I. Purpose

The Ursinus College Hazardous Waste Management Program outlines the safe storage and disposal of hazardous waste in accordance with applicable Environmental Protection Agency (EPA) and the Pennsylvania Department of Environmental Protection (PA DEP). It is the policy of Ursinus College to minimize hazardous waste through the implementation and administration of hazardous waste minimization and disposal programs in all effected departments.

II. Scope

This program applies to all Faculty, Staff, students, and contractors who generate hazardous waste from activities on campus. Responsibilities under the program, identification of hazardous wastes, labeling, container, and recordkeeping requirements, generator status, Satellite Accumulation Areas (SAA), hazardous waste storage areas, and disposal guidelines will be explained.

Ursinus College is considered a Small Quantity Generator (SQG) according to the PA DEP and EPA hazardous waste regulations and is permitted to generate the following monthly amounts of hazardous waste:

- Between 220 pounds (100kg) and 2200 pounds (1,000 kg) of non-acutely hazardous waste (D, F, K, or U waste codes)
- No more than 2.2 pounds (1 kg) of acutely hazardous waste (P waste code), and
- No more than 220 pounds (100 kg) of acutely hazardous waste spill clean-up materials.

As a small quantity generator, Ursinus College removes accumulated waste within 180 days as stipulated by the regulations. Two regular pickups occur at the end of each academic semester. Additional pickups occur when 1 kg of acutely hazardous waste accumulates in the laboratories or on an as needed basis.

III. Applicable Regulations

25 PA Code, Parts 260a through 270a
40 CFR, Parts 260 through 270 (Resource Conservation and Recovery Act or RCRA)

IV. Responsibilities

A. **Director of Facilities Services**
   1. Ensures hazardous wastes generated in the department are managed according to the program.
   2. Designates the Director of Environmental Health and Safety & Risk Management to manage the program to ensure all affected departments comply with the program.

B. **Director of Environmental Health & Safety and Risk Management**
   1. Implements the hazardous waste management program for the College
   2. Maintains hazardous waste manifests for at least 3 years.
   3. Regularly inspects hazardous waste storage areas to ensure waste has been properly identified, labeled, segregated, and stored for collection and disposal.
   4. Schedules hazardous waste pickups at least two times per year.
   5. Regularly reviews contractor information on the EPA ECHO website for compliance history.
   6. Provides training and resources to affected departments.
   7. Reports all hazardous waste spills to the Facilities Services Director.
   8. Reviews the plan annually and updates as needed.

C. **Department Chairpersons**
   1. Communicates the importance of the Hazardous Waste Management Program to department members.
   2. Ensures proper training in hazardous waste disposal is provided to department members.
   3. Designates a hazardous waste coordinator for the department to oversee the implementation and administration of the hazardous waste disposal program.
   4. Reports all hazardous waste spills to the Environmental Health and Safety & Risk Management office.

D. **Faculty and Staff**
   1. Reads and understands the Hazardous Waste Management Program.
   2. Complies with the requirements of the Hazardous Waste Management Program including proper identification, labeling, segregation, and storage of hazardous waste.
   3. Attend training as required.
   4. Reports all hazardous waste spills to the department chairperson/supervisor and/or the Environmental Health and Safety & Risk Management office.

V. Identification of Hazardous Waste

Hazardous waste is waste that is either a solid, liquid, or gaseous material that is discarded, abandoned, recycled (in certain ways), or inherently waste-like. EPA and PA DEP define hazardous wastes as listed hazardous waste and characteristic hazardous waste.

A. **Listed** (F, K, P and U)
   1. F-list – non-specific source wastes that include spent solvents
   2. K-list – specific source or wastes generated from certain industries
   3. P-list – classified as “acutely hazardous”, are unused, discarded, commercial chemical products that are 100 percent pure, technical grade or with a sole active ingredient on the P-list. P-list wastes also apply to discarded chemical solutions made in the laboratory or a spilled product. Examples at Ursinus

College include aldicarb, osmium tetroxide, potassium cyanide, and sodium azide. Complete list is located on the Environmental Health and Safety & Risk Management website.

4. U-list – classified as toxic wastes are unused, discarded, commercial chemical products that contain a sole active ingredient on the U-list. Complete list is located on the Environmental Health and Safety & Risk Management website.

