Laboratory Safety Guidelines for Science Departments of Patharkandi College

Prepared by Research and Development Cell,
Patharkandi College

Approved
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Introduction:

Considerations for health, safety, and security are equally crucial to the teaching of science to pupils as any other subject. A constant threat to one's health and the environment is there while working with chemicals, bacteria, etc. The responsibility to maintain lab-specific safety information and documentation is critical because every lab is unique and processes change with new student arrival. Documenting information specific to the lab is the Head of Department's / Lab in-charge's responsibility. When new processes are added, when current processes change considerably, or at least once a year, lab-specific information must be evaluated and authorized by the Departmental Safety Committee or Governing Body.

This guideline book aims to increase laboratory workers' understanding of safety issues and to promote safe working procedures. These succinct instructions, which are applicable to all laboratory users, should serve as a reminder of the steps you can take to perform more safely.

The guidelines and recommendations in this Laboratory Safety Guidelines won't fully protect you unless you put effort into your everyday tasks or at least take a break from them occasionally to look around.

One can maintain complete cleanliness when working with chemicals by following some rules and acting responsibly. Here are a few rules to follow in order to protect our PKDC fraternity, and its properties as well.

General Laboratory Protocols

Basic Rules

- Safety goggles are required for all lab personnel.
- Lab personnel shouldn't work by themselves there.
- Everyone should wear lab coats and full pants when working in the lab.
- Lab coats are not permitted in public spaces such as the cafeteria, restrooms, etc.
- Lab personnel should be familiar with where laboratory safety equipment is located and how to use it
- Become familiar with the building's and laboratory's exits
- Using blast shields while performing potentially hazardous reactions is highly advised (such as dealing with peroxides, diazo-compounds, high pressure vessels, distillation of high boiling substances)
- When working in the lab, gloves must be worn; they must be taken off before touching surfaces outside the work area (i.e., doorknobs, computers etc).
- Shoes with suitable heel heights should entirely enclose the feet.
- Avoid wearing half pants or shorts and open-toed sandals in the lab

Good Personal Habits & Behavior

- Students should always conduct themselves professionally.
- It is not permissible to eat, drink, chew gum, or use tobacco in the lab.
- It is strictly forbidden to use a cell phone in the lab.
- Do not smell or taste chemicals. Do not utilise ice from the ice makers for laboratory use for beverages, food, or food storage.
- Students and researchers should speak with the appropriate PI or lab manager before handling any unfamiliar chemicals or biological samples.

- Avoid coming into contact with chemicals on your skin.
- Before leaving the lab, hands should be completely cleansed.

Housekeeping

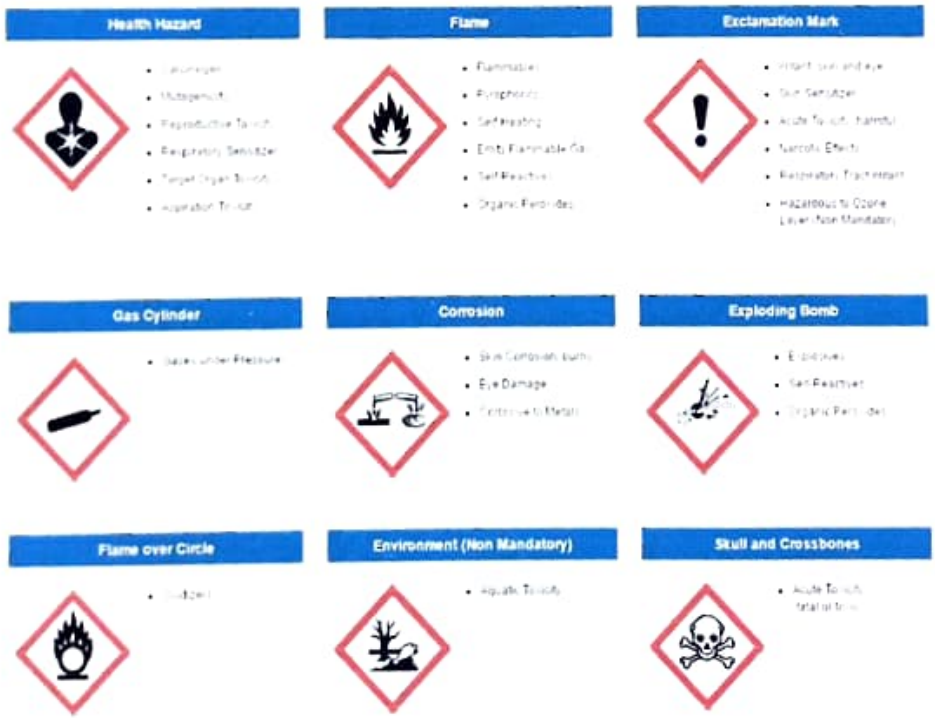
- Lab spaces must be kept tidy and free of clutter.
- Spills need to be cleaned up right away from flooring and work spaces.
- Before requesting repair or calibration services, equipment and instrumentation must be cleaned to remove spills and contaminants.
- Personnel within fume hoods must be able to see clearly through the protective glass sashes.
- Check aisles, exits, and corridors for anything that could cause slipping or tripping risks (e.g., boxes, electrical cords or other items on the floor).
- Ensure that none of the following are blocked:
    - Eyewash/safety showers
    - Electrical panels
    - Fire extinguishers
    - Chemical storage cabinets
    - Fume hoods
    - Waste containers

