Hazardous Waste Disposal Policy

Webster University, Biological Sciences
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DEFINITION OF HAZARDOUS WASTE

A Hazardous Waste is any substance that exhibits certain characteristics as defined by federal and Missouri rules and regulations, is unusable or unwanted in any way and poses a potential hazard to individuals, the environment or public health. To be considered hazardous waste, the material must possess at least one of ozd-er(l mu)2 (s)0waw(o)2ll(o)2when.1-6 (g2l mu)2 (sq o)2u w

Carcinogens and cytotoxic (antineoplastic) agents
Non-radioactive lead shielding, lead blocks and lead scrap
Photographic film processing solutions
Used solvents
Thermometers and other items containing mercury
Paint, paint thinners, brush cleaners, linseed oil,
Heavy metal-containing waste or products (arsenic, barium, cadmium, chromium, lead, mercury, selenium and silver)

SPECIAL WASTE TYPES

The following categories of waste have additional disposal requirements and should NOT be mixed with regular hazardous waste. Contact the Chemical Safety Officer if you wish to dispose of any of these materials.

Used oil --- motor, vacuum pump, lubricating
Pesticides
Batteries (any type)
Prescription drugs and controlled substances

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incineration requirements and must be handled differently by the waste hauler. (If a few mL of halogenated solvent are added to 5 L of ordinary non-halogenated solvent, the entire 5 L must be disposed of as halogenated material.)

- If a waste doesn't seem to fall into any of these categories, contact the Chemical Safety Officer for guidance.

3) Label waste containers

- All chemical waste containers must be properly labeled. Complete and attach a Hazardous Waste Label for any unlabeled waste containers.
- Always enter a start date (the date the first drop of material was placed in the container)
- On the waste label, identify constituents by chemical name.
  - No abbreviations, or chemical formulas!
- The label must contain the approximate amount or concentration of constituents.
  - Entering amounts or concentrations can save the department significant money, as waste haulers charge different fees for waste depending upon its composition.
  - If no concentrations or amounts are listed on the label, the waste hauler charges a higher fee to process the waste because they must assume that everything listed is present in large amounts.

4) Store waste containers properly.

- Caps must be tight. No open funnels or filling aids may be left in containers when waste is not actively being added.
- During waste collection, process waste containers (i.e., HPLC, photographic solutions) must have a cap with tight fitting hole for the fill tube.
- Never store flammables with oxidizers or acids with caustics.
- Labs must use bins for segregation and secondary containment.
- Flammable wastes are best stored in a fire rated flammables cabinet.

OTHER REMINDERS

- Always wear eye/face protection, lab coat and gloves when working with hazardous chemicals.
- Consult Safety Data Sheets (SDS) for more information on hazardous chemicals you may work with at Webster University

WASTE MINIMIZATION

The Environmental Protection Agency's (EPA's) policy for hazardous waste management places the highest priority on waste minimization.

Waste minimization is any action that:

Decreases the amount of hazardous waste generated, or
Reduces the inherent t

the amount of chemicals purchased. It is easier to order additional chemicals than to dispose of unwanted or unused surplus chemicals. REMEMBER: The disposal cost can exceed ten times the cost of the chemical.

In some cases, there are no acceptable waste disposal options.

Rethink how you purchase, handle and store laboratory chemicals to control the increasing costs

GENERAL PRINCIPLES FOR MANAGING LABORATORY CHEMICALS

- Less is better. Purchase small amounts that you will use up within a year. Whereas the per-unit cost may be greater—significant savings are realized in reduced disposal costs and safer storage.
- Buy pre-made molar and normal solutions, thereby reducing the likelihood of waste.
- Obtain access to a SDS for each chemical, and consult the SDS before using a chemical.
- Read labels. Handling and storage information is on the manufacturer's label.
- Purchase chemicals in plastic containers to minimize potential breakage. If this is not possible, purchase shatter-resistant plastic coated bottles.
- Manage first-in, first-out! Indicate the date received and the date opened. Pay particular attention to expiration dates.
- Dispose of open, partially used or expired chemicals.
- Peroxide-forming compounds require frequent testing or disposal.
- Keep all chemical containers off floors, carts and electrical equipment.
- Physically segregate your chemicals according to compatibility.
- Label the secondary storage containers or areas in which particularly hazardous chemicals may be used.
- Store hazardous chemicals below eye level. This simple task greatly reduces the likelihood of something falling from above and breaking.
- Cabinets with doors are safer locations than open shelves for hazardous chemicals.
- Safely transport any hazardous chemical. Place in secondary containment such as a bottle carrier.
- Avoid placing any chemical container in direct sunlight, underneath a sink or near heat sources.
- Place volatile or flammable chemicals only in specially designed refrigerators.
- Be especially careful with reactive chemicals. Obtain and read the SDS for each reactive chemical that you may have or may work near.
- Label all containers in the laboratory with the following information (this includes any stock or working solutions):
    - Name of chemical or stock solution
    - Date started
    - Your initials
    - Hazard warning (i.e., flammable, toxic, corrosive, reactive)
- Store chemical by hazard class. Do not store merely by alphabetical order.
- Use and manage your chemical fume hood, wisely. Too many chemical containers or equipment block the air slots and compromise the containment performance.