OR

B. **Characteristic** - exhibits one or more of the following characteristics: ignitable, corrosive, reactive, and toxic. These wastes are also referred to as ".D listed". wastes.

1. Ignitable (D001)
    a. liquids with flashpoints below 60°C like methanol and acetone.
    b. Non-liquids if capable of causing fire through friction, adsorption of moisture, or spontaneous chemical changes, and burns in a manner that creates a hazard. Benzoyl peroxide is an example.
    c. An ignitable compressed gas like propane.
    d. An oxidizer like hydrogen peroxide
    e. Common examples include paints, used paint thinners, adhesives, and mineral spirits.
2. Corrosive (D002)
    a. Aqueous solutions with a pH $\leq$2 or $\geq$12.5
    b. Have the ability to corrode metals
    c. Examples include rust removers, acid, or alkaline cleaning fluids, and battery acid
3. Reactivity (D003)
    a. Generally unstable, explosive, and capable of detonation when heated under confinement
    b. Reacts violently with water
    c. Generates toxic gases or fumes when mixed with water or noncorrosive materials
3. Toxic (D004-D043)
    a. Waste that is harmful or fatal when ingested or absorbed or leach toxic chemicals into the soil or groundwater when disposed of on land.
    b. The Toxicity Characteristic Leaching Procedure (TCLP) is used to determine the characteristic of toxicity.
    c. Examples include waste containing high levels of metals such as cadmium, lead, or mercury.

VI. Waste Determination

To properly manage hazardous waste, all areas generating waste must identify and inventory its waste streams, characterize these wastes, and determine and track generator status. At Ursinus College, most wastes are characterized by generator knowledge. In the event the hazard characteristics cannot be determined or are unknown, a waste analysis is required.

A. **Identify and Inventory Wastes** - identify all waste streams generated within the laboratory or facility using process knowledge. Examples of waste streams include a one-week science laboratory experiment, a scheduled stockroom cleanout, art project, or building renovation. Excess hazardous reagents, out-dated chemicals, spent paint solvents, or asbestos-containing materials may result from these processes.

B. **Characterize the waste** – determine if the identified waste is a listed or characteristic waste as described in the hazardous waste section. Chemicals and solutions containing the following components or characteristics are hazardous wastes:
   1. All heavy metals and their salts (toxic).
   2. All sulfides, bisulfides, and cyanides (reactive).
   3. All other toxic, reactive, or oxidizing inorganics (toxic, reactive, or corrosive).
   4. All organic compounds *except ethanol below 24%* (toxic, ignitable, or corrosive).
   5. All gases not normally constituents of the earth's atmosphere, and all flammable or oxidizing gases (toxic, reactive, ignitable, or corrosive)

C. **Determine if a mixed chemical waste is hazardous or non-hazardous** - If a RCRA- <u>listed</u> hazardous waste is mixed with a non-hazardous waste the resulting mixture will remain regulated as the listed waste regardless of the quantity present in the mixture.

ANY AMOUNT OF Non-hazardous	+	Any amount of <u>listed</u> hazardous	=	LISTED HAZARDOUS WASTE

If a characteristic waste is mixed with a non-hazardous waste the resulting mixture will be regulated as a hazardous waste <u>only</u> if the resulting mixture still exhibits the characteristic.

D. **Determine and track generator status** – generator status and applicable requirements are dependent upon the amounts of waste generated and accumulated per month. A generator log or inventory of waste sheet must be maintained for each area generating hazardous waste. The following information must be included on the log for each generated waste:
   - Room number and container number (i.e., T210-1, T210-2…)
   - Description of the waste (i.e., full chemical names and concentrations/percentage of solvents and water
   - Container size
   - Start date
   - Accumulation date
   - Amount generated
   - pH (for all liquid wastes)
   - Generator name
   - RCRA Code(s) from the F, K, P, U and D lists.

