SOP For Disposal and Liquid Waste

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STANDARD OPERATING PROCEDURES

SOP For Disposal & Liquid Waste

Sharps contaminated with Biological Waste

Sharps are items that are capable of puncturing, cutting or abrading the skin, e.g., needles, scalpel blades, slides and cover slips. Sharps are deactivated by autoclaving. Place sharps in a container that is red, rigid, puncture resistant, leak-proof and labelled with the biohazard symbol.

- Autoclave your sharps container for a minimum of 30 minutes at 121°C and 15psi
- Log the autoclave run duration, quantity of processed waste, date, and operator
- Label the sharps container with the words "autoclaved"
- Deface any biohazard symbols
- Dispose of the container:

a) Submit an authorized agency, Note on the request that the container has been autoclaved.

b) Leave your autoclaved container collection point to pick up by agency.

Liquid Waste

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Liquid wastes, e.g., cell culture media and serum, are deactivated either by autoclaving or chemical disinfection. Most liquid wastes can be deactivated with bleach.

- Chemically disinfect with a 1:10 final dilution (vol/vol) of household bleach
- Swirl flask contents and allow a contact time of 30 minutes
- Pour down a sink drain connected to the campus sewage system and flush the plumbing with an excess of water. Alternatively, liquid waste may be autoclaved for 30 minutes at 121°C and 15psi.

Solid Waste

- Solid biological waste, e.g., pipettes, tissue culture flasks, and multiple well plates, is typically deactivated by autoclaving:
- Collect solid biological waste directly into autoclavable bags
- Tie a knot using the upper third of the bag and affix heat sensitive indicator tape near the knot
- Use a secondary container for all autoclave bags until disposal
- Ensure the autoclave operates for 30 minutes at 121°C and 15psi
- Log the autoclave run duration, quantity of processed waste, date, and operator
- Deposit the bag in the red-lidded totes designated for laboratory waste

List of Do's and Don'ts

Do's

- Access to the laboratory is limited or restricted when experiments are in progress.
- Should use mechanical pipetting devices.
- Should wash hand after handling the material and before the existing the laboratory.
- Should wipe the bench with a cleaning agent.

Don'ts

- Do not do mouth pipetting.
- Do not eat, drink, smoke, and not apply cosmetics in the work area.
- All other tubes and tips used in the project do not come in contact with the bacteria.

SOP For hazardous waste & hazardous chemicals

What is Hazardous?

This section will help you identify hazardous chemicals. The Indiana Department of Environmental Management (IDEM) and the U.S. Environmental Protection Agency (EPA) considers chemical waste hazardous if it: - exhibits certain hazardous characteristics, or - is a listed hazardous chemical.

1.1.1 Hazardous Characteristics Chemicals which have the following four characteristics are considered to be hazardous by the EPA:

- **IGNITABILITY** A liquid which has a flash point of less than 60 deg C is considered ignitable by the EPA. This includes almost all organic solvents. Some examples are: Ethyl ether, Methanol, Ethanol, Acetone, Toluene, Benzene, Pentane, Hexane, Skelly B, Xylene, Formaldehyde, Heptane, Ethyl Acetate, Petroleum Ether Instructions for the disposal of organic solvents.
- **CORROSIVITY** An aqueous solution having a pH of less than or equal to 2, or greater than or equal to 12.5 is considered corrosive by the EPA. Instructions for the disposal of concentrated solutions of acids or bases. Corrosive materials also include thionyl chloride, solid, sodium hydroxide and other nonaqueous acids or bases.
- **REACTIVITY** Chemicals that react violently with air or water are considered reactive by the EPA. An example is sodium metal. Reactive materials also include strong oxidizers, such as perchloric acids, and chemicals capable of detonation when subjected to an initiating source, such as old picric acid and phosphorous. Solutions of cyanide or sulfide that could generate toxic gases are also classified as a reactive by EPA.

- **TCLP TOXICITY TCLP** is a laboratory test to determine leaching. Chemicals characterized as toxic by the EPA may leach into the groundwater if improperly managed. EP toxic wastes include concentrated toxic metal solutions and the following list of pesticides: Endrin Lindane 2,4-D Methoxychlor Toxaphene 2,4,5-TP Silvex Any chemical with an LD50 less than 500 mg/kg or is a carcinogen, mutagen or, teratogen eg. Furadan Oral LD50 (human) 11 mg/kg or Osium tetraoxide Oral LD50 (rat) 14 mg/kg.