- Slowly stir acid into a large amount of an ice-water to dilute to about 5% acid.
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- Suitable for Drain Disposal (See Appendix B)
- NOT Suitable for Drain Disposal
    1. Inherently toxic, malodorous or lachrymatory chemicals
    2. Solutions containing heavy metals
    3. Flammable liquids (flashpoint < 140F) of any type.
    4. Organic solvents – methanol, acetone, hexane, chloroform, etc
    5. Paint and paint thinner
    6. Poisons, carcinogens, teratogens or embryotoxins
    7. Toxic dyes and stains
    8. Sodium azide
    9. Strong acids and bases (either in pH extremes/concentration)
    10. Chromic/sulfuric acid cleaning solutions
    11. Photographic fixer
    12. Motor oil, gasoline, degreasing solutions, antifreeze or other automotive fluid
    13. Pesticides

ETHER

Ether is a highly flammable liquid and can form potentially explosive peroxides over time. Containers of ether must be dated when opened and tested periodically for the presence of peroxides. Ether must be collected using appropriately labeled container. Ether cans have expiration dates on the label. Dispose before they expire.

ETHIDIUM BROMIDE (ETBR) & PROPIDIUM IODIDE

Ethidium bromide staining and running buffer solutions must be disposed using appropriately labeled container. For the collection of acrylamide gels that contain ethidium bromide, dispose of in a five-gallon plastic pail.

Never use bleach to treat EtBr wastes. This actually increases toxicity.

NOTE: SYBR Safe® is sold as a safer alternative to Ethidium Bromide. It is less toxic and the stain and gels can be disposed as regular waste. SYBR Safe can be used in the same manner as solutions of EtBr. Tests indicate that it is just as, if not more sensitive than EtBr. It can also be read in the same manner with a standard UV or visible light-transilluminator, or laser based scanner. SYBR Safe is provided ready to use as a concentrate, it can be cast directly in the gel or used as a post stain. It may also be used to help prevent breaks or spills. Use an appropriately labeled container for disposal.

OILS
Uncontaminated instrument and machine oils such as centrifuge, diffusion pump and vacuum pump oils must be collected in plastic containers and labeled appropriately. Oils found in X-Ray machines and other similar devices may contain PCB's (polychlorinated biphenyls), especially if the equipment is old. DO NOT MIX PCB CONTAMINATED OIL WITH OTHER OILS.

PEROXIDE FORMING COMPOUNDS
Certain chemicals (such as isopropyl ether, ethyl ether, dioxane, 2-butanol and tetrahydrofuran) can form organic peroxides if they are exposed to air, become more concentrated, or age. These compounds may violently explode when combined with certain other compounds (i.e., metals) or when exposed to heat, shock, friction, light, or static discharge.

Never move or open a container if crusty deposits formed on the material or its container, an oily, viscous layer appeared, or there are solids on the bottom.

- Clearly and explicitly label chemicals known to form peroxides.
- Always date the container when received and when opened.
- Limit the on-hand stock to a three (3) month supply or less.
- Air dry empty containers under the hood, flush with water, deface the label and put containers in the glass disposal container.
- Store away from heat and light.
- Protect from ignition sources, physical damage, contact with strong reducing agents or oxidizers, or other contamination.
- Ensure air-tight closures on containers, purge head space with nitrogen when possible.
- Keep a minimal working inventory.
- Never store in a freezer. Use explosion-proof or explosion-safe refrigerators, as needed.
- Never store in glass bottles with glass stoppers.
- Never attempt to clean containers that were used to store peroxide forming compounds by scraping or rubbing, especially if an oily deposit or crusty residue is present.
- Test for peroxide concentration before distilling or concentrating peroxide formers. Prevention of unwanted peroxides is paramount. Stabilization and disposal can cost up to $8,000 per container.

PESTICIDES
If old pesticides are found, please contact the head of Facilities.

PHARMACEUTICALS
The possession of controlled substances is only permitted with a valid DEA license. Keep Drug Enforcement Administration (DEA) regulated drugs under lock and key security until time of pick up.

PHENOL/CHLOROFORM
1. Collect liquid mixtures using labeled containers. Indicate percentages on the label.
2. Phenol/Chloroform-contaminated labware such as pipette tips and Eppendorf tubes with small

volumes of liquid must be collected using an appropriately labeled container.

It is not acceptable to throw this type of waste into general trash containers, autoclave in biohazard bags, or dispose of as biological waste. It must be disposed of as hazardous chemical waste.

REACTIVES

Chemicals that are considered reactive can react violently with air, water or other substances and also have the potential to explode. These chemicals include sodium azide, picric acid, sodium cyanide and perchloric acid

- Segregate oxidizers from flammable and combustible materials, organic material and reducers;
- Pyrophoric chemicals ignite spontaneously on contact with air. Keep these chemicals in a glove box.
- Store breakable glass bottles inside a plastic bottle carrier.
- Shock-sensitive and/or explosive materials (benzoyl peroxide) can spontaneously release large amounts of energy when struck, shaken, dropped or agitated. Some chemicals become increasingly shock sensitive with age. Inspect these regularly for degradation and dispose of promptly. Consult the Safety Data Sheet (SDS) before working with these.
- Never contaminate reactive chemicals with heavy metals or incompatibles.

SODIUM AZIDE

Sodium azide is commonly used in low concentrations as a microbiocide to preserve samples. Avoid exposure to the pure material. Avoid weighing the solid by adding solvent to the material and diluting to working concentrations. Take care not to contaminate pure sodium azide with metals or foreign materials as this can lead to the formation of explosive metal azides. If used as a microbiocide, purchase sodium azide in solution. Azide solutions can also form explosive metal azides in drain pipes. Collect solutions and pure material for disposal in an appropriately labeled container. Best practice is to make azide waste solutions basic >pH 10 beforefd1ie waseen (a

SULFIDES
Cyanides, nitrites and sulfides are among the most toxic and rapidly acting substances found in a chemical lab. Symptoms of toxicity occur if these materials are swallowed, inhaled or absorbed through the skin. Store in locked and secure locations. Always use secondary containers to help prevent breaks or spills. Use an appropriately labeled container for disposal.

SCIENTIFIC EQUIPMENT - SURPLUS, REPAIR OR DISPOSAL
Any piece of scientific equipment must be carefully surveyed and decontaminated when it may have been in contact with potentially hazardous chemicals or biohazards.

APPENDIX B - SANITARY SEWER OR ORDINARY REFUSE DISPOSAL
Only dilute solutions of non-toxic materials shall be disposed of in the sanitary sewer system. This includes most normal biological metabolites and nontoxic cellular constituents (proteins, nucleic acids, carbohydrates, soluble fats, and their precursors and catabolites, common sugars, amino acids, non-toxic common salts (NaCl, $MgCl_2$, etc) and biological buffers with pH between 5-10. (Phosphate buffers, saline, Tris, etc.).

Note that acid or base solutions containing organic or inorganic impurities (e.g. base baths or acidic solutions used to clean glassware) must not be flushed down the drain even if neutralized. These solutions must be collected for hazardous waste disposal in an appropriately labeled container.

In general, only the non-hazardous laboratory chemicals in the following table may be placed into the ordinary refuse (garbage) for disposal. Non-hazardous materials in aqueous solution may be poured down the drain with the exception of >2% slurries of sand, earth, gypsum, cement or other insoluble material. Materials that do not appear on these lists MUST be collected for disposal by the Chemical Safety Officer.

[illegible]	[illegible]	[illegible]	[illegible]
Lactose monohydrate	Sodium carbonate	Alcohol <24%	Collagen
Lysine hydrochloride	Sodium chloride	Alanine	Dextrin
Maltose	Sodium citrate	Albumin, bovine	EDTA (acid form)
Sodium phosphate	Alumina	EDTA disodium salt	Manganese chloride
[illegible]	[illegible]	[illegible]	[illegible]
Mannitol	Sorbitol	Ammonium acetate	Ferric citrate
Magnesium borate	Stannic oxide	Ammonium phosphate dibasic	Ferric oxide
Ferrous sulfate hexahydrate	Magnesium carbonate	Stannous oxide	Ammonium sulfate
Fetal bovine serum	Magnesium chloride	[illegible]	Amylase
[illegible]	[illegible]	monohydrate	[illegible]
Aspartic acid	Glucose	Niacin	Tin
Tris base	Boric Acid	Glycerol	Potassium borate
Potassium chloride	Yeast extract	Calcium borate	Glycogen

NOTE THAT LIQUID NITROGEN OR DRY ICE MUST NEVER BE PLACED IN THE SINKS, AS THEY CAN CRACK THE SINK AND CAUSE DAMAGE TO THE PLUMBING.