1. **Unknown/Unidentified Wastes** - Unknown containers present safety issues as well as increased disposal costs. All containers of chemicals must be properly labeled with the contents. In the event an unlabeled container is discovered, label the containers as "Unknown" and attach a note to the container with any known information about the container. Unknown containers with crystal formation are suspect peroxides. Handle these containers as little as possible as they are shock sensitive.
2. **Empty Containers -** ".Empty" means all possible materials are removed from the container and not considered hazardous. 40 CFR 261.7(b)(1) states that a container or inner liner removed from a container that has held a hazardous waste is empty if:
   a. All waste has been removed that can be removed using the practices commonly employed to remove materials from that type of container.
   b. No more than 2.5 centimeters (1 inch) of residue remains on the bottom of the container or inner liner.
   c. No more than 3 percent by weight of the total capacity of the container remains in the container or inner liner if the container is less than or equal to 119 gallons in size
   d. No more than 0.3 percent by weight of the total capacity of the container remains in the container or inner liner if the container is greater than 119 gallons in size.

Containers of acutely hazardous waste are empty only after being tripled rinsed with a solvent capable of removing the acutely hazardous waste. The solvent rinseate must be managed as a hazardous waste. The alternative is to dispose of the "empty" container as hazardous waste.

VII. Hazardous Waste Collection, Storage Requirements, and Manifests

A. **Satellite Accumulation Areas (SAAs)** – an area at or near the point of generation of waste and under the control of the generator. For most laboratories, this is in the fume hood. Waste accumulated from more than one laboratory may not be contained in one laboratory SAA as it makes that laboratory a central storage area. The following requirements apply to SAAs:

1. Storage of up to 55 gallons of hazardous waste or up to 1kg of acutely hazardous waste per SAA is permitted.
2. Waste must be stored by compatibility – use several dish pans or other appropriate containers to separate.
3. Waste containers must be stored in secondary containment to prevent access of spilled waste to the sanitary sewer.
4. Waste containers must be removed for disposal within one year.
5. **Containers** must be kept closed except upon the addition of waste. Evaporation of waste in fume hoods is prohibited.
6. **Labels** must contain the following information:

a. The words ".Hazardous Waste"..
b. The full name of the chemical(s) including water – no formulas. If more than one chemical, approximate percentage of each chemical.
c. The start date when the first drop of waste is added to the container.
d. The accumulation date when the container is full, or waste addition is completed.
e. Hazards – use pictograms
f. In addition, Ursinus College requires the name of the generator, the room number, and the container number to be on the label.
g. pH, if applicable
h. RCRA waste codes prior to shipment off-site. These codes can be added to the label in the SAA or at the end of the semester. Contact the lab manager or the Director of Environmental Health and Safety & Risk Management for assistance.

B. **Inventory of Waste Sheet** must be completed for each waste container accumulated in the SAA (see Waste Determination section VI. D. Determine and track generator status).
C. **Hazardous Waste Manifests** ensure cradle-to-grave tracking of the College's hazardous waste. The EPA ".Uniform Hazardous Waste Manifest" is used in Pennsylvania for shipments to facilities within the state. The destination state may supply its own manifest. Only those persons who have received the Department of Transportation (DOT) Hazardous Materials training are permitted to sign the waste manifest. If a DOT trained employee is not on-site, the vendor is permitted to sign on behalf of the college.

VIII. Sewer/Trash Disposal

The majority of chemical substances generated at the College will be disposed of by a licensed hazardous waste hauler. Some materials may be safely disposed of in the sanitary sewer only after a waste determination and characterization indicates that the contents are non-hazardous. When in doubt, send the substance out with the hazardous waste pickup.

A. **Acids and Bases** –Elementary neutralization of acid and base waste exhibiting only the corrosive characteristic is permitted so long as it is part of the experiment. *Neutralization must occur at the point of generation and must be part of the written experimental procedure.*
B. **Inorganic Compounds** – Certain inorganic compounds not exhibiting hazardous waste characteristics may be dissolved in water and disposed of in the sanitary sewer with copious amounts of water providing they do not contain heavy metals or toxic anions, are not oxidizers, or water reactives. Following a waste determination and characterization, the following chemicals may be flushed to the sanitary sewer:
   a. Soluble salts of sodium, potassium, magnesium, and calcium
   b. Soluble chlorides, bromides, carbonates, bicarbonates, and sulfates
   c. Soluble, natural products such as sugars and amino acids.

d. If these materials are in solid form or not soluble, trash disposal is acceptable. Make sure the container is placed inside a secondary container and labeled ".nonhazardous waste"..