1. AQUEOUS SOLUTIONS OF CHEMICALS LISTED UNDER "CHEMICALS FOR THE NORMAL TRASH"

2. VERY DILUTE AQUEOUS SOLUTIONS OF WATER-SOLUBLE ORGANIC SOLVENTS.

3. CONCENTRATED SOLUTIONS OF ACIDS OR BASES This section explains the disposal of concentrated solutions of acids, such as hydrochloric, sulfuric, and nitric and bases such as ammonium hydroxide. These solutions should be neutralized in the laboratory as described in Section 1.5 below. You should take special care when neutralizing strongly oxidizing acids such as perchloric acid and fresh chromic acid, so call RMS for additional instructions.

1.2.1 General Neutralization Procedures CAUTION: FUMES AND HEAT ARE GENERATED

1. Do your neutralizations in a well-ventilated hood and behind a safety shield.

2. Keep containers cool while neutralizing.

3. You should be wearing an apron, goggles, and gloves.

4. Perform all steps SLOWLY.

5. Neutralize concentrated solutions of acids and bases to within a pH range of greater than 2 and lower than 12.5 and then flush them into the sanitary sewer with at least twenty (20) parts of water.

1.2.2 Acid Neutralization While stirring, add acids to large amounts of an ice-water solution of base such as sodium carbonate (soda ash), calcium hydroxide (slaked lime), or 8M sodium

hydroxide (for concentrated acids). When a pH above 2 is achieved, dispose of the solution into the sewer system followed by twenty (20) parts of water.

1.2.3 Base Neutralization Neutralize by first adding the base to a large vessel containing water. Slowly add a 1M solution of HCL. When a pH of 12.5 is achieved, dispose of into the sewer system followed by twenty parts of water.

1.2.4 Chromic Acid 1. Alternatives to Chromic Acid Cleaning Solutions Chromic acid is a powerful oxidizing agent. It is both toxic and corrosive and can explode on contact with organic materials. Users of chromic acid cleaning solutions on campus have suffered burns to both skin and clothing. We urge you to consider the alternatives listed on the next page that clean satisfactorily and are less toxic.

1.3.1 Organic Solvents Place your organic solvents in glass bottles or carboys the solvents originally came in or in ones provided by RM&S. Don't put them in the sewer. Halogenated solvents (e.g., chloroform, carbon tetrachloride and dichloromethane) and their mixtures should be kept separate as they are more difficult to dispose of. Be sure to deface or remove original label and attach Chemical Discard tag to bottle. Call RM&S and we'll pick up your spent organic solvents and their associated organic solutes. When we pick up the solvents, the contents will then be commingled in 55 gallon drums and shipped off campus for incineration. We have to pump the contents, so they must be fluid and not contain any solids, precipitates or residues. 1. Substances That Should Not Be Put Into Solvent Waste Containers The following substances are inappropriate for incineration. Don't put them into your organic waste containers. They should be collected in separate containers. Solutions of acids or bases Aqueous solutions of toxic organic chemicals.

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Hazardous Chemicals and Alternative Disposal Options

Benzene -Dissolve or mix with flammable solvent and then burn in pit or trench in an area at least 10 meters away from combustible material or in a 45/55- gallon drum (use slow burning to ignite).

Phenol - Low levels of solid waste (e.g. gels, contaminated paper towels etc) should be placed into a suitable, leak-tight container and then into a yellow bag and treated as clinical waste for incineration.

Phenol/chloroform - mixtures can be treated as halogenated waste solvent and disposed of accordingly Incineration is the recommended method of disposal. Dissolve the phenol with a combustible solvent and burn in chemical incinerator equipped with an afterburner or scrubber Aqueous solutions or buffer containing phenol may be disposed of in shatter proof bottle using the carrier. Low levels of solid waste (e.g. gels, contaminated paper towel) should be placed into suitable, leak-tight container and then into a yellow bag and treated as clinical waste for incineration.

If phenol waste is the solid waste form, it should be disposed buy making packages of phenol in paper or other flammable material and burning in suitable combustion chamber. If it is in a liquid form, by absorbing it in vermiculite, dry sand, earth or similar material and disposing in a secured sanitary landfill or atomizing in a suitable combustion chamber.

Compounds - Dilute the alkali 1 to 10 times with water (diluted alkalis are less dangerous). Select an acidic material. Strong acids (e.g., hydrochloric acid, sulphuric acid) must be diluted 1:10 or greater prior to utilization.

Inorganic peroxides - Add oxidizing agent to a large volume of a concentrated solution of sodium hypo-bisulfite (sodium metabisulfite) or a ferrous salt. Acidify with dilute Sulphuric acid. When reduction is complete (i.e., when heat generation stops), neutralize the solution with soda ash or dilute hydrochloric acid. Dispose off in sewersystem with a large amount of excess water.

