with a biohazard symbol, and be equipped with a tight-fitting lid for use during handling and transport. Various sizes of sharps containers are available from Biochemistry Stores and vendors.

Close and prepare for decontamination and disposal a sharps container when 2/3 full. If a sharps container is punctured or has needles sticking out of it, the entire container must be placed inside a larger sharps container prior to treatment and disposal. Do not attempt to empty a sharps container that has been punctured. Refer to the EH&S web page http://www.for specific disposal instructions.

All sharps containers must be decontaminated prior to disposal. The method for getting sharps waste collected and treated vary depending on your work location. Refer to the Biohazardous Waste Flow Chart for your specific location at https://www..

2. Bio-Hazardous Glass Items

Biohazardous lab glass and plastic must be decontaminated prior to disposal. Contaminated pipettes can be placed in a pipette box/keeper, while other biohazardous-contaminated glass or plastic items can go into a heavy cardboard box lined with a biohazard bag. The box must be labeled with the biohazard symbol. An EH&S poster showing examples of these boxes is at http://www..

3. "Lab Glass"

"Lab glass" waste (including plastic items) is defined as items that could puncture regular waste bags and endanger waste handlers, and is not contaminated with a biohazardous material. This category never includes syringes, lancets, scalpel blades, or hypodermic needles.

Examples of “lab glass” include:

- Broken glassware
- Empty chemical containers such as test tubes, pipettes and pipette tips, and centrifuge tubes
- Pointed swabs and sticks
- Razor blades
- Fragile glass items such as glass Pasteur pipettes, glass slides and cover slips.

Package such “lab glass” waste in a sturdy cardboard box lined with plastic. The box should never weigh more than 25 pounds and clearly identify the PI name and room number. Seal the box with pre-printed “lab glass tape” or create your own tape using clear packaging tape over writing indicating “lab glass.”

“Lab glass” boxes and tape can be purchased from the Chemistry stockroom or from vendors. Tape can also be purchased from Biochemistry stores.

The sealed box is placed alongside the regular waste container for collection by Custodial Services.

Never use a “lab glass” box for the disposal of chemicals, “sharps,” biohazardous materials, or liquid waste.

K. INFECTIOUS OR BIOLOGICAL WASTE

For infectious waste disposal requirements, see Section 4.F of the CSU Biohazard Safety Manual, at http://www.. For general information about infectious waste, see http://.

L. RADIOACTIVE WASTE

For radioactive waste, see the CSU Radiation Safety Manual, Section 14 (Radioactive Waste) at http://www..

M. MIXED WASTE

Most mixed wastes consist of low level radioactive wastes combined with hazardous materials.

Cleveland State University policy as well as state and federal law prohibit the disposal of mixed waste. There is no means for disposing of mixed material. If a lab attempts to dispose of mixed waste as either radioactive waste or chemical waste the fines and penalties to CSU will be severe and could result in a Cease and Desist Order. Fines and fees of up to $250,000 per year may be assessed against the University by federal and state agencies if mixed wastes were generated and/or stored on campus.

Exceptions to the production of mixed waste includes liquid scintillation cocktails which can be legally shipped to a contract waste disposal vendor to be burned, and radioactive materials mixed with a hazardous component that can be neutralized or deactivated in the laboratory.

N. LIQUID SCINTILLATION COCKTAILS

Several Liquid Scintillation Cocktail (LSC) manufacturers now produce non-hazardous fluids, some marketed as being sanitary sewer disposable.They are listed at http://www..

O. ANIMALS AND ANIMAL BY-PRODUCTS

Special consideration is needed when disposing of dead animals, animal body parts/tissues, animal bedding, or animal waste.

1. Contaminated Animals and Animal By-Products

Animals and animal by-products contaminated by infectious agents, radioactive materials, highly toxic chemicals, or stored in fixatives require special disposal procedures. Contact EH&S at 216-687-9306 for disposal guidance

P. GAS CYLINDERS

Gas cylinders used on campus must be either rented or, if purchased, purchased from the preferred supplier, Praxair, if possible. This ensures the cylinders can be properly disposed of and have a return authorization program for unused gas. As applicable, gas cylinders should be marked FULL / PARTIAL / EMPTY and returned to the supplier. Shipping cylinders that are not empty require shipping precautions as described on the gas cylinder web page Insert link(http://www.).

Any non-returnable cylinder must be disposed of through EH&S. Cost of disposal will be charged to the purchaser. Any abandoned cylinders will be recharged to the associated department. Cylinders or lecture bottles containing an unknown substance must be analyzed prior to disposal. Currently, the cost of analysis on an unknown cylinder is approximately $1,600 per cylinder, paid by the laboratory.

Empty lecture bottles may be discarded as scrap metal after the main valve is unscrewed and detached and the bottle has been flushed with an inert gas or rinsed with an appropriate solvent.

Cylinders containing constituents which are normally part of air should be vented to the atmosphere until they are empty. Empty cylinders may be discarded as scrap metal after the main valve is unscrewed and detached and the cylinder has been flushed with an inert gas of rinsed with an appropriate solvent. Calibration gas cylinders containing hazardous constituents in the 1 to 100 ppm range may be eligible for venting.

For assistance about the disposal of gas cylinders, complete and submit a Hazardous waste Inventory sheet to EHS