Section B - 5

UNO WASTE REQUIRING SPECIAL PROCESSING

Introduction

The variety of chemicals generated at UNO prohibits the development of guidelines specific to each chemical. Therefore, an overview of guidelines for the disposal of chemical waste is presented and must be subsequently tailored to accommodate different types of chemical wastes. Certain common chemical wastes, including compressed gas containers, water reactive compounds, shock-sensitive compounds, pyrophoric chemicals, peroxide-forming chemicals, biohazardous/infectious waste, mixed (radioactive and hazardous) waste, dioxin, battery collection, commercial (trade name) products, spent photo fixer, spent Cidex (glutaraldehyde), spent formaldehyde and unknown chemicals, are addressed in this section for easy reference. If questions arise concerning the appropriate disposal procedures, contact EHS at extension 4-3921.

A. Compressed Gas Containers

Due to regulations prohibiting land filling of gas cylinders, disposal of these items presents a special problem. EHS has two disposal options: a disposal company may (1) vent the cylinder into a chemical waste incinerator or into the flow of another chemical treatment process or (2) detonate the cylinder. Cylinder detonation is chosen as a last resort since it does not assure complete destruction of the contents, nor controls the release of contents to the environment. In addition, detonation is extremely expensive, particularly for cylinders whose contents are unknown. Alternatively, it is much more preferable to return compressed gas cylinders to the manufacturer or distributor.

- Compressed gas cylinders

Compressed gas cylinders which are lecture bottle size must be disposed of according to the following procedures:

1. Return empty gas cylinders to the manufacturer or distributor from which they were purchased. Arrangements should be made at the time of purchase for return of the cylinders. This should be part of the bid proposal. If the manufacturer does not accept the cylinders for disposal, they should be purchased through another supplier.

2. In the event it is not possible to return the cylinders as specified above, submit the cylinders for waste pickup by EHS following normal disposal procedures.

- Disposable propane and butane containers

Empty disposable propane and butane bottles must be tagged and submitted for collection by EHS in accordance with normal disposal procedures.

- Aerosol can disposal

1. For unwanted aerosol cans, **except those which originally contained pesticides, "P" or "U" listed chemicals, or freons**, use the can to near zero contents before disposing in the trash. Some aerosol cans, such as paint, can be emptied by spraying the remaining contents on a piece of cardboard and then disposing of both items in the trash.

2. Submit empty aerosol cans which originally contained pesticides, "P" or "U" listed chemicals, or freons and any unwanted aerosol cans that are not empty for waste pickup by EHS. Note that in packaging, the aerosol cans should be stood upright in the box and capped to prevent the accidental release of contents. If the ingredients of the can are known, list them on the Chemical Collection Tag.

B. Highly Reactive Chemicals

1. Water-Reactive Chemicals

Certain chemicals react with water to evolve heat and flammable or toxic gases and should be stored and handled so that they do not come in contact with liquid water or water vapor. Table 2 lists some common laboratory materials which are water reactive. Water reactive compounds, such as those listed below, require special handling; contact EHS (ext. 4-3921) for disposal instructions.

TABLE 2

WATER-REACTIVE CHEMICALS
• Alkali metals • Alkali metal hybrids • Alkali metal amides • Metal alkyls, such as lithium alkyls and aluminum alkyls • Grinard reagents • Halides of nonmetals, such as BCl_3, BF_3, PCl_3, PCl_5, $SiCl_4$, S_2Cl_2 • Inorganic acid halides, such as $POCl_3$, $SOCl_2$, SO_2Cl_2 • Anhydrous metal halides, such as $AlCl_3$, $TiCl_4$, $ZrCl_4$, $SnCl_4$ • Phosphorus pentoxide • Calcium carbide • Organic acid halides and anhydrides of low molecular weight

2. Shock-Sensitive Compounds

Table 3 lists some common classes of laboratory chemicals which have potential for producing a violent explosion when subjected to shock or friction. Some chemicals identified as shock

sensitive, require water to be added to the chemical before transportation. For disposal instructions, contact EHS (ext. 4-3921).

TABLE 3

SHOCK-REACTIVE CHEMICALS

- Acetylenic compounds, especially polyacetylenes, haloacetylenes, and heavy metal salts of acetylenes (copper, silver and mercury salts are particularly sensitive)
- Acyl nitrates
- Alkyl nitrates, particularly polyol nitrates such as nitrocellulose and nitroglycerine
- Alkyl and acyl nitrites
- Amminemetal oxosalts: metal compounds with coordinated ammonia, hydrazine or similar
  nitrogenous donors and ionic perchlorate, nitrate, permanganate, or other oxidizing group
- Azides, including metal, nonmetal and organic azides
- Chlorite salts of metals, such as $AgClO_2$ and $Hg(ClO_2)_2$
- Diazo compounds such CH_2N_2
- Diazonium salts, when dry
- Fulminates such as mercury fulminate ($Hg(CNO)_2$)
- Hydrogen peroxide becomes increasingly treacherous as the concentration rises above 30%, forming explosive mixtures with organic materials and decomposing violently in the presence of traces of transition metals
- N-Halogen compounds such as difluoroamino compounds and halogen azides
- N-Nitro compounds such as N-nitromethylamine, nitrourea, nitroguanidine and nitric amide
- Oxo salts of nitrogenous bases: perchlorates, dichromates, nitrates, iodates, chlorites, chlorates, and permanganates of ammonia, aminds, hydroxylamine, guanidine, etc....
- Perchlorate salts. Most metal, nonmetal and amine perchlorates can be detonated and may undergo violent reaction in contact with combustible materials.
- Peroxides and hydroperoxides, organic
- Peroxides (solid) that crystallize from or are left from evaporation of peroxidizable solvents
- Peroxides, transition-metal salts
- Picrates, especially salts of transition and heavy metal, such as Ni, Pb, Hg, Cu and Zn
- Polynitroalkyl compounds such as tetranitromethane and dinitroacetonitrile
- Polynitroaromatic compounds, especially polynitro hydrocarbons, phenols and amines (e.g., dinitrotoluene, trinitrotoluene and picric acid)

3. Pyrophoric Chemicals

Listed in Table 4 below are several classes of readily oxidized chemicals which can ignite spontaneously in air. Pyrophoric chemicals, such as the following, should be stored in tightly closed containers under an inert atmosphere and any handling of them should be carried out under an inert atmosphere or liquid as well. Due to their highly reactive characteristics, contact EHS (ext. 4-3921) for special instructions concerning their disposal.

TABLE 4

PYROPHORIC CHEMICALS
• Grinard reagents, RMgX • Metal alkyls and aryls, such as RLi, RNa, R_3Al, R_2Zn • Metal carbonyls, such as $Ni(CO)_4$, $Fe(CO)_5$, $Co_2(CO)_8$ • Alkali metals such as Na, K • Metal powders, such as Al, Co, Fe, Mg, Mn, Pd, Pt, Ti, Sn, Zn, Zr • Metal hydrides, such as NaH, $LiAlH_4$ • Nonmetal hydrides, such as B_2H_6 and other boranes, PH_3, AsH_3 • Nonmetal alkyls, such as R_3B, R_3P, R_3As • Phosphorus (white)

4. Organic Peroxides

Organic peroxides are among the most hazardous chemicals normally handled in laboratories. As a group, they are flammable, low-power explosives and oxidizers that are sensitive to shock, heat, sparks, frictions, impact, and light. Many of them are much more shock-sensitive than typical explosives such as TNT.

Purchase and use of peroxides shall be kept to a minimum. Unused peroxides shall not be returned to the container. Glass containers with screw caps or glass stoppers shall not be used. Polyethylene bottles with screw caps are acceptable. Liquid peroxides or solutions shall be stored so that the peroxide will not freeze or precipitate, because these forms are extremely sensitive to heat or shock. Consistent with this precaution, they shall be kept as cold as practical to avoid decomposition.

The sensitivity of organic peroxides to heat and shock may be reduced by diluting the peroxides with inert solvents (such as aliphatic hydrocarbons or mineral oil). However, not all solvents are appropriate to mix with peroxides. Toluene, in particular, is known to induce the decomposition of diacyl peroxides. Do not use acetone or other oxidizable materials for dilution of organic peroxides.

Ceramic, Teflon, or wood spatulas shall be used. Metal spatulas will contaminate the peroxide, which can lead to explosive decomposition. Friction, grinding, and other forms of impact shall be avoided.

5. Peroxide-Forming Chemicals

Certain chemicals are known to form peroxides on exposure to air or light. Peroxide concentrations may accumulate over long periods of time. The distillation of solvents contaminated with peroxides may lead to violent explosions as the peroxides become concentrated during the process. A peroxide present as a contaminating reagent in a solvent can change the course of a planned reaction.

Keep all stored chemicals, especially flammable liquids, away from heat and direct sunlight. Peroxide-forming chemicals call for special consideration at all times and particularly in storage. They should be stored in dark bottles. Ultraviolet light and elevated temperature accelerate peroxide formation.

