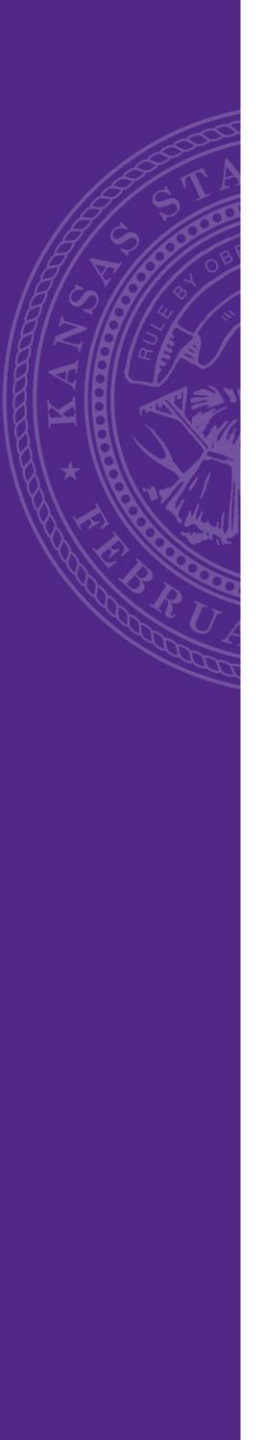




Hazardous Waste Awareness Training Refresher



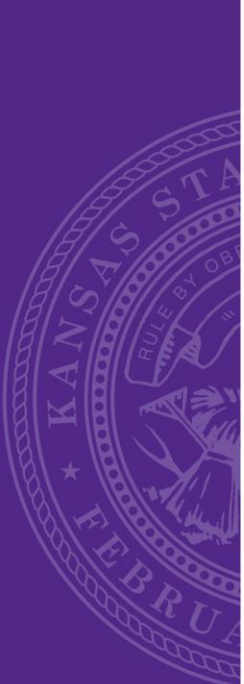
Hazardous materials have different requirements than hazardous waste. Here are the main requirements for each:

Hazardous Materials

- **Usable** chemicals or products
- Hazard Communication training required
- Requirements fall under OSHA, KDOL & DOT
- All containers must be labeled with name & hazard of the material
- Keep an updated chemical inventory in EHS's [Environmental Health and Safety Assistant program](#)
- **Do not use Hazardous Waste label**

Hazardous Waste

- **Unusable or no longer wanted** chemicals or products
- Hazardous Waste Awareness training required
- Requirements fall under EPA & DOT
- All containers must be labeled with name of the material
- **MUST have a Hazardous Waste label on container**



High Hazard Materials Management

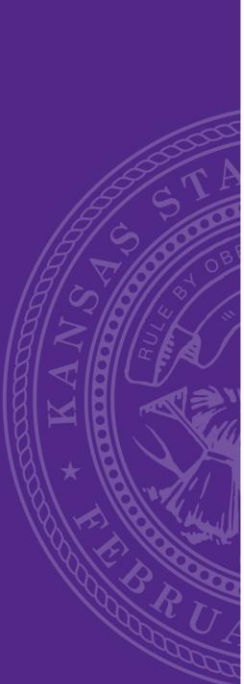
There are many hazardous materials that are highly hazardous due to their nature, when they begin to degrade or when they are mismanaged as material or hazardous waste. It is important to properly manage these materials for everyone's safety. Disposal is also expensive and can be even more expensive when mismanaged.

Peroxide formers

- Materials that react with oxygen to form peroxide crystals which can **explode** with impact, heat or friction
- Include potassium metal and various ethers, such as tetrahydrofuran
- Purchase in minimal quantities and dispose of 3-12 months after opening. **See App C of [Lab Safety Manual](#).**
- You must have a peroxide forming chemical management plan.

Other high hazard materials include :

- Shock sensitive compounds (2,4-dinitrophenylhydrazine, picric acid)
- Azo and azide compounds (sodium azide)
- Water reactive compounds (lithium metal)



What is Hazardous Waste?

1. First, the waste must be a Solid Waste, which is defined as *any liquid or solid (and in some cases a gas)* that is discarded, abandoned, recycled or considered inherently waste-like.

These may be spent, discarded, used, expired or unwanted chemicals.