C. **Chemicals Prohibited from Sink Disposal** include, but are not limited to, the following:

Metals

Arsenic	Copper	Nickel
Barium	Iron	Selenium
Cadmium	Lead	Silver
Chromium	Manganese	Tin
Cobalt	Mercury salts	Zinc

Other compounds

Bisulfides	Fluorides	Permanganates
Chlorates	Nitrites	Peroxides
Cyanides	Perchlorates	Sulfides

D. **Non-hazardous Waste List –** see Stanford University's list of non-hazardous waste.

IX. Special Disposal Procedures – some chemicals require special attention for disposal including peroxide formers while other chemicals not considered hazardous have unique properties that warrant special consideration when it comes to disposal.

A. **Controlled Substances** – the purchase, use, storage, and disposal of controlled substances is regulated by the United States Drug Enforcement Administration (DEA). The College's current hazardous waste vendor is permitted to dispose of such substances. Please contact the Environmental Health and Safety & Risk Management office for assistance in the disposal of controlled substances.

B. **Diaminobenzidine Solutions (DAB**) - While DAB is not listed as an EPA hazardous waste, it is a known mutagen - a physical or chemical agent that changes the genetic information of an organism. Treating DAB solutions with household bleach renders the DAB non-mutagenic but produces other mutagenic by-products. ("The Safe Disposal of Diaminobenzidine" in *Applied Occupational and Environmental Hygiene*, 1991.) Collect all DAB solutions for hazardous waste disposal.

C. **Ethidium Bromide –** as with DAB, ethidium bromide is not classified as an EPA hazardous waste, but it is a mutagen and may present a hazard if poured down the drain untreated or placed in the trash. The following procedures should be followed for the safe and proper disposal of ethidium bromide.

1. Solutions containing ethidium bromide
    a. Small quantities of aqueous solutions containing <10ug/ml (10 ppm) may be disposed down the drain.
    b. Large quantities of aqueous solutions containing >10ug/ml must be collected for hazardous waste disposal.

2. Solids contaminated with ethidium bromide including gloves, centrifuge tubes, towels, etc should be placed in a translucent polyethylene container for chemical waste disposal.
3. Sharps contaminated with ethidium bromide including needles, syringes, slides, broken glass, etc should be placed in an infectious waste red sharps container and sent out as medical waste (without autoclaving).
4. Gels contaminated with ethidium bromide
    a. <10ug/ml – wrap in plastic wrap and discard in the regular trash.
    b. >10ug/ml – place in biohazard box for incineration or package for chemical waste

D. **Peroxide Formers** are those compounds that can react with oxygen to form shock-sensitive explosive peroxide crystals. Ether and tetrahydrofuran are two of the more common peroxide forming compounds used at the College. Appendix A lists common peroxide forming chemicals and the time limit specified for disposal. In the event that crystal formation is evident, contact the Environmental Health and Safety & Risk Management office immediately to arrange for disposal.

X. Other Hazardous Waste Management

A. Universal Waste

Universal wastes are hazardous wastes commonly found in medium to large volumes, exhibit low-level hazards, and can be easily managed. Universal wastes include rechargeable batteries, lamps, some pesticides, and mercury-containing devices. See Appendix B for the Ursinus College Universal Waste Collection Fact Sheet. In general, universal waste must be collected in a closed container and labeled as ".universal (type) waste" or ".used (type) waste" with the start accumulation date.

B. Mercury

1. Elemental mercury can be recycled. Contact the Environmental Health and Safety & Risk Management office for assistance.
2. Mixtures of mercury compounds must be disposed of as hazardous waste.
3. Intact mercury containing devices including thermometers, barometers, thermostats, and other instruments containing mercury devices may be disposed of as universal waste. If any of these devices are broken, dispose of them as hazardous waste.

C. Oil based paints, finishes, and thinners

1. Paints, varnishes, sealants, finishes, and thinners may be flammable and contain heavy metals. These must be disposed of as hazardous wastes.
2. Empty containers with no free liquids and dry, latex based paint containers may be disposed of in the regular trash.
3. Examples of paints, finishes, and thinners requiring hazardous waste disposal include Hard Ground, Linseed Oil, Liquin, Mineral Spirits, paint thinners, Stop-out Varnish, Turpentine, and Xylenes.