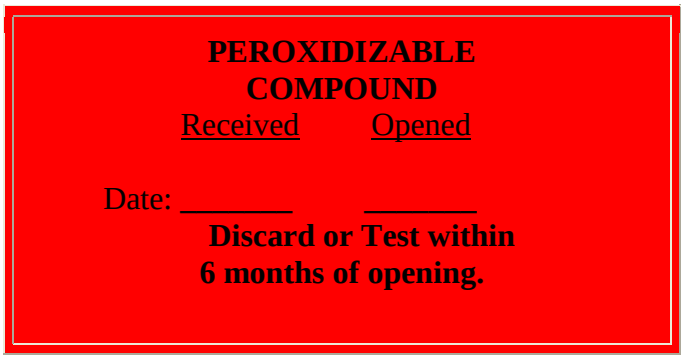
Peroxide-forming solvents shall be dated when opened and checked for the presence of peroxides with either wet chemicals or test strips. The checks should be conducted prior to heating the solvent and after each month of storage. Peroxides may be removed by passing the solvent through an alumina column. The alumina shall not be allowed to dry out and shall be given to EHS promptly for disposal.

Some peroxide-forming chemicals are listed in Table 5. Most typical are ethyl ether, dioxane, and tetrahydrofuran. They shall not be stored more than six months and shall not be put into storage without special posting indicating their presence and removal date.

Note that all peroxidizable compounds should be stored away from heat and light. They should be protected from physical damage and ignition sources. A warning label should be affixed to all peroxidizable compounds as illustrated below to indicate the date of receipt and the date the container was first opened. (These warning labels are available from EHS).

Example of Warning Label

Figure 9



Several acceptable calorimetric tests for peroxides in ethers are available. Contact EHS for information. If sufficient peroxide is present to form a precipitate, the container and its contents shall be handled with extreme care. Call EHS to have it removed. Generally, if you think you should test for the presence of peroxides, then you probably have kept the material too long and should dispose of it immediately.

A test for peroxides should only be attempted if it is clear that no danger will result from moving or opening the container. Solids in the liquid or around the cap can indicate dangerous peroxide buildup.

If old containers of peroxide-forming chemicals are found, do not move them without consulting EHS. This is especially true if they contain precipitate. If they are to be moved, handle them only by the bottom of the container and never by the cap or lid, as friction may cause a violent explosion.

In general, do not attempt to dilute the concentration of peroxides in peroxide-forming solvents by adding additional solvent. Increasing the total volume may dilute the peroxide concentration but creates a larger quantity of waste for disposal. The higher volume of waste may require stabilization because of the presence of peroxides.

TABLE 5

LIST OF PEROXIDIZABLE COMPOUNDS

Acetal	Diethyl fumarate	Limonene
Acetaldehyde	Diethylene glycol dimethyl ether	1,5-p-Menthadiene
Acrylamide	Diethylketene	Methoxy-1,3,5,7-cyclooctatetraene
Acrylic Acid	Digylme	2-Methoxyethanol
Acrylonitrile	2,3-Dihydrofuran	2-Methoxyethyl vinyl ether
Allyl ethyl ether	2,3-Dihydropyran	Methyl acetylene
Allyl phenyl ether	Diisopropyl ether *	Methyl methacrylate
Allyl vinyl ether	1,1-Diethyoxyethane	4-Methyl-1,3-dioxane
1-Allyloxy-2,3-epoxypropane	1,2-Dimethoxyethane	2-(1-Methylheptyl)-4,6-dinitrophenyl crotonate
Benzyl-1-naphthyl ether	1,1-Dimethoxypropane	2,3-Methyl-2-methylene butanal
Benzyl butyl ether	2,2-Dimethoxypropane	4-Methyl-2-pentanone
Benzyl ethyl ether	3,3-Dimethoxypropene	2-Methyltetrahydrofuran
Bis(2-ethoxyethyl) ether	2,2-Dimethyl-1,3-dioxolane	Methyl vinyl ether
Bis(2-methoxyethyl) ether	2,6-Dimethyl-1,4-dioxane	2-Penten-4-yn-3-ol
1,3-Butadiene	1,3-Dioxane	a-Pentylcinnamaldehyde Potassium * (forms yellow potassium peroxide on the surface)
1,3-Butadiyne	1,4-Dioxane	
2-Butanol	1,3-Dioep-5-ene	
Buten-3-yne	1,3-Dioxol-4-en-2-one	Potassium amide
Butyl ethyl ether	Dipropyoxymethane	2-Propanol
Butyl formate	Dipropyl ehter	Propionaldehyde
Butyl vinyl ether	Divinyl acetylene *	2-Propyne-1-thiol
2-Chloro-1,3-butadiene	Divinyl ether	Sodium 5,8,11,14-eicosatetraenoate
1-Chloro-2,2-diethoxyethane	1,2-Epoxy-3-isopropoxy propane	Sodium amide *
2-Chloroacrynitrile	1-Ethoxy-2-propyne	Sodium ethoxyacetylide
2-Chloroethyl vinyl ether	2-Ethoxyethanol	

Chloroethylene Chloroprene Chlorotrifluoroethylene Cinnamaldehyde Crotonaldehyde Cyclohexene Cyclooctene Cyclopropyl methyl ether Decahydronapthalene Decalin Di(2-propynl)ether Diacetylene Diallyl ether Dibenzyl ether p-Dibenzyloxybenzene 1,2-Dibenzyoxyethane Dibutyl ether 1,1-Dichloroethylene Dicyclopentadiene 1,1-Diethoxyethane 1,2-Diethoxyethane Diethoxymethane 3,3-Diethoxypropene Diethyl ether	2-Ethyl butanal Ethyl isopropyl ether Ethyl propenyl ether Ethyl vinyl ether 2-Ethylacrylaldehyde oxime Ethylene glycol dimethyl ether 2-Ethylhexanal 2-Ethylhexyl vinyl ether 2-Furaldehyde Furan Glyme compounds 4,5-Hexadien-2-yn-1-ol 2,4-Hexadienal 2,5-Hexadiyn-1-ol 2-Hexenal Indole-2-carboxyaldehyde Isobutyl vinyl ether Isobutyraldehyde Isopropoxypropionitrile Isopropyl ether * Isopropyl propyl ether Isopropyl vinyl ether 2-Isopropylacrylaldehyde oxime Isovaleraldehyde	Styrene 1,1,2,3,-Tetrachloro-1,3-butadiene Tetrafluoroethylene Tetrahydrofuran Tetrahydronaphthalene Tetrahydropyran Tetralin Tridecanal 1,3,3-Trimethoxyprpene 3,3,5-Trimethyl-2-cylcohexene-1-one (isophorone) Vinyl acetate Vinyl acetylene Vinyle Chloride Vinyl ethers Vinyl pyridine 4-Vinylcyclohexene Vinylidene chloride
NOTE: Compounds with synonyms are listed under all known names. NOTE: * Forms Peroxides rapidly upon storage		

6. Polynitro Compounds

Many polynitroaromatic compounds are shock-sensitive, as are some aliphatic compounds containing more than one nitro group. Many of these compounds are sold and stored with 10 to 20 percent waste, which desensitizes their reaction to shock, although they are still flammable solids.

a. Storage

Polynitro compounds shall be stored separately from most chemicals and labeled so they will be easily identified as reactive. They shall not be placed in long-term storage without special posting indicating their presence and removal date. Long-term storage without checking for proper water content may allow the compound to dehydrate sufficiently to make them highly reactive.

Surplus and waste polynitro compounds shall be given to EHS promptly for proper disposal or recycling and not left on a shelf to be forgotten.

If old containers of polynitro compounds are found, including picric acid or dinitrophenyl hydrazine, do not move them without consulting EHS. If they are moved, handle them only by the bottom of the container and never by the cap or lid, as friction may cause a violent explosion.

b. Picric Acid

Dry picric acid is highly explosive and should be brought into the laboratory only when specifically required. Users should have a thorough understanding of its hazards. Although not explosive when wetted, picric acid solutions may evaporate to leave the hazardous solid. Picric acid should be stored away from combustible materials and should not be kept for extended periods. Old containers of picric acid shall be handled only by EHS.

c. Methyl nitronitrosaoguanidine

Methylnitronitrosoguanidine is a carcinogenic agent that is also shock-sensitive. It is to be stored in a separate area, preferably locked. Waste paper, plastic, and glass contaminated with this material shall be given to EHS for proper disposal.

7. Catalysts

Catalysts such as raney nickel or palladium on carbon shall be filtered from catalytic hydrogenation reaction mixtures with care. The catalyst has usually become saturated with hydrogen and will produce flames spontaneously on exposure to air.

8. Calorimeters (Commonly Known as Parr Bombs)

Calorimeters/Parr bombs shall be handled behind shields. The operator shall wear goggles or preferably a face shield.

9. Sodium Azide

Sodium azide is an acutely toxic, highly reactive, heat-sensitive, and potentially shock-sensitive material. Because it reacts with metals, Teflon or other nonmetal spatulas should be used with the material. It shall be stored in a locked cabinet and used with appropriate personal protective gear.

10. Organometallics

Organometallics are organic compounds comprised of a metal or nonmetal attached directly to carbon (RM). Examples are Grignard compounds and metallic alkyls such as triethylaluminum and trimethylindium. Many organometallics are highly toxic or flammable. Many are also water-reactive and spontaneously combustible in air. Trialkyltins are the most toxic as a group. Most are highly reactive chemically. Special firefighting equipment (e.g., dry chemical powder fire extinguisher) may be needed where organometallics are handled.

11. Hydrides

Hydrides are inorganic compounds composed of hydrogen and other elements, often a metal. Examples include arsine (AsH_3), phosphine (PH_3), diborane (B_2H_6), germane (GeH_4), stibine (SbH_3), and silane (SiH_4). The listed hydrides are highly toxic and flammable. They react violently with water and oxidizing agents and pose a dangerous fire risk. Phosphine, diborane, and silane are spontaneously flammable in air.