2. Second, the Solid Waste has hazardous characteristics or is listed as a hazardous waste in EPA regulations.

Use this [flow chart](#) to help you determine if you have a HW. The definitions for items in the flow chart are in the following slides. If you're still unsure if you have a HW, call EHS at 785-532-5856 or email us at safety@ksu.edu.

Characteristic Hazardous Waste

There are four classes of characteristic hazardous waste.

- Ignitable



- Corrosive



- Reactive



- Toxic



Hazardous Waste Characteristics

Ignitable

- Flash point $<140^{\circ}\text{F}$
- **Flash Point** - lowest temperature at which the vapors of a liquid will ignite
- Examples: methanol, hexane, xylene, toluene, benzene, etc.
- [Flash point demonstration](#)
- Find the flash point of the original material on the Safety Data Sheet.



Hazardous Waste Characteristics

Ignitable

- Is an oxidizer
- Is an ignitable compressed gas
- A solid that can cause fire through friction, absorption of moisture, or spontaneous chemical changes and when ignited burns vigorously and persistently



Hazardous Waste Characteristics

Corrosive

$$\text{pH} \leq 2 \text{ OR } \geq 12.5$$

- Strong acids
 - Ex: hydrochloric acid & glacial acetic acid
- Strong bases
 - Ex: ammonium hydroxide & sodium hydroxide
- Refers to
 - aqueous solutions
 - liquids that corrode steel faster than 1/4"/year



Hazardous Waste Characteristics

Reactive

- Unstable
- May spontaneously and violently react with **air or water** to generate a toxic, flammable or explosive gas.
 - Ex: lithium, sodium cyanide and potassium
- [Video of reactions](#) – do not try this at home, in a lab or anywhere else!



Hazardous Waste Characteristics

Toxic

- The EPA has a list of toxic chemicals.
- Wastes with concentrations of these chemicals high enough to fail the *Toxicity Characteristic Leaching Procedure (TCLP)* testing method are HW.
- The TCLP mimics conditions found in landfills when groundwater percolates through buried materials.



Toxic Waste List

If your waste contains any of these chemicals, treat it as hazardous waste.

8 Heavy Metals

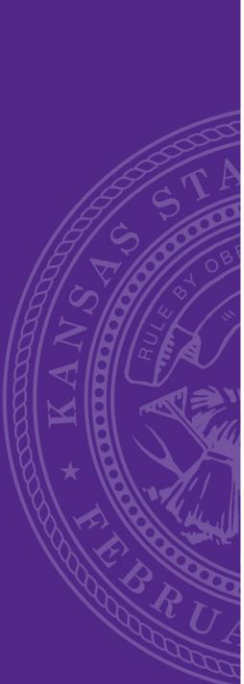
- Arsenic
- Barium
- Cadmium
- Chromium
- Lead
- Mercury
- Selenium
- Silver

17 Pesticides

- Chlordane
- 2, 4-D
- chlorobenzene
- 1,4-dichlorobenzene
- 1,2-dichlorethane
- 1,1-dichloroethylene
- Endrin
- Heptachlor
- hexachlorobenzene
- Lindane
- hexachlorobutadiene
- Methoxychlor
- pentachlorophenol
- Toxaphene
- 2,4,5-trichlorophenol
- 2,4,6-trichlorophenol
- 2,4,5-TP (Silvex)

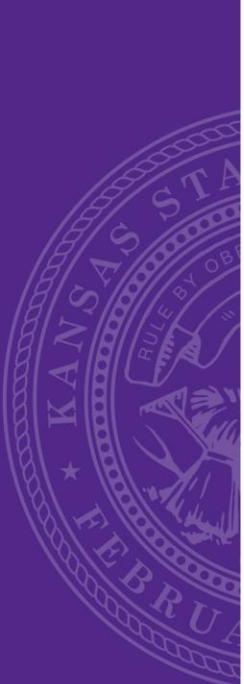
12 Organic Solvents

- benzene
- carbon tetrachloride
- chloroform
- cresol(s)
- 2,4-dinitrotoluene
- hexachloroethane
- methyl ethyl ketone
- nitrobenzene
- pyridine
- tetrachloroethylene
- trichloroethylene
- vinyl chloride



Listed Hazardous Waste (HW)

- F and K Lists
 - These are based on industry (K) or process (F) generating the waste.
 - Many solvents are on the F list (F001-F005).
- P and U Lists
 - These chemicals are unused, pure commercial grade/product OR the sole active ingredient in a chemical formulation.
 - P-listed wastes are acutely toxic. Even the empty container that held a P-listed waste is considered a HW.
 - We have many U-listed wastes and some P-listed on campus.
- [See the lists here.](#)



Hazardous Waste Examples

1. Acetone 99.5%, unused, unwanted

This is HW. The flash point is 1.4 F and it is listed on the U list, U002.