D. Oily Rags and rags/paper soaked with flammable liquids must be collected in a red flammable waste disposal can. Oily rags can spontaneously ignite. Examples include rags soaked with paint thinners, turpentine, xylenes, mineral spirits, linseed oil, and denatured alcohol

E. Used Oil -While used oil alone is not a hazardous waste, it becomes a hazardous waste if it contains a chemical listed as hazardous.
   1. Used oil generated from vacuum pumps used in the laboratories will be sent out with hazardous waste collection.
   2. Label all used oil containers with the words ".used oil" and the date of the first drop of oil was added to the collection container. Place the container in secondary containment.
   3. All other used oil generated on the campus is collected in the Facilities Barn. The College's Waste Oil Protocol located in the Environmental Health and Safety & Risk Management office outlines the collection process.

F. Compressed Gas Cylinders
   1. Empty compressed gas cylinders should be returned to the vendor. Proper shipping papers and packaging must be completed. Follow vendor and carrier's instructions for packaging and labeling. Contact the Environmental Health and Safety & Risk Management office for assistance.
   2. Lecture bottles that are not returnable must be disposed of via a hazardous waste vendor.

XI. Spill Procedures

A. **Chemical Spill Response Plan for the Laboratories:** Spill control materials are located in the following laboratories:

Pfahler Hall: General Chemistry (314), Organic Chemistry (315), and Advance Chemistry (301)

Thomas Hall: Biology Prep Room(126A) and Beagle Lab (202)

It is the responsibility of the professor to be knowledgeable of the hazards associated with the chemicals located in his/her lab(s) via SDS. This information must be readily available in case of a spill.

1. **EVALUATE** THE AREA:
   a. Hazards
   b. Dangers
   c. Spill direction
   d. Stop leak **safely** by diking with pigs/absorbent
2. **ALERT** all others in the area, and the building coordinator.
3. **Evacuate if necessary, following the above procedures for a fire emergency.**
4. **Call 911** if there is a fire or medical attention needed.
5. **Attend to any persons who may have been contaminated or injured.** Remove contaminated clothing immediately and flush the skin with water For at least 15 minutes. Pfahler - use room shower initially followed by the shower located on the second floor, *room 215A*, between 215 and 218.
5. **Determine the extent and type of spill.** If spill is too large, if there has been a release to the environment, or assistance is needed, contact Safety, 610-409-3333, the Director of Environmental Health and Safety & Risk Management, 610-409-3221, and the Director of Facilities, Services, 610-409-3598.

6. **If cleaning up spill, proceed cautiously and safely.**
   a. Check **SDS** for hazards, PPE, etc. required. Put on **PPE**
   b. **Control and contain spill**
      1. Turn valve off.
      2. Cover drains or other escape routes.
      3. Stand overturned container upright if lid is secure.
      4. Place leaking container in another container.
      5. Build dike around area using absorbent materials, pigs, etc.
      6. Place empty container under leak.
   c. **Clean up**
      1. Use absorbents per instructions– place in sealed and labeled containers for chemical waste pickup
      2. Neutralize if appropriate – check SDS. Place in sealed and labeled containers for chemical waste pickup.

OR 3. Disposal – environmental specialist takes care of removal.

   d. **Decontaminate**
      1. Set up away from spill area.
      2. All PPE, shovels, brooms, or other tools must be decontaminated or disposed of in an EPA approved container.
   e. **Record information** on how spill containment was implemented.
   f. **Get a medical examination** if exposed to hazardous substance.

B. **Facilities Chemical Spill Response Plan**

In the event of a spill, use the guidelines below to assess and then act according to the situation.

1. **EVALUATE** THE AREA
   a. Hazards?
   b. Danger?
   c. Spill direction?
   d. Stop leak **safely**?
   e. **Safely** dike or block leak w/absorbent?
2. **NOTIFY** the Director of Facilities – 610-409-3598
   a. Location
   b. Name of chemical leaking
   c. Size of leak/spill
   d. Flow rate of spill/leak

   If the Director of Facilities is not available, notify the Director of Environmental Health and Safety & Risk Management at 610-409-3221. If both are not available, contact any member of the Facilities Spill Response Team at 610-409-3598. AFTER HOURS, CALL CAMPUS SAFETY AT 610-409-3333.