Acidic halides - To a large container, containing an excess of sodium bicarbonate (or sodium carbonate, or calcium carbonate), slowly add in the organic acid halide, and mix thoroughly.Dilute with water until pH of approximately 6-8 is obtained, let it stand 24 hours. Handover to a Common Effluent Treatment Plant (CETP) for treatment purposes or treat the waste as per the discharge norms prescribed for CETP. Always remember that organic halides may react violently with water. Take necessary precautions while diluting with water (wear PPE, maintain safe distance, keep first aid kit handy etc.)

Inorganic acids - Dilute acids 1 to 10 with water (dilute acids are less dangerous). Dilution should always be by adding acid to water (until fizzing stops), but not water to acid which should be strictly avoided Select a basic material, such as sodium bicarbonate, potassium bicarbonate, calcium bicarbonate, limestone. Strong bases (e.g., sodium hydroxide and potassium hydroxide) must be diluted 1:10 times with water prior to utilization.

Aqueous solutions of water-miscible flammable organic solvents (e.g., solutions of less than 18% acetone, ethanol, methanol and other water-soluble and water-miscible solvents_Add solution to an available flammable solvent (acetone, acetonitrile, benzene, etc of flammability rating 2 or 3). Burn in pit or trench, in an area 10 meters away from any combustible material, or in a 45/55-gallon drum (use slow burning fuse to ignite).

Iodine - In the fume hood, if possible, cautiously add iodine to a solution of sodium thiosulfate (300 ml of 4%) containing sodium carbonate (0.1 g). Stir until all of the iodine has dissolved (solution becomes colorless).

Neutralize to a maximum pH of 8.5 with sodium carbonate (if pH larger than 9, iodine will re-dissolve).

When reduction is complete, add sodium carbonate or dilute hydrochloric acid to neutralize the solution.

Handover to a Common Effluent Treatment Plant (CETP) for treatment purposes or treat the waste as per the discharge norms prescribed for CETP.

Sodium Hypochlorite - To the sodium hypochlorite solution, add a large excess of a bisulfite or a ferrous salt and acidify with dilute Sulphuric acid.

When the reduction is complete, add soda ash or dilute hydrochloric acid to neutralize the solution.

Handover to a Common Effluent Treatment Plant (CETP) for treatment purposes or treat the waste as per the discharge norms prescribed for CETP.

Disposals of hazardous chemical wastes: Do's and Don'ts

Do's

- Wear safety equipment like gloves, boots, goggles, overalls, aprons, while handling the chemicals.
- Always have a second person to assist, while handling the chemicals.
- Read all labels prior to handling or moving chemicals.
- Label chemicals clearly with permanent stickers.
- Segregate waste as hazardous and non-hazardous waste.
- Always dilute acids at a ratio of approximately 1:10 prior to neutralization.

Don'ts

- Don't mix unknown chemicals together and dispose.
- Don't store/ keep chemicals on floor.
- Don't use the chemicals from unlabeled containers.
- Don't eat, drink, gum chewing, during the disposal process.
- Don't sweep spilled chemicals with broom.
- Don't dump cloth soaked in spilled chemicals in waste bin.
- Don't use mobile phone while handling disposals.

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SOP For Laboratory/R&D Centre/Centre of Excellence

- Research labs and centre of excellence facility is available for all researchers on prior information.

- The Researchers should handle the Instruments at Laboratory/R&D Centre/Centre of Excellence as per the SOP

- Before operating the instrument entry should be made in the Instrument LOG book.

- Required chemicals, glass wares should be procured from the store and used as per guidelines

- While using LAF/Bio-safety cabinet, standard protocol should be followed, proper PPE kit/LAB coat, HEAD MASK, GLOUSE should be used as per SOP

- While handling Microorganisms, proper entry should be made in log book, purpose of usage, supervisor details should be made available to the LAB In-charge.

- After experimentation disposal of the used media, reaction mixtures should be disposed as per SOP and should be reported to LAB In-charge.

- Before using pathogenic organism for experimentation, authorisation from Head of the Institute, HOD, LAB in-charge is mandatory.

- While using hazardous chemicals proper SOP should be followed

- Ensure, glass wares, chemicals, reagents, instruments and any other materials used in the centre should be replaced in right position

- If you are using any Biological sample, ensure proper BIOSAFETY procedure is followed for handling and disposing.

- While using systems in the Labs, ensure that systems are used with admin permission.

- No new software should be installed/deleted

- No gadgets are allowed in the labs
- Pirated softwares should not be installed
- In Circuit labs proper care should be taken while using Electronic instruments
- Instruments should be switched on and off as per SOP
- Proper Safety measures should be followed in case of Emergency

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