2. Ceramic glaze with cadmium.

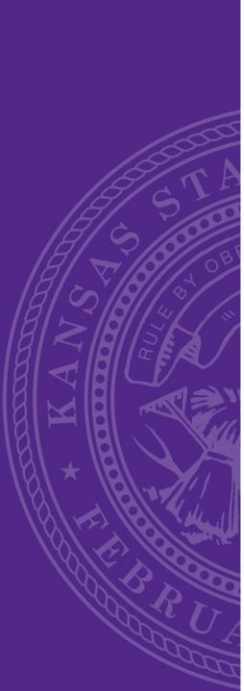
Handle this as HW because of the cadmium. Cadmium is on the Toxic Characteristic list.

3. Mixture of 85% water, 10% nitric acid and 5% hydrogen peroxide.

This is HW. It is ignitable and corrosive. The nitric is corrosive and the hydrogen peroxide is an oxidizer (ignitable).

4. Dimethyl sulfoxide.

This is not HW but should be collected for proper disposal. It should not be put down the drain.

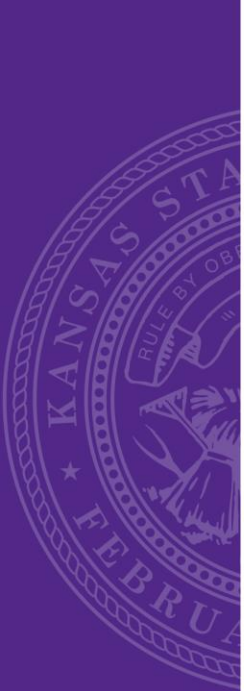


Hazardous Waste Generators

- If you create hazardous waste, you are a Generator of HW.
- There are several categories of generators. Each depends on how much waste is generated monthly.
- K-State is in the highest category of HW generators:
 - a Large Quantity Generator, which means it generates 2,000 pounds or more of HW each month.

As such, we are under heavy scrutiny by EPA, KDHE, and other agencies.

- The entire Manhattan campus is considered one generator.