Possible ways to avoid clutters in Labs

- Researchers, students, and visitors are all at risk for many types of safety dangers in congested laboratories. The following are some typical techniques for reducing clutter in laboratories:
- Dispose of chemicals and outdated equipment in a responsible manner.
- Before acquiring chemicals in bulk, inquire about their availability in other concerned labs. • Do not purchase chemicals, solvents, or other stocks in bulk unless there is space available to safely store the commodity. The lab inventory created by each lab should be reviewed by the students.
- Schedule "lab cleanup days" on a regular basis.
- Clear away any debris from fume hoods and make sure they aren't being used as long-term storage for tools, chemicals, or supplies that aren't frequently used there.
- Regularly empty containers containing waste (including trash), and never let them overflow.
- Store extra items neatly and securely so that they are easy to access and have a lower chance of rolling, falling, or spreading.
- Chemical equipment, supplies, and containers should not be kept close to the edges of benches or shelves, and overhead storage should only be used for lightweight, non-hazardous products.
- Never place chemical containers on top of one another directly (unless they are in original cartons that may be properly stacked and/or contain chemicals that are incompatible) (such as acids with bases or flammables with oxidizers).
- Chemical storage containers shouldn't be kept on the floor. Containers should be kept in secondary containment when this cannot be avoided, such as plastic tubs.
- Use radiation tape and sorbent pads to clearly designate any portions of a bench that contain radioactive materials.
- Quickly clean up any spillage. On floors or work surfaces, never leave puddles, dust, or unidentified items.
- Extension cables and/or power strips may not be connected in a daisy chain. Keep supplies, glasses, and other items that aren't frequently used away from workstations.
- Avoid using the leg room underneath desks and benches in a way that interferes with good ergonomic posture.
- Keep your own desk and other areas tidy (free of all hazardous research materials).
- Never store hazardous chemicals in freezers that hold food. • Store lab coats and safety glasses neatly away from potential sources of contamination.
- Only use designated spaces to consume or store food. Keep the laboratory's open space large enough to handle acquisition

Globally Harmonized System

The Globally Harmonized System of Classification and Labeling of Chemicals, or GHS, is a system for defining and categorising chemical product dangers and disseminating information about their health and safety. The intention is for the classification of risks to follow a standard set of guidelines, and for labels and safety data sheets (SDS) to follow a standard format and content. It's crucial that anyone handling chemicals is aware of all the markings and symbols present on the containers. The emblem and associated warning details that are frequently seen in research labs are listed below..



GENERAL SAFETY GUIDELINES

Workers in scientific laboratories are subject to a variety of risks. The majority of workplace dangers have well-defined actions to control the situation (those of regular fire, for example). However, a wider range of potential risks exist in laboratories, and some of these risks need for special safety measures. The list below provides an introduction to safe practises for several frequently used laboratory procedures.

GENERAL SAFETY AND OPERATIONAL RULES

1. It is not allowed to sprint or jump in a lab. