Emory University - Department of Chemistry

Chemical Waste Disposal Guidelines

Important Notices

(1) The information provided in this document pertains solely to procedures of chemical waste collection and disposal within the Department of Chemistry at Emory University.
It is a supplement to the *Chemical Safety Manual* and *Chemical Hygiene Plan* maintained by the Environmental Health and Safety Office (EHSO) of the University. All users of this supplement must be familiar with both documents, available at http://www.ehso.emory.edu/. Download these documents by selecting the "Chemical Safety" link of the above URL.

(2) Procedures presented here and those found in reference materials are intended to be carried out only by, or under the direct supervision of, trained scientists or technologists who understand the chemistry and hazards involved. Appropriate personal protection should be used.

Introduction

All work in a chemistry laboratory eventually generates chemical waste. **The individual laboratory worker carries the legal and ethical responsibility to learn and follow proper procedures for safe disposal of all waste material generated in the course of his or her work. Effective immediately, the disposal of pyrophoric, air- or moisture-sensitive, highly reactive substances, and gas cylinders (both high-pressure, and low-pressure) through the waste facility (Emerson E133) is no longer acceptable.**

This document provides guidelines for the proper inactivation of these chemicals prior to disposal through the waste facility. Additional information on the disposal of other classes of hazardous chemical waste can be found in the *Chemical Safety Manual* (EHSO). Exceptions to this policy can be granted through the Chemical Safety Office of the University for chemicals in unstable condition (i.e. picric acid, peroxide forming materials), and leaking or damaged containers. Contact the Chemistry Safety Committee (Stefan Lutz, Emerson Hall E205) for details.

Please remember that the improper disposal of chemical waste (i.e. simply depositing the waste or unknown chemical in Emerson E133) will require removal by external professionals and **the substantial extra costs will be fully charged to your advisor's account**.

General Waste Disposal Procedures

(reprinted from the Chemical Safety Manual of Emory University)

a) Segregation of Chemicals

Chemical wastes from each specific process should be stored separately. Solvent wastes are the only wastes that may be stored together in the same container, however halogenated and non-halogenated should be segregated. Other wastes may be able to be combined to save storage space, but approval must be received from the Chemical Safety Office before doing so. At a minimum, the following wastes should be stored separately: Acids, Bases, Amines, Cyanides, Halogenated Solvents, Metals, Non- halogenated Solvents, Oxidizers, Sulfides, Water Reactive and Extremely Toxic compounds.

b) Containers and Packaging

Wastes must be stored in containers made of a compatible material. For example, strong acids may not be stored in plastic bottles and hydrofluoric acid may not be stored in glass bottles. Containers are provided for solvent, aqueous, and silica gel wastes. These are the only waste containers returned. Empty containers of which the product was originally received are best reused as waste containers for other materials. All waste containers must have tightly fitting caps and be kept closed at all times except when waste is actually being added. Funnels left in the bottle mouth are not acceptable. Do not overfill liquid containers. To minimize spillage, allow enough air space for expansion.

c) Labeling

All waste containers must be labeled as to their contents and approximate concentrations. Solvent and aqueous wastes must be labeled with the labels found in the waste room. The “Date Received” should be the date the waste is delivered to the waste room, not the date you take the container to your lab. When reusing empty bottles, the original label should be completely defaced. Chemical names should be filled out in letters, not chemical symbols or structural formulas. Unused chemicals in their original containers do not need additional labeling, except for the lab from which it originated.

d) Delivery

Surplus and waste chemicals are to be delivered to Emerson E133. A key and sign out sheet are located in the stockroom. Dr. Stefan Lutz must be notified in advance of large quantities of chemicals being delivered. Pickups by Chemical Safety Office (7-5688) can be arranged for chemicals in unstable condition (i.e. picric acid, peroxide forming), and leaking or damaged containers.

e) Surplus Chemicals

CSO maintains two surplus chemical storage areas where any Emory employee authorized and trained to work with hazardous materials may browse before purchasing a new chemical. CSO makes no warranty as to the purity of these chemicals, although oftentimes the containers are still sealed. This service is offered free of charge to encourage its use and is open during regular waste receiving hours, or by appointment. Please contact the Chemical Safety Office (7-5688) for additional information.

Reference for the Laboratory-scale Treatment of Surplus and Waste Chemicals

Specific procedures for laboratory treatment are increasingly being included in the experimental sections of chemical journals and in publications such as Organic Syntheses and Inorganic Syntheses. The following books contain practical laboratory procedures for the deactivation of laboratory chemicals.