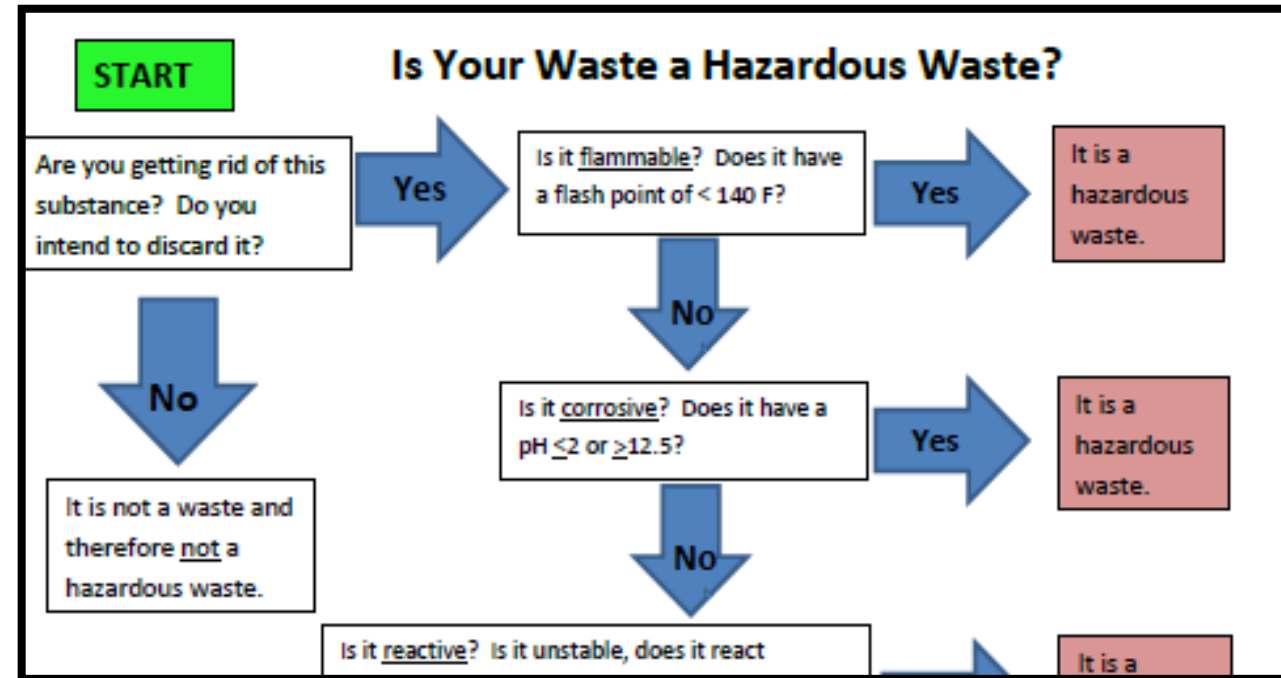
Hazardous Waste Generators

- K-State units not on the main campus may be:
 - Conditionally Exempt Small Quantity Generator (*Exempt doesn't mean there aren't any rules to follow; there are some but not many.*)
 - Kansas Small Quantity Generator
 - Small Quantity Generators
 - or are not considered generators
- Rabies lab in the Innovation Center – Kansas Small Quantity
- [Polytechnic, Salina – Conditionally Exempt Small Quantity](#)
- [Olathe – Conditionally Exempt Small Quantity](#)
- Extension farms - varies
- Each has different rules than the Manhattan campus.

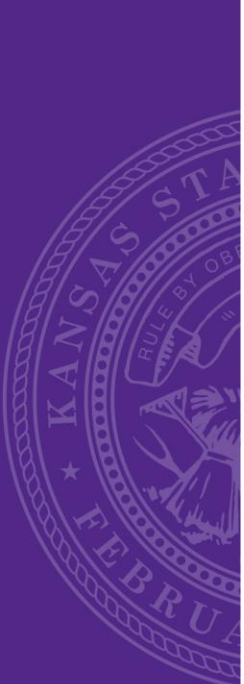
Chemical Disposal

- EHS manages all hazardous material/waste disposal for K-State.

- All spent hazardous waste chemicals must be identified using a hazardous waste label available from EHS.



- All unused chemicals must be discarded through EHS even if they are not ultimately identified as hazardous waste.
- Use this [flow chart](#) to help you determine if you have a HW. If you're still unsure call EHS at 785-532-5856 or email us at safety@ksu.edu.

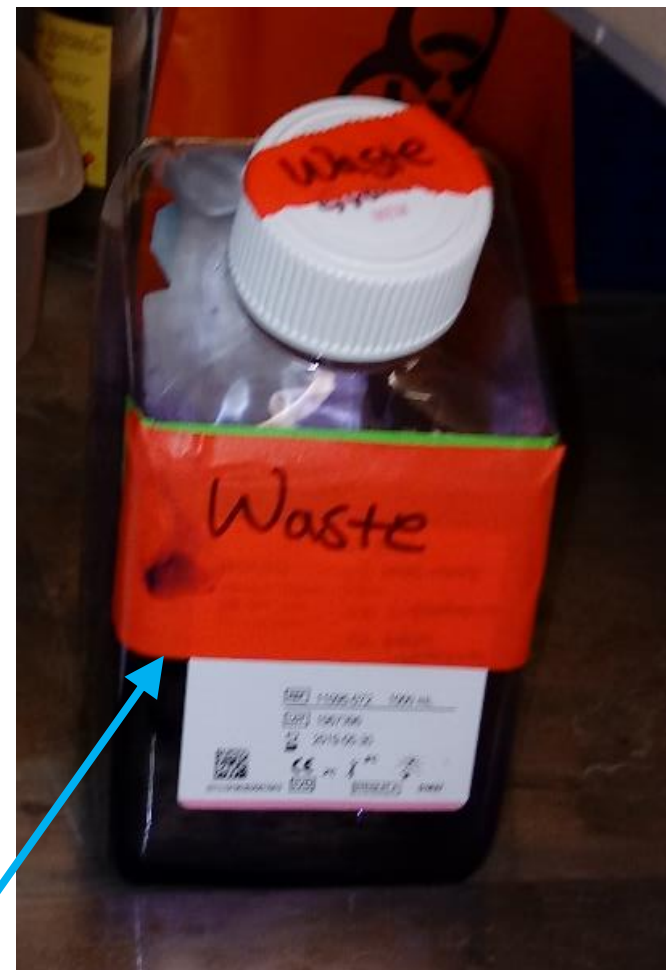


Satellite Accumulation Areas (SAAs)

- Every lab or shop on the Manhattan campus that generates hazardous waste is a Satellite Accumulation Area, SAA.
- There are specific rules for SAAs concerning HW management that are in the following slides.
- SAAs differ from the rules that EHS must follow when storing the waste that is picked up from the campus.

Labeling

- Identify waste.
 - The words “Hazardous Waste” must be on the label.
- The **full chemical name(s)** must be marked on the label.
 - Do not use abbreviations or chemical formula



**What's wrong
with this label?**

Labeling

- **Date waste is first put into container.** *Waste shouldn't be kept more than 6 months.*
- **List all contents** of the waste. If you need more room use another label, a mailing label or some other method.
- **Location and PI info**

HAZARDOUS WASTE	
Start Date: _____	
Contents	
Chemical	Amount
Full names only, List ALL components	%, ml, or g
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____
Full Date: _____ Fill in only when pickup has been requested.	
PI/Supervisor _____ Bldg & Room _____ Phone # _____	
Request pickup at www.k-state.edu/safety	
EHS Use Only: EHS ID#: _____	

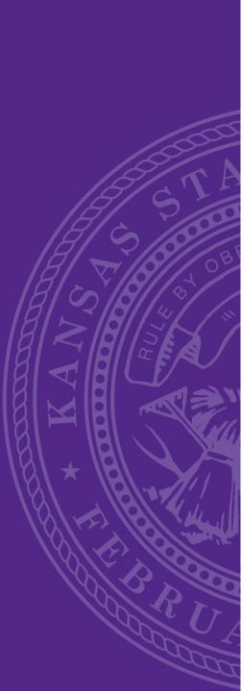
- **Ratio of each ingredient.**
- **Date the container becomes full or is ready for disposal.**
Container must be removed by EHS within 3 days of Full Date.

Labeling

What's wrong with the label on the container?

1. The words "Hazardous Waste" aren't on the label.
2. None of the contents are named.
3. There's no Start Date.
4. If the container is full or no longer being used it requires a Full Date and a Waste Pickup Request should have been submitted.





Waste Storage & Containers

- **Different waste types must be placed in separate containers.**
 - Don't mix any wastes together unless given permission by EHS.
 - Mixing wastes can cause explosions, toxic off-gassing and more, resulting in injuries, damage and can make disposal considerably more expensive.
- **Advantages of waste separation:**
 - You can store more waste volume;
 - Disposal is more cost effective;
 - Disposal is easier; and
 - ***Disposal is safer.***

Waste Storage

- Store only one container of any waste type (waste stream) per room
- Once one container is full, you've filled out a Waste Pickup Request and have written the full date on the container, you can begin filling another container of the same waste.

The image shows two identical hazardous waste containers side-by-side. Each container has a white label with a red header that reads "HAZARDOUS WASTE". The label contains several sections for information: "Start Date" (10/31/18), "Contents" (a table with "Chemical" and "Amount" columns), "Full Date" (with a note to fill in only when pickup has been requested), "PI/Supervisor" (Kelly Greene), "Bldg & Room" (108 Edwards), "Phone #", "Request pickup at" (www.k-state.edu/safety), and "EHS Use Only" (EHS ID#).

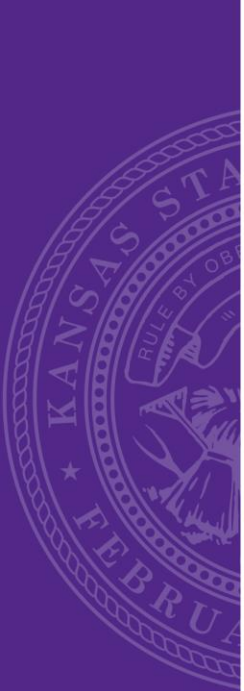
Contents	
Chemical	Amount
Full names only, List ALL components	
acetone	80%
water	20%

Full Date: _____
Fill in only when pickup has been requested.

PI/Supervisor Kelly Greene
Bldg & Room 108 Edwards
Phone # 785-532-5856

Request pickup at
www.k-state.edu/safety

EHS Use Only:
EHS ID#:



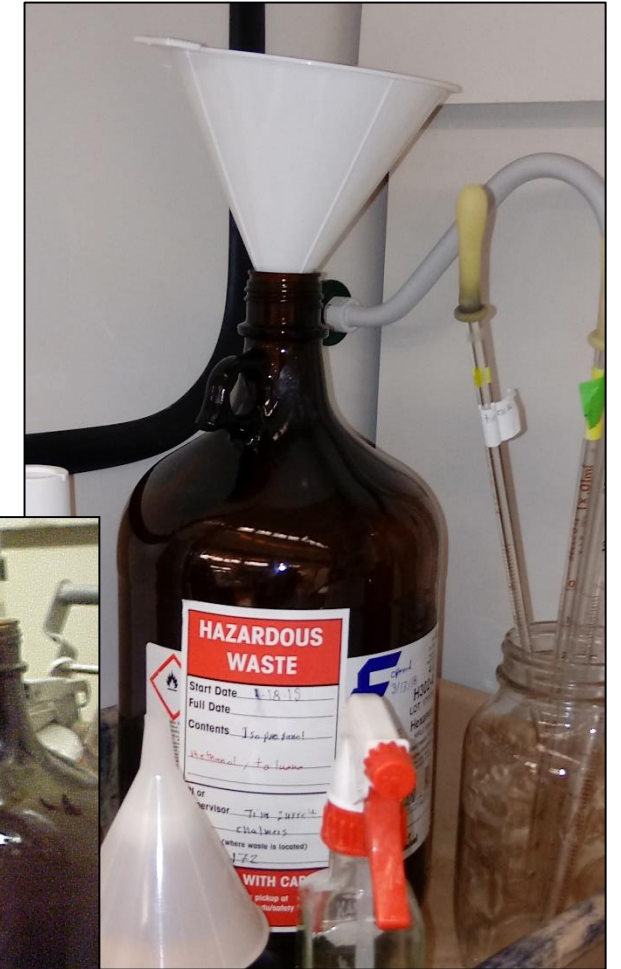
Waste Storage & Containers

Store HW containers at or near the point of waste generation.

- Don't take your waste container(s) to a different room. Keep waste where it was created.
- It is best to keep HW in a designated area within the lab or shop.
- Separate incompatibles wastes.

Waste Storage & Containers

- Keep containers tightly closed except when adding waste.
 - Prevents contamination
 - Prevents evaporation
 - Prevents spills.
 - Required!



Containers

- Use a chemically compatible container.
- Make sure that:
 - Waste doesn't degrade the container;
 - Waste is compatible with the previous contents.
- EHS only provides solvent waste cans and 55-gallon drums for approved wastes.



Requesting Waste Pickup



The screenshot shows a web browser window with the URL k-state.edu/safety/environmental/waste/pickup.html. The page features the Kansas State University logo and a search bar. The main content area is titled "Environmental Health and Safety" and includes a navigation menu with options: Environmental, Fire, Laboratory, Safety, Radiation, and Sanitation. The "Environmental" section is expanded, showing a list of links: Environmental, Waste Pickup Request, Hazardous Waste, Laboratory Cleanout/Close-Out, Controlled Substances, Disposal Guide, Medical Waste, Air Permitting, Recycling, Olathe Campus, and Polytechnic Campus. The "Waste Pickup Request" link is highlighted. The main content area contains the following text:

Waste Pickup Request

Don't save it up! Do NOT allow more than one container of waste type to accumulate per lab.

A pick up service is provided by the Department of Environmental Health & Safety. Waste material should be placed into glass, metal, or plastic containers and kept closed. Segregate waste by hazard classes. Collect halogenated waste separate from nonhalogenated waste.

To request a pickup, fill out the form below (eid required to login)

https://kstate.qualtrics.com/jfe/form/SV_79Y7CcLhsc0fLr7

On the right side, there is a list of categories of waste picked up:

- Categories of waste picked up
- Waste chemicals must be properly labeled, dated, and sorted
- Toxic chemicals

The bottom of the page shows a taskbar with various application icons.

Fill out a pickup request on the EH&S website.

Other Waste – not HW



Spent fluorescent lamps
stored and forgotten in attic
= EPA violation

- Light bulbs and batteries
- **Place in a box and mark “Used Lamps” or “Used Batteries”.**
- Do not purposefully break lamps.
- You may not discard fluorescent lamps in the trash, even “green” lamps.
- **Broken fluorescent lamps must be treated as hazardous waste.**

Used Oil

- Unless contaminated with PCBs, oil (e.g., motor oil, instrument oil, machine oil, pump oil, compressor oil) is recyclable.
- Mark the container “Used Oil”, **NOT** waste oil or hazardous waste.
- **Do NOT** mix any other type of waste with used oil. This may cause the used oil to become a hazardous waste.



Used Oil

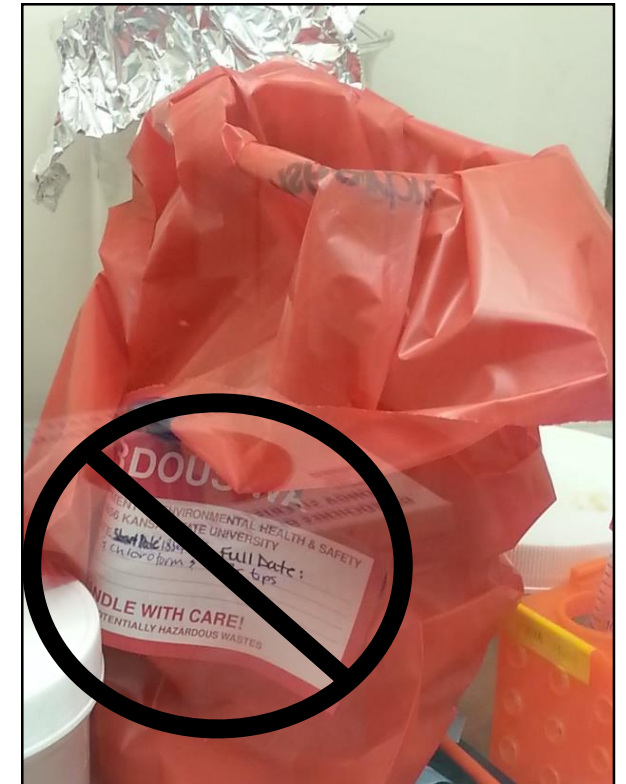


**Waste
Oil**

Regulated Medical Waste

- Must be placed in red biohazard bags.
- Prior to moving, bags should be placed inside biohazard boxes, totes, or tubs.
- Bags and containers must be kept closed.
- Don't use a HW label
- Autoclaved waste should be placed in a regular black trash bag prior to disposal into regular trash containers.
- Refer to the [Biohazardous/Medical Waste Management & Sharps Procedures](#) document for complete information.

Bag needs to be closed unless waste is being added.



Spills

- For any spills
 - **Call KSU PD IMMEDIATELY**
 - call campus PD 2-6412 or dial 911
 - Do not leave a voice mail at EHS.
- You may clean up small spills yourself, *if:*
 1. have the proper training
 2. have the PPE and needed clean up materials, which usually includes a respirator
 3. The spill is minor (non-volatile, non-flam)



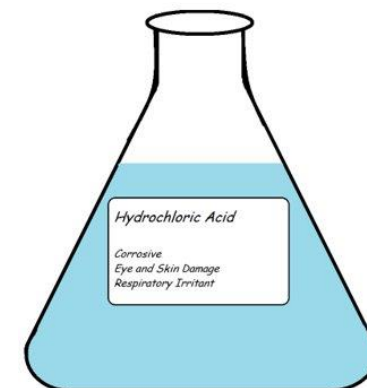
Pollution Prevention/ Waste Minimization

- Keep your [chemical inventory](#) up to date, remove old or expired chemicals and avoid purchasing duplicate items.
- Reduce “unknowns” by properly labeling all chemical containers.
- Recycle or reuse chemicals whenever possible.
- Purchase only what you need.
- Purchase in small quantities.



**Environmental Health
& Safety Assistant**

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Questions? Need Help?

If you have any questions or concerns regarding hazardous waste or any safety or environmental issues please call EHS at 785-532-5856 or send us an email at safety@ksu.edu.

Visit the EHS website at www.k-state.edu/safety.