Certain hydride gases, notably arsine and phosphine, are commonly used as dopants in semiconductor research applications. Arsine is one of the most toxic gases known. It is a potent hemolytic agent (symptoms: red discoloration of the urine and sclera). Phosphine is extremely toxic to organs of high oxygen flow and demand. Thorough emergency planning for accidental releases shall be in place when such gases are to be used in the laboratory. Provision of air-supply respiratory protection may be called for as well as continuous system monitoring for releases.

Exhaust streams of hydride gases shall be treated (e.g., scrubbing or thermal decomposition) before release. Inform EHS of the treatment procedures to be applied.

C. Biohazardous/Infectious Waste

1. Biohazardous/infectious waste shall mean a waste type capable of producing an infectious disease in humans.

a. Pursuant to Omaha Ordinance, Chapter 33, "infectious waste" shall include the following categories:

1) Blood and body fluids - blood, blood products, and body fluids shall be classified as infectious. The term human blood and blood products shall include serum, plasma, and other blood components. The term body fluid shall include semen, vaginal secretions, cerebrospinal fluid, synovial fluid, pleural fluid, peritoneal fluid, pericardial fluid, amniotic fluid, and any other body fluid visibly contaminated with blood. Items contaminated with the above fluids are considered infectious only when a pourable quantity is present. Pourable quantity is further defined as the ability of a liquid or semi-solid form to drip or flow. Items that are caked with dried blood or other body fluids and are capable of releasing these materials during handling are considered infectious.

2) Infectious sharps waste - infectious sharps waste shall be defined as all discarded items derived from human patient diagnosis, care or treatment; or animals infected with zoonotic disease in medical, research, or industrial facilities which could potentially transmit disease via direct subdermal (beneath the skin) inoculation. Infectious sharps shall include, but not be limited to, hypodermic needles, scalpels, pipettes, breakable containers, and glass products (i.e., container, slides, coverslips) containing materials defined within the definitions be infectious.

3) Laboratory waste - all cultures and stock of infectious agents, including specimen cultures from medical and pathological laboratories, wastes from the production of biologicals, discarded live and attenuated vaccines, and culture dishes and devices used to transfer, inoculate, and mix cultures shall be defined as infectious laboratory waste.

4) Animal Waste - animal waste derived from animals afflicted with zoonotic disease, or purposely infected with agents infective to humans, shall be classified as infectious waste. Infectious animal waste shall include blood, body fluids, carcasses, body parts, and bedding of animals that were infected with a disease communicable to humans.

5) Medical Sharps - while needles and syringes not used in patient care (and therefore not contaminated with blood or body fluids) do not generally constitute a vehicle of disease transmission, they shall be considered in this category due to safety concerns about their disposal.

2. Biohazardous/infectious waste, except for sharps, shall be contained in disposable plastic bags or containers that are tear-resistant, leak-proof, and secured to prevent leakage or expulsion of solid or liquid waste during storage, handling, or transport.

a. Bags must be a 4 mil (rated) red plastic bag or equivalent. The bag must be twisted shut, the end folded over, and taped or tied.

b. Waste that is sterilized before leaving an area/department must be rendered non-recognizable or placed in red bags to be incinerated. Red bags require special disposal and cannot enter common trash receptacles.

c. Equipment and linen contaminated with infectious material or biological agents must be handled and decontaminated in accordance with the guidelines established by the UNO/UNMC Biosafety Committee and UNO Bloodborne Pathogen Exposure Control Committee.

d. Sharps contaminated with infectious material must be disposed of in one of several sharps containers. Infectious sharps and medical sharps waste shall be packaged in leak-proof, rigid, puncture-resistant, and break-resistant containers. These containers must be sealed shut and placed with the infectious waste for pickup and disposal. Sharps containers should be bagged and sealed as outlined above if they contain liquids in the form of blood, body fluids or medications.

e. Glass contaminated with infectious material must be placed in a sharps container as outlined above prior to disposal.

f. Pipettes contaminated with infectious material must be placed in a rigid, puncture-resistant container prior to disposal. This container must be sealed and bagged as outlined above.

g. Environmental services will pick up and handle infectious waste in accordance with departmental procedures.

D. Chemical Mixtures

To submit chemical mixtures for disposal, carry out standard disposal procedures and note the following requirements:

1. Use the Chemical Collection Tags provided by EHS for mixtures consisting of aggregated or collected waste.

2. List the mixture ingredients and their approximate percentages on both sections of the Chemical Collection Tag. (Include water as an ingredient of aqueous solutions.)

3. Write the pH of aqueous solutions, or the pH of a 10% aqueous solution for organic mixtures, on both sections of the Chemical Collection Tag.

4. Indicate the presence of any sludge, precipitant, or material which is polymerizable on both sections of the Chemical Collection Tag.

5. Contact EHS for further instructions if necessary.

For questions concerning labeling and packaging of mixtures, contact EHS (4-3921).

E. Dioxin

Dioxin is a contaminant in the production of some pesticides. It is highly toxic and very persistent in the environment. As a result, the Environmental Protection Agency (EPA) has banned most uses of pesticides containing this chemical.

Outlined below are some of the compounds of concern.

- Trichlorophenols (e.g., 2,4,5-T; 2,4,5-TP; Silvex; Ronnel; Fenchlorophos)
- Tetrachlorophenol
- Pentachlorophenol/pentachlorophenate
- Tetrachlorobenzene
- Pentachlorobenzene
- Hexachlorobenzene

F. Battery Collection

Listed below are some of the types of batteries used and the proper disposal methods. If you have batteries that are not included below, please contact EHS for disposal instructions.

<u>Alkaline, carbon-zinc (heavy duty), and zinc-air batteries</u>
These are the typical non-rechargeable batteries that most people use. They are non-hazardous and can be thrown in the garbage.

<u>Button batteries</u>
These batteries are found in watches, calculators, hearing aids, etc. Button batteries often contain mercury, silver, or lithium, and should be collected and given EHS for proper disposal or recycling.

Lead-acid batteries
This includes most car and motorcycle batteries. These batteries contain regulated amounts of lead and should be recycled. Businesses will often buy back old batteries when a new one is purchased. There are also several businesses in town that will buy old lead-acid batteries. If old batteries will not be taken back by the company supplying the new ones, then these batteries should be collected and given to EHS for proper disposal.

Nickel-cadmium batteries
These are the most common type of rechargeable battery and they can be found in cellular phones, equipment, and toys. Ni-cad batteries contain regulated amounts of cadmium and should be recycled or handled as hazardous waste. If old batteries will not be taken back by the company supplying the new ones, then these batteries should be collected and given to EHS for proper disposal.

Recycling is the best option from both an economical and environmental standpoint. Check with companies to make sure that they will take back old batteries when new ones are bought. If batteries cannot be recycled, make sure that they are collected and given to EHS for proper disposal.

Sometimes rechargeable batteries are built into a machine or tool (i.e., rechargeable flashlight). When these items will no longer work or stay charged, the whole unit may have to be handled as hazardous waste.

G. Commercial (Trade Name) Products

Commercial products being submitted for disposal must be identified as to their chemical constituents and hazard category before they can be picked up. For this reason, the following steps should be carried out in addition to normal disposal procedures:

1. If available, send a Material Safety Data Sheet (MSDS) with the Chemical Collection Tag.

2. If a Material Safety Data Sheet is not available, submit the following information on a separate sheet of paper with the Chemical Collection Tag:

a. product name
b. ingredient list from the bottle label
c. description of product's usage
d. manufacturer/distributor name, address, city, and telephone number
e. product catalogue number or batch code
f. approximate age
g. pH (if liquid)

3. If none of the above information is accessible, it may be necessary to treat the chemical as an unknown. To evaluate an unknown commercial product, follow the guidelines outlined in Section B-5, Part I, "Unknown Chemicals" and contact EHS if questions arise concerning preliminary analysis procedures.

H. Used Photo Fixer

To assist waste minimization, used photo fixer is collected with hazardous waste from University generators and the silver reclaimed by EHS. For this reason, used photo fixer is collected and disposed of separately from other photographic waste. To dispose of used photo fixer, carry out the following steps in addition to normal disposal procedures:

1. Original containers may be used to submit the spent photo fixer, but they must be properly labeled "Used photo fixer." Do not place used photo fixer in an empty photo bleach or photo activator container.

2. Do not fill containers to the top. Leave some space (3 inches) at the top of the container to facilitate the recovery process.

Once the used fixer has been received, EHS will extract the silver through the use of electrolytic processors and ion-exchange cartridges and then dispose of the remaining solution as non-hazardous waste. Chemical analyses are performed to demonstrate regulatory compliance. Any used photo fixer that is not reclaimed will be disposed of as hazardous waste. Any questions concerning disposal procedures for used photo fixer should be addressed to EHS (ext. 4-3921).

I. Unknown Chemicals

Before disposing of laboratory waste, its hazard class must be identified so that it can be disposed of safely and in accordance with regulatory standards. Disposing of unknown chemicals is very expensive since a complete chemical analysis would need to be performed. For this reason, and for safety considerations of everyone working in the laboratory, do not allow containers of unknown chemicals to accumulate. Avoid generating materials of unknown composition by properly labeling bottles and boxes with the contents, its associated hazards, and the date the waste chemical was first added to the container. Inspect the condition of the containers and their labels weekly, documenting the inspections. If a label appears faded or illegible, affix a new label to the bottle.

In the event you are unsure of the exact contents of a chemical mixture or you have an unlabeled compound, you can assist EHS in the analysis of the unknown item by examining the container and the contents and making some initial observations. Photocopy the Unknown Preliminary Analysis Checklist at the end of this section and complete the form, recording your observations and any known history of the material as requested.

Caution: **Wear appropriate protective clothing and work in a hood when opening containers of unknown chemicals. Bear in mind the hazards involved in handling potential pyrophoric and peroxide forming chemicals. Several classes of chemicals can form explosive peroxides on long exposure to air. Unless it is known that the compound does not contain an explosive substance, do not use heroic efforts to open the bottle to examine the contents; it may be necessary to dispose of the bottle as a potentially explosive chemical. If you have questions concerning potential explosives, contact EHS (ext. 4-3921).**

Retain one copy of the completed form and submit a second copy to EHS at the following address:

Campus Mail
Environmental Health & Safety
EAB 100

Once EHS receives the Unknown Analysis Checklist, it will be reviewed by technical staff and a complete analysis for hazard classification will be performed (as required) before waste pickup. If you have not been contacted by EHS personnel nor had your waste evaluated in two weeks, contact EHS (ext. 4-3921).

J. Mixed Waste

Mixed waste means low-level radioactive waste as identified in Title 180, Nebraska Administrative Code that also contains RCRA hazardous waste as identified in Title 128, Nebraska Administrative Code. At UNO, this means any radioactive waste that is mixed with a RCRA hazardous waste. **Mixed waste shall not be generated without prior written approval from the EHS Manager.**

K. Non-RCRA Regulated Laboratory Waste (Sanitary Sewer Disposal)

Limited quantities of non-RCRA regulated waste may be disposed of in the sanitary sewer system. A sanitary sewer is one that is connected directly to a water-treatment plant. A publicly owned treatment works is known as a POTW. The City of Omaha's Missouri River Wastewater Treatment Plant is the POTW serving UNO. The Quality Control Division of the Omaha Public Works Department is responsible for the regulation of discharges to the sewer system pursuant to Chapter 31 of the Omaha Municipal Code. Waste materials must not interfere with the POTW operations or pose a hazard to the general public, the environment, or to POTW employees.

Non-RCRA Regulated Laboratory Waste is divided into the following categories:

- Non-RCRA Regulated Laboratory Waste
- Non-RCRA Regulated Laboratory Waste Requiring Neutralization

1. Non-RCRA Regulated Laboratory Waste

The following list of non-RCRA regulated laboratory waste may be disposed of into the sanitary sewer, provided:

a. there are no RCRA regulated wastes mixed with the non-RCRA regulated wastes. **(Absolutely no RCRA regulated waste may be disposed of via the sanitary sewer.** Sanitary sewer disposal will be audited by EHS during internal audits. If you have any doubts about the proper procedure for the waste you are disposing, contact EHS at ext. 4-3921); and

b. the total quantity per day does not exceed five (5) gallons per laboratory. For quantities greater than five (5) gallons, approval from EHS is required prior to disposal.

NOTE: *Waste must be flushed with at least a five-fold excess of water in the laboratory to achieve a 100-fold excess at the discharge connection to the sanitary sewer.*

Table 6

NON-RCRA REGULATED LABORATORY WASTE

Acetylglucosamine	Corn Oil	Pepsin
Acetylsalicylic acid	Corticotropin	Petrolatum
Actin	Coverage Plus	Petroleum jelly
Adenosine	(Germicidal Detergent)	Phenylalanine
Agar	Creatinine	Phosphatidyl choline
Agarose	Cysteine	Potassium acetate
Alanine	Cytosine	Potassium acid
Albumen	Deoxyribonuclease	phosphate
Alconox alginic acid	Dextran	Potassium bicarbonate
Aluminum silicate	Dextrose	Potassium bisulfate
Aluminum sodium	Drierite	Potassium bitartrate
sulfate	Epsom salts	Potassium carbonate
Aluminum sulfate	Ethanol (<24% prior to	Potassium chloride
Amber	dilution)	Potassium citrate
Amino acid	Ethylenediaminetetraacetic	Potassium iodide
Aminoacetic acid	acid (EDTA)	Potassium phosphate
Ammonium	Ferritin	Potassium
bicarbonate	Fluorescein	pyrophosphate
Ammonium	Fructose	Potassium sodium
carbonate	Fullers earth	tartrate
Ammonium chloride	Galactose	Potassium sulfate
Ammonium citrate	Gelatin	Potassium sulfite
Ammonium lactate	Globulin	Pumice riboflavin
Ammonium	Gluconic acid	Riboflavin-5-
phosphate	Glutamic acid	phosphate
Ammonium stearate	Glutamine	Ribonucleic acid
Ammonium sulfate	Glycylglycine	Salicylic acid
Ammonium valerate	Guanine	Sephadex
Amylopectin	Guanosine	Serine
Arabinose	Gum arabic	Silica gel
Arginine	Gypsum	Silicon carbide
Ascorbic acid	Hemoglobin	Silicon dioxide

Asparagine	Heparin	Sodium acetate
Aspartic acid	Histamine	Sodium ammonium
Beef extract	Histidine	phosphate
Bees wax	Inositol	Sodium bicarbonate
Bentonite	Insulin	Sodium carbonate
Bitumen	Isoleucine	Sodium chloride
Borneol	Kaolin	Sodium citrate
Calcium acetate	Keratin	Sodium iodide
Calcium borate	Lactic acid	Sodium lactate
Calcium carbonate	Lactose	Sodium phosphate
Calcium chloride	Lanolin	Sodium salicylate
Calcium citrate	Lecithin	Sodium silicate
Calcium gluconate	Leucine	Sodium thiosulfate
Calcium	Lithium carbonate	Sodium
glycerophosphate	Lithium chloride	trimetaphosphate
Calcium lactate	Litmus	Sodium tungstate
Calcium pantothenate	Magnesium borate	Sorbitol
Calcium phosphate	Magnesium carbonate	Sorbose
Calcium sulfate	Magnesium citrate	Starch
Carborundum	Magnesium lactate	Steapsin
Carbowax	Magnesium phosphate	Strontium carbonate
Carnitine	Magnesium sulfate	Succinic acid
Carotene	Malt extract	Sucrose
Casein	Maltose	Talcum powder
Celite	Mannitol	Tartaric acid
Cellulose	Methionine	Thiamine
Cellulose phosphate	Methyl cellulose	hydrochloride
Cellulose acetate	Methyl histidine	Tocopherol
Cerium oxide	Molecular sieves	Tricalcium phosphate
Chlorophyll	Nicotinamide adenine	Trisodium phosphate
Choline	dinucleotide phosphate	Triton X
Choline chloride	(NADP)	Trypsin
Citric acid	Naphthoflavone	Tryptone
	Niacinamide	Tryptophan
	Nicotinamide	Tyrosine
	Nicotinic acid	Uricase
	Oleic acid	Uridine
	Pancreatin	Valine
	Papain	Vanillic acid
	Parafin	Vanillin
		Yeast Extract
		Zinc phosphate

2 Non-RCRA Laboratory Waste Requiring Neutralization

The following list of non-RCRA regulated laboratory waste requiring neutralization may be disposed of into the sanitary sewer, provided:

a. The waste is neutralized prior to sanitary sewer disposal utilizing an approved neutralization procedure; and

b. The total quantity per day does not exceed five (5) gallons per laboratory. For quantities greater than five (5) gallons, approval from EHS is required prior to disposal.

NOTE: *Waste must be flushed with at least a five-fold excess of water in the laboratory to achieve a 100-fold excess at the discharge connection to the sanitary sewer*.

NON-RCRA REGULATED LABORATORY WASTE REQUIRING NEUTRALIZATION

Spent n-amyl-N-methylnitrosamine
Bleach (pH 6.5-9.5)
Ethidium Bromide (liquid)
Spent Formaldehyde Solution
Gluteraldehyde Solution
Corrosive Inorganics (pH <6.0 or >9.5 excluding those which pose an additional hazard from characteristics or TCLP regulated chemicals, i.e. nitric acid (oxidizer) or chromic acid (chromium)).
Corrosive Organics (pH <6.0 or >9.5)

NOTE: Ethidium bromide gels may be disposed of with biohazardous waste providing the gel is contained in leak-proof containers before placing in the appropriate biohazard bag.

UNKNOWN PRELIMINARY ANALYSIS CHECKLIST

(Please photocopy this checklist and follow the instructions given in Section B-5, Part I)

Name: _____Telephone: _____

Date: _____Dept: _____Bldg: _____Room: _____

Type of Laboratory: _____

Please fill out as much information as possible.

Container Description

Age of chemical: _____ Original container?_____

Type of container: _____ No. of containers: _____

Size of containers: _____ Possible usage: _____

Suspected to contain: (PCB's, pyrophoric chemicals, radioactive materials, water reactive materials, mercury, dioxins, chlorinated dibenzofurans or chlorinated phenols)

_____

_____

Manufacturer's name and address:

_____

_____

Physical Description

Color: _____ Amount of chemical: _____

If Liquid: Is it layered or is there a sludge? _____

Is it viscous or mobile? _____

If Solid: Appearance: (crystals, pellets, chunks, powder)

_____

Do not open the container for the purpose of "sniffing" the contents or bottle cap, but make note of any odor which you are previously aware or which is obvious from the closed container.

Characteristic odor? _____

Signature _____