Prudent Practices in the Laboratory: Handling and Disposal of Chemicals, National Research Council, 1995 http://www.netlibrary.com/Details.aspx?ProductId=969
Note: The electronic version of this book is available through the Emory University Library. Chapter 7 includes detailed chemical procedures for the destruction of chemical reagents.

Prudent Practices for Disposal of Chemicals from Laboratories, National Research Council, 1983.
Note: This book, and older edition of the above volume, contains more extensive experimental procedures for the destruction of chemical reagents. See Chapter 6. Available through the University Library and in Emerson Hall E133.

Destruction of Hazardous Chemicals in the Laboratory, Lunn, George, and Sansone, Eric B., John Wiley and Sons, Inc., 1994.

Waste Disposal in Academic Institutions, Kaufman, James A. ed., Lewis Publishers, 1990.

Hazardous Chemicals: Information and Disposal Guide, by M.A. Armour, L.M. Browne, G.L. Weir, University of Alberta, 3rd edition, 1987.

Chemical Technicians' Ready Reference Handbook, Gershon J. Shugar, Jack T. Ballinger, McGraw Hill, 1996.

Compressed Gas and Condensed Gas Cylinders

Whenever possible, compressed gases should be purchased from a supplier willing to take the spent cylinder back. This means avoiding the use of lecture bottles. Do not store corrosive gases for an extended period of time. Commercial waste disposal companies are not willing to remove a gas cylinder with a corroded or inoperative valve.

If your work requires chemicals available only in non-returnable cylinders, **these cylinders must be completely and safely emptied in the laboratory by the user**. The content of the cylinder must be treated appropriately as any hazardous waste giving consideration to the type of chemical substance(s) present. The empty cylinder should be washed completely, the valve removed, and the cylinder should then be washed again. Be aware of the safety consideration due the residual chemicals in the cylinder (flammability, toxicity, etc) when washing a cylinder. Treat any wash solutions if appropriate as hazardous chemical waste. The clean cylinder **with the valve removed** may now be recycled as scrap metal.

Disposal of chemical storage containers

Empty chemical storage containers (glass or plastic) should be rinsed with water prior to disposal in the regular waste (for plastic containers) or glassware waste. Chemical residues are not only a general safety risk (flammable liquids, acids & bases) but also represent a serious health threat to the custodial staff and the environment. The EPA has identified a list of chemicals as “Acutely hazardous” or “P-list” chemicals. Empty chemical containers from this list must be triple rinsed with any solvent suitable for removing the chemical. This rinsate must be collected and disposed of as hazardous waste. The full list is found in Appendix G of the Chemical Safety Manual.

Disposal of pump oil

Used pump oil should be collected in storage containers, clearly labeled with a waste disposal sticker. Full containers can be placed in the waste facility in Emerson E133.

Methods for Deactivating Small Quantities of Selected Reactive Materials

(Source: Prudent Practices in the Laboratory: Handling and Disposal of Chemicals, National Research Council, 1995. For additional details and procedures – see http://www.netlibrary.com/Details.aspx?ProductId=969)

General remarks:

All described procedures should be carried out in a fume hood. Use additional shielding as indicated. Proper personal protection (lab coat, safety glasses and appropriate gloves) must be worn. Please consult the primary literature and your research advisor for details on protocols for the proper handling of waste product not listed here.

Alkali metals

Alkali metals react violently with water, with common hydroxylic solvents, and with halogenated hydrocarbons. They should always be handled in the absence of these materials. The metals are usually destroyed by controlled reaction with an alcohol. The final aqueous alcoholic material can usually be disposed of with the solvent waste.

Waste **sodium** is readily destroyed with 95% ethanol. The procedure is carried out in a three-necked, round-bottomed flask equipped with a stirrer, dropping funnel, condenser, and heating mantle. Solid sodium should be cut into small pieces with a sharp knife while wet with a hydrocarbon, preferably mineral oil, so that the unoxidized surface is exposed. A dispersion of sodium in mineral oil can be treated directly. The flask is flushed with nitrogen and the pieces of sodium placed in it. Then 13 mL of 95% ethanol per gram of sodium are added at a rate that causes rapid refluxing. (CAUTION: Hydrogen gas is evolved and can present an explosion hazard. The reaction should be carried out in a hood, behind a shield, and with proper safeguards (such as in Chapter 5, sections 5.G.4 and 5.G.5) to avoid exposing the effluent gas to spark or flame. Any stirring device must be spark-proof.) Stirring is commenced as soon as enough ethanol has been added to make this possible. The mixture is stirred and heated under reflux until the sodium is dissolved. The heat source is removed, and an equal volume of water added at a rate that causes no more than mild refluxing. The solution is then cooled, neutralized with 6 M sulfuric or hydrochloric acid and added to the solvent waste.

To destroy metallic **potassium**, the same procedure and precautions as for sodium are used, except that the less reactive t-butyl alcohol is used in the proportion of 21 mL/g of metal. (CAUTION: Potassium metal can form explosive peroxides. Metal that has formed a yellow oxide coating from exposure to air should not be cut with a knife, even when wet with a hydrocarbon, because an explosion can be promoted.) If the potassium is dissolving too slowly, a few percent of methanol can be added gradually to the refluxing t-butyl alcohol. Oxide-coated potassium sticks should be put directly into the flask and decomposed with t-butyl alcohol. The decomposition will require considerable time because of the low surface/volume ratio of the metal sticks.

Lithium metal can be treated by the same procedure, but using 30 mL of 95% ethanol per gram of lithium. The rate of dissolution is slower than that of sodium.

Hydrides

$LiAlH_4$ To the hydride solution in a flask equipped with a stirrer, ethyl acetate is added slowly. The mixture sometimes becomes so viscous after the addition that stirring is difficult and additional solvent may be required. When the reaction with ethyl acetate has ceased, a saturated aqueous solution of ammonium chloride is added with stirring. The mixture separates into an organic layer and an aqueous layer containing inert inorganic solids. The upper, organic layer should be separated and disposed of as a flammable liquid. The lower, aqueous layer can be disposed of aqueous waste.

$NaBH_4$ Sodium borohydride is so stable in water that a 12% aqueous solution stabilized with sodium hydroxide is sold commercially. In order to effect decomposition, the solid or aqueous solution is added to enough water to make the borohydride concentration less than 3%, and then excess equivalents of dilute aqueous acetic acid are added dropwise with stirring under nitrogen.

KH / NaH Potassium and sodium hydride in the dry state are pyrophoric, but they can be purchased as a relatively safe dispersion in mineral oil. Either form can be decomposed by adding enough dry hydrocarbon solvent (e.g., heptane) to reduce the hydride concentration below 5% and then adding excess t-butyl alcohol dropwise under nitrogen with stirring. Cold water is then added dropwise, and the resulting two layers are separated. The organic layer can be disposed of as a flammable liquid. The aqueous layer can often be neutralized and disposed of as solvent waste.

CaH_2 Calcium hydride, the least reactive of the materials discussed here, is purchased as a powder. It is decomposed by adding 25 mL of methyl alcohol per gram of hydride under nitrogen with stirring. When reaction has ceased, an equal volume of water is gradually added to the stirred slurry of calcium methoxide. The mixture is then neutralized with acid and disposed of as solvent waste.

Lewis Acids / reactive metal halides

BF_3-Et_2O Wear rubber gloves and eye protection. In the fume hood pour the boron trifluoride complex into a large evaporating dish. Cautiously cover the boron trifluoride complex with excess solid soda ash or calcium carbonate. When the reaction has subsided, very slowly add the mixture to a pail of cold water. Allow to stand 24 hours. Test the pH of the solution and neutralize if necessary. Remove waste to the waste disposal facility.

Liquid halides, such as **$TiCl_4$** and **$SnCl_4$**, can be added to well-stirred water in a round-bottomed flask cooled by an ice bath as necessary to keep the exothermic reaction under control. It is usually more convenient to add solid halides, such as $AlCl_3$ and $ZrCl_4$, to stirring water and crushed ice in a flask or beaker. The acidic solution can be neutralized and removed to the waste facility.

Halides and Acid Halides of Nonmetals

Halides and acid halides such as **PCl_3, PCl_5, $SiCl_4$, $SOCl_2$, SO_2Cl_2,** and **$POCl_3$** are water-reactive. The liquids can be hydrolyzed conveniently using 2.5 M sodium hydroxide by the procedure described earlier for acyl halides and anhydrides. These compounds are irritating to the skin and respiratory passages and, even more than most chemicals, require a good hood and skin protection when handling them. Moreover, PCl_3 may give off small amounts of highly toxic phosphine (PH_3) during hydrolysis.

Sulfur monochloride (S_2Cl_2) is a special case. It is hydrolyzed to a mixture of sodium sulfide and sodium sulfite, so that the hydrolyzate must be treated with hypochlorite as described earlier for sulfides before it can be disposed of as aqueous waste.

The solids of this class (e.g., PCl_5) tend to cake and fume in moist air and therefore are not conveniently hydrolyzed in a three-necked flask. It is preferable to add them to a 50% excess of 2.5 M sodium hydroxide solution in a beaker or wide-mouth flask equipped with a stirrer and half-filled with crushed ice. If the solid has not all dissolved by the time the ice has melted and the stirred mixture has reached room temperature, the reaction can be completed by heating on a steam bath, and then the acidic solution neutralized and disposed of as aqueous waste.

Acids and Bases

Neutralization of acids and bases (corrosives) is generally exempt from a RCRA treatment permit if done within their waste container. However, because the products of the reaction are often disposed of in the sanitary sewer, it is important to ensure that hazardous waste such as toxic metal ions is not a part of the effluent.

In most laboratories, both waste acids and waste bases are generated, and so it is most economical to collect them separately and then neutralize one with the other. If additional acid or base is required, sulfuric or hydrochloric acid and sodium or magnesium hydroxide, respectively, can be used.

If the acid or base is highly concentrated, it is prudent to first dilute it with cold water (adding the acid or base to the water) to a concentration below 10%. Then the acid and base are mixed, and the additional water is slowly added when necessary to cool and dilute the neutralized product. The concentration of neutral salts disposed of in the sanitary sewer should generally be below 1%.

Thiols and Sulfides

Small quantities of thiols (mercaptans) and sulfides can be destroyed by oxidation to a sulfonic acid with sodium hypochlorite. If other groups that can be oxidized by hypochlorite are also present, the quantity of this reagent used must be increased accordingly.

Thiols: Five hundred milliliters (0.4 mol, 25% excess) of commercial hypochlorite laundry bleach (5.25% sodium hypochlorite) is poured into a 5-L three-necked flask located in a fume hood. The flask is equipped with a stirrer, thermometer, and dropping funnel. The thiol (0.1 mol) is added drop wise to the stirred hypochlorite solution, initially at room temperature. A solid thiol can be added gradually through a neck of the flask or can be dissolved in tetrahydrofuran or other appropriate non-oxidizable solvent and the solution added to the hypochlorite. (The use of tetrahydrofuran introduces a flammable liquid that could alter the final disposal method.) Traces of thiol can be rinsed from the reagent bottle and dropping funnel with additional hypochlorite solution. Oxidation, accompanied by a rise in temperature and dissolution of the thiol, usually starts after a small amount of the thiol has been added. If the reaction has not started spontaneously after about 10% of the thiol has been added, addition is stopped and the mixture warmed to about 50 °C to initiate this reaction. Addition is resumed only after it is clear that oxidation is occurring. The temperature is maintained at 45 to 50 °C by adjusting the rate of addition and using an ice bath for cooling if necessary. Addition requires about 15 minutes. If the pH drops below 6 because of generation of the sulfonic acid, it may be necessary to add some sodium hydroxide or additional bleach because hypochlorite is destroyed under acidic conditions.

Stirring is continued for 2 hours while the temperature gradually falls to room temperature. The mixture should be a clear solution, perhaps containing traces of oily by-products. The reaction mixture can usually be disposed of as aqueous waste. The un-reacted laundry bleach need not be decomposed.

(Because sodium hypochlorite solutions deteriorate on storage, it is advisable to have relatively fresh material available. A 5.25% solution of sodium hypochlorite has 25 g of active chlorine per liter. If determination of the active hypochlorite content is justified, it can be accomplished as follows. Ten milliliters of the sodium hypochlorite solution is diluted to 100.0 mL, and then 10.0 mL of this diluted reagent is added to a solution of 1 g of potassium iodide and 12.5 mL of 2 M acetic acid in 50 mL of distilled water. Using a starch solution as indicator, titrate the solution with 0.1 N sodium thiosulfate. One milliliter of titrant corresponds to 3.5 mg of active chlorine. A 5.25% solution of sodium hypochlorite requires approximately 7 mL of titrant.)

Calcium hypochlorite may be used as an alternative to sodium hypochlorite and requires a smaller volume of liquid. For 0.1 mol of thiol, 42 g (25% excess) of 65% calcium hypochlorite (technical grade) is stirred into 200 mL of water at room temperature. The hypochlorite soon dissolves, and the thiol is then added as in the above procedure.

Laboratory glassware, hands, and clothing contaminated with thiols can be deodorized by a solution of Diaperene®, a tetraalkylammonium salt used to deodorize containers in which soiled diapers have been washed.

Small amounts of **sulfides**, RSR', can be oxidized to sulfones (RSO_2R') to eliminate their disagreeable odors. The hypochlorite procedure used for thiols can be employed for this purpose, although the resulting sulfones are often water-insoluble and may have to be separated from the reaction mixture by filtration.

Small amounts of the inorganic sulfides, sodium sulfide or potassium sulfide, can be destroyed in aqueous solution by sodium or calcium hypochlorite using the procedure described for oxidizing thiols.

Acyl Halides and Anhydrides

Acyl halides, sulfonyl halides, and anhydrides react readily with water, alcohols, and amines. They should never be allowed to come into contact with waste that contains such substances. Most compounds in this class can be hydrolyzed to water-soluble products of low toxicity.

Procedure for hydrolyzing RCOX, RSO_2X, or $(RCO)_2O$:

A 1-L three-necked flask equipped with a stirrer, dropping funnel, and thermometer is placed on a steam bath in a hood, and 600 mL of 2.5 M aqueous sodium hydroxide (1.5 mol, 50% excess) are poured into the flask. A few milliliters of the acid derivative are added drop wise with stirring. If the derivative is a solid, it can be added in small portions through a neck of the flask. If reaction occurs, as indicated by a rise in temperature and dissolution of the acid derivative, addition is continued at such a rate that the temperature does not rise above 45 °C. If the reaction is sluggish, as may be the case with less soluble compounds such as p-toluenesulfonyl chloride, the mixture is heated before adding any more acid derivative. When the initial added material has dissolved, the remainder is added drop wise. As soon as a clear solution is obtained, the mixture is cooled to room temperature, neutralized to about pH 7 with dilute hydrochloric or sulfuric acid, and disposed of as aqueous waste.

Many aldehydes are respiratory irritants, and some, such as formaldehyde and acrolein, are quite toxic. There is sometimes merit in oxidation of aldehydes to the corresponding carboxylic acids, which are usually less toxic and less volatile.

Amines

Acidified potassium permanganate efficiently degrades aromatic amines. Diazotization followed by hypophosphorus acid protonation is a method for deamination of aromatic amines, but the procedure is more complex than oxidation.

Procedure: A solution of 0.01 mol of aromatic amine in 3 L of 1.7 N sulfuric acid is prepared in a 5-L flask; 1 L of 0.2 M potassium permanganate is added, and the solution allowed to stand at room temperature for 8 hours. Excess permanganate is reduced by slow addition of solid sodium hydrogen sulfite until the purple color disappears. The mixture is then removed to the waste room.

Organic Peroxides and Hydroperoxides

(CAUTION: Peroxides are particularly dangerous. These procedures should be carried out only by knowledgeable laboratory workers.) Peroxides can be removed from a solvent by passing it through a column of basic activated alumina, by treating it with indicating Molecular Sieves®, or by reduction with ferrous sulfate. Although these procedures remove hydroperoxides, which are the principal hazardous contaminants of peroxide-forming solvents, they do not remove dialkyl peroxides, which may also be present in low concentrations. Commonly used peroxide reagents, such as acetyl peroxide, benzoyl peroxide, t-butyl hydroperoxide, and di-t-butyl peroxide, are less dangerous than the adventitious peroxides formed in solvents.

Removal of peroxides with alumina:

A 2 x 33 cm column filled with 80 g of 80-mesh basic activated alumina is usually sufficient to remove all peroxides from 100 to 400 mL of solvent, whether water-soluble or water-insoluble. After passage through the column, the solvent should be tested for peroxide content. Peroxides formed by air oxidation are usually decomposed by the alumina, not merely absorbed on it. However, for safety it is best to slurry the wet alumina with a dilute acidic solution of ferrous sulfate before it is discarded.

Removal of peroxides with Molecular Sieves®:

Reflux 100 mL of the solvent with 5 g of 4- to 8-mesh indicating activated 4A Molecular Sieves® for several hours under nitrogen. The sieves are separated from the solvent and require no further treatment because the peroxides are destroyed during their interaction with the sieves.

Removal of peroxides with ferrous sulfate:

A solution of 6 g of $FeSO_4$ $7H_2O$, 6 mL of concentrated sulfuric acid, and 11 mL of water is stirred with 1 L of water-insoluble solvent until the solvent no longer gives a positive test for peroxides. Usually only a few minutes are required.