Steve Gehringer	Rich Kershner
Tim Grater	Neil Tyson

   The above people will call 911 if deemed necessary.
3. **EVACUATE** area if not cleaning up spill. Be sure all workers and vehicles are kept

away from area.

4. **CLEAN-UP SPILL, cautiously and safely.**
   a. Check **SDS** - hazards and PPE
   b. Don appropriate **PPE**
   c. **Control and contain spill**
      1. Turn valve off.
      2. Cover drains or other escape routes.
      3. Stand overturned container upright if lid is secure.
      4. Place leaking container in another container.
      5. Build dike around area using absorbent materials, pigs, etc.
      6. Place empty container under leak.
      7. If outdoors, dig a trench around the spill to help contain it.
   d. **Clean up**
      1. Use absorbents – place in sealed and labeled containers.
      2. Neutralize if appropriate – check SDS.

   OR 3. Disposal – environmental specialist takes care of removal
   e. **Decontaminate**
      1. Set up away from spill area.
      2. All PPE, shovels, brooms, or other tools must be decontaminated or disposed of in an EPA approved container.
   f. **Record information** on how spill containment was implemented.
   g. **Get a medical examination** if exposed to hazardous substance.

NOTE: **Electronic SDS access** - https://chimeracloud.org/sds/ or go to the manufacturer's website
CHEMTREC 1-800-424-9300

XII. Training

A. Employees generating waste must receive initial training at time of employment and on an as needed basis.
B. Training topics will include the following:
   1. Hazardous waste determinations
   2. Container use, compatibility, and storage
   3. SAA and Accumulation limits
   4. Labeling requirements
   5. Emergency procedures.
C. In addition, employees who are designated to sign the hazardous waste manifests must receive Department of Transportation (DOT) Hazardous Materials training every three years to ensure manifests are completed properly and to comply with the regulations.

XIII. Recordkeeping

A. Waste determinations and Inventory of Waste sheets must be maintained for at least 3 years. The Environmental Health and Safety & Risk Management office shall maintain these documents.

B. Hazardous waste manifests must be maintained for at least 3 years according to the regulation. The manifests are maintained by the Environmental Health and Safety & Risk Management office who will retain the manifests for thirty years.
C. Land Disposal Restrictions (LDR) notices, LDR determination records, and exception reports will be kept with the corresponding hazardous waste manifests.
D. Employee training records of current employees shall be maintained for life of employment plus three years from the date the employee last worked at the College.

References:

A. 25 PA Code, Parts 260a through 270a
B. 40 CFR, Parts 260 through 270 (Resource Conservation and Recovery Act or RCRA)
C. University of Pennsylvania "Ethidium Bromide Waste Disposal Policy"
D. University of Pennsylvania "Compressed Gas Disposal" procedure

Appendix A – Peroxide Forming Chemicals

This list is not comprehensive. The user should always review the SDS and chemical label.

Class A – Severe Peroxide Hazard

Spontaneously decompose and become explosive with exposure to air without concentration. **Test for peroxide formation every 3 months from receive date or discard. If peroxides not present or the level is below 100 ppm, re-set the discard date 3 months from the test date.**

Butadiene (liquid monomer)	Isopropyl ether	Sodium amide (sodamide)
Chloroprene (liquid monomer)	Potassium amide	Tetrafluoroethylene (liquid monomer)
Divinyl acetylene	Potassium metal	Vinylidene chloride

Class B – Concentration Hazard

Require external energy for spontaneous decomposition. Form explosive peroxides when distilled, evaporated, or otherwise concentrated. **Test for peroxide formation 12 months from receive date or discard. If peroxides not present or the level is below 100 ppm, re-set the discard date 6 months from the test date.**

Acetal	Diethylene glycol dimethyl ether (diglyme)	4-Methyl-2-pentanol
Acetaldehyde	Diethyl ether	2-Pentanol
Benzyl alcohol	Dioxanes	4-Penten-1-ol
2-Butanol	Ethylene glycol dimethyl ether (glyme)	1-Phenylethanol
Cumene	Furan	2-Phenylethanol
Cyclohexanol	4-Heptanol	2-Propanol
Cyclohexene	2-Hexanol	Tetrahydrofuran
2-Cyclohexen-1-ol	Methylacetylene	Tetrahydronaphthalene
Decahydronaphthalene	3-Methyl-1-butanol	Vinyl ethers
Diacetylene	Methylcyclopentane	Other secondary alcohols
Dicyclopentadiene	Methyl isobutyl ketone	

Class C – Shock and Heat Sensitive

Highly reactive and can auto-polymerize as a result of internal peroxide accumulation. The peroxides formed in these reactions are extremely shock and heat sensitive. **Test for peroxide formation every 12 months from receive date or discard. If peroxides not present or the level is below 100 ppm, re-set the discard date 12 months from the test date.**

Acrylic acid	Chlorotrifluoroethylene	Vinyl acetate
Acrylonitrile	Methyl methacrylate	Vinylacetylene (gas)
Butadiene (gas)	Styrene Vinylpyridine	Vinyladiene chloride
Chloroprene	Tetrafluoroethylene (gas)	Vinyl chloride (gas)

Class D – Potential Peroxide Forming Chemicals: May form peroxides but cannot be clearly categorized in Class A, B, and C.

Acrolein	p-Chlorophenetole	4,5-Hexadien-2-yn-1-ol
Allyl ether	Cyclooctene	n-Hexyl ether
Allyl ethyl ether	Cyclopropyl methyl ether	o.p-Iodophenetole
Allyl phenyl ether	Diallyl ether	Isoamyl benzyl ether
p-(n-Amyloxy)benzoyl chloride	p-Di-n-butoxybenzene	Isoamyl ether
n-Amyl ether	1,2-Dibenzyloxyethane	Isobutyl vinyl ether
Benzyl n-butyl ether	p-Dibenzyloxybenzene	Isophorone
Benzyl ether	1,2-Dichloroethyl ethyl ether	b-Isopropoxypropionitrile
Benzyl ethyl ether	2,4-Dichlorophenetole	Isopropyl-2,4,5-trichlorophenoxy acetate
Benzyl methyl ether	Diethoxymethane	n-Methylphenetole
Benzyl-1-napthyl ether	2,2-Diethoxypropane	2-Methyltetrahydrofuran
1,2-Bis(2-chloroethoxyl)ethane	Diethyl ethoxymethylenemalonate	3-Methoxy-1-butyl acetate
Bis(2-ethoxyethyl)ether	Diethyl fumarate	2-Methoxyethanol
Bis(2-(methoxyethoxy)ethyl) ether	Diethyl acetal	3-Methoxyethyl acetate
Bis(2-chloroethyl) ether	Diethylketene	2-Methoxyethyl vinyl ether
Bis(2-ethoxyethyl) adipate	Diethoxybenzene (m-,o-,p-)	Methoxy-1,3,5,7-cyclooctatetraene
Bis(2-methoxyethyl) carbonate	1,2-Diethoxyethane	b-Methoxypropionitrile
Bis(2-methoxyethyl) ether	Dimethoxymethane	m-Nitrophenetole
Bis(2-methoxyethyl) phthalate	1,1-Dimethoxyethane	1-Octene
Bis(2-methoxymethyl) adipate	Di(1-propynl) ether	Oxybis(2-ethyl acetate)
Bis(2-n-butoxyethyl) phthalate	Di(2-propynl) ether	Oxybis(2-ethyl benzoate)
Bis(2-phenoxyethyl) ether	Di-n-propoxymethane	b,b-Oxydipropionitrile
Bis(4-chlorobutyl) ether	1,2-Epoxy-3-isopropoxypropane	1-Pentene
Bis(chloromethyl) ether	1,2-Epoxy-3-phenoxypropane	Phenoxyacetyl chloride
2-Bromomethyl ethyl ether	p-Ethoxyacetophenone	a-Phenoxypropionyl chloride
beta-Bromophenetole	1-(2-Ethoxyethoxy)ethyl acetate	Phenyl-o-propyl ether
o-Bromophenetole	2-Ethoxyethyl acetate	p-Phenylphenetone
p-Bromophenetole	(2-Ethoxyethyl)-a-benzoyl benzoate	n-Propyl ether
3-Bromopropyl phenyl ether	1-Ethoxynaphthalene	n-Propyl isopropyl ether
tert-Butyl methyl ether	o,p-Ethoxyphenyl isocyanate	Sodium 8-11-14-eicosatetraenoate
n-Butyl phenyl ether	1-Ethoxy-2-propyne	Sodium ethoxyacetylide
n-Butyl vinyl ether	3-Ethoxypropionitrile	Tetrahydropyran
Chloroacetaldehyde diethylacetal	2-Ethylacrylaldehyde oxime	Triethylene glycol diacetate
2-Chlorobutadiene	2-Ethylbutanol	Triethylene glycol dipropionate
1-(2-Chloroethoxy)-2-phenoxyethane	Ethyl-b-ethoxypropionate	1,3,3-Trimethoxypropene
Chloroethylene	Ethylene glycol monomethyl ether	1,1,2,3-Tetrachloro-1,3-butadiene
Chloromethyl methyl ether	2-Ethylhexanal	4-Vinyl cyclohexene
beta-Chlorophenetole	Ethyl vinyl ether	Vinylene carbonate
o-Chorophenol	2,5-Hexadiyn-1-ol	

(List from the Cornell University Weill Medical College EH&S website: Peroxide Former List).

Appendix B – Universal Waste and Electronics Fact Sheet

This fact sheet provides a quick guide for the proper disposal of college generated universal waste and electronics. Always try to return any recyclable items to the vendor first. Most vendors who supply rechargeable batteries will take them back. Contact the Environmental Health and Safety & Risk Management office if further assistance is required.

RECHARGEABLE BATTERIES - include nickel cadmium (Ni-Cd), sealed lead acid, lithium ion (Li-ion), and nickel metal hydride (Ni-MH) found in cellular and cordless phones, laptop computers, camcorders, 2-way radios, remote control toys and cordless power tools.

- **Take to the closest collection site for disposal – Campus Safety, Information Technology in Myrin Library, Pfahler 112, or Facilities Services.**
- Tape the electrical terminals with non-conductive tape OR
- Place each battery into a sealed plastic bag.

THEN

- Place the battery in the properly labeled collection container.

ALKALINE BATTERIES - Ursinus College is unable to recycle these types of batteries. Dispose of these in the regular trash after taping the contacts or placing each battery in a plastic bag to avoid contact with another battery that could spark a fire.

LAMPS – include mercury fluorescent, high intensity discharge, neon, mercury vapor, high-pressure sodium, and metal halide.

- Place spent lamp in the carton/container of the new lamp.
- Date and label the carton/container with ".Universal Waste – lamps."
- Take scientific lamps to the Chemistry Stockroom, Pfahler 314b. All other lamps are disposed of at the Facilities Services Building.

***Note: Home Depot and Lowes recycle consumer compact fluorescent lamps (CFLs). Facilities Services will also take CFLS for $.50/lamp.**

MERCURY CONTAINING DEVICES/THERMOSTATS

- Place the mercury-containing ampule in a compatible, closed container.
- Date and label the container with ".Universal Waste – Mercury Containing Device."
- Take the container with the ampule to the Facilities Services Building.

If you have equipment containing mercury, contact the Environmental Health and Safety & Risk Management office at ext. 3221.

PESTICIDES

- Contact Environmental Health and Safety & Risk Management at ext. 3221.

ELECTRONICS – include **College owned** computer monitors, CPU units, printers, mice, keyboards, TVs, AV equipment, servers, laptops and more. Contact Information Technology at ext. 3789 for assistance.
***Note:** Best Buy has e-cycling kiosks located in its stores and Dell has a recycling program available to consumers who purchase a new computer. Staples accepts some electronics for recycling as well. Please dispose of personally owned electronics at Best Buy, Dell, any other retailer who sells electronics, or at one of the county hazardous waste sites.

For information on county hazardous waste drop-off dates, click here MontgomeryCountyRecycles.