Diacyl peroxides can be destroyed by this reagent as well as by aqueous sodium hydrogen sulfite, sodium hydroxide, or ammonia. However, diacyl peroxides with low solubility in water, such as dibenzoyl peroxide, react very slowly. A better reagent is a solution of sodium iodide or potassium iodide in glacial acetic acid.

Procedure for destruction of diacyl peroxides:

For 0.01 mol of diacyl peroxide, 0.022 mol (10% excess) of sodium or potassium iodide is dissolved in 70 mL of glacial acetic acid, and the peroxide added gradually with stirring at room temperature. The solution is rapidly darkened by the formation of iodine. After a minimum of 30 minutes, the solution is removed to the waste.

Most dialkyl peroxides (ROOR) do not react readily at room temperature with ferrous sulfate, iodide, ammonia, or the other reagents mentioned above. However, these peroxides can be destroyed by a modification of the iodide procedure.

Procedure for destruction of dialkyl peroxides:

One milliliter of 36% (w/v) hydrochloric acid is added to the above acetic acid/potassium iodide solution as an accelerator, followed by 0.01 mol of the dialkyl peroxide. The solution is heated to 90 to 100 °C on a steam bath over the course of 30 minutes and held at that temperature for 5 hours.

Metal Azides

Heavy metal azides are notoriously explosive and should be handled by trained personnel. Silver azide (and also fulminate) can be generated from Tollens reagent, which is often found in undergraduate laboratories. Sodium azide is explosive only when heated to near its decomposition temperature (300 °C), but heating it should be avoided. Sodium azide should never be flushed down the drain. This practice has caused serious accidents because the azide can react with lead or copper in the drain lines to produce an azide that may explode. It can be destroyed by reaction with nitrous acid:

Procedure for destruction of sodium azide:

The operation must be carried out in a hood because of the formation of toxic nitric oxide. An aqueous solution containing no more than 5% sodium azide is put into a three-necked flask equipped with a stirrer and a dropping funnel. Approximately 7 mL of 20% aqueous solution of sodium nitrite (40% excess) per gram of sodium azide is added with stirring. A 20% aqueous solution of sulfuric acid is then added gradually until the reaction mixture is acidic to litmus paper. (CAUTION: The order of addition is essential. Poisonous, volatile hydrazoic acid (HN_3) will evolve if the acid is added before the nitrite.) When the evolution of nitrogen oxides ceases, the acidic solution is tested with starch iodide paper. If it turns blue, excess nitrite is present, and the decomposition is complete. The reaction mixture is washed down the drain.

Metal Catalysts

Raney nickel and **copper** catalysts can be slurried into water; dilute hydrochloric acid is then added carefully until the solid dissolves. Following careful neutralization with sodium hydroxide solution, the waste can be discarded in the sanitary sewer.

Palladium on carbon, **tungsten**, and **molybdenum** catalysts can be filtered off over silica gel and disposed in the silica gel waste.

Chromium, **cadmium**, and **osmium** and waste material containing these substances are collected separately by placing the solid waste in an appropriate, clearly labeled, container. Filled waste containers can be deposited in the waste facility in Emerson E133.

Mercury spills can be avoided by using supplies and equipment that do not contain mercury. However, most mercury spills do not pose a high risk.

The initial response to a spill of elemental mercury should be to isolate the spill area and begin the cleanup procedure. Those doing the cleanup should wear protective gloves. The cleanup should begin with collecting the droplets. The large droplets can be consolidated by using a scraper or a piece of cardboard, and the pool of mercury removed with a pump or other appropriate equipment. For cleaning up small mercury droplets, use wet toweling, which consolidates the small droplets to larger pieces, or picked up with a piece of adhesive tape.

Commercial mercury spill cleanup sponges and spill control kits are available. The common practice of using sulfur should be discontinued because the practice is ineffective and the resulting waste creates a disposal problem. The mercury should be placed in a thick-wall high-density polyethylene bottle and transferred to a central depository for reclamation. After a mercury spill the exposed work surfaces and floors should be decontaminated by using an appropriate decontamination kit.

Unknown Chemicals

Before disposing of laboratory waste, its hazard class must be identified so that it can be transported and disposed of safely and in accordance with regulatory standards. 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. If required, 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 the Chemical Waste Program 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 (see Appendix II) and complete the form, recording your observations and any known history of the material as requested. Retain one copy of the completed form and submit a second copy to the Chemical Waste Program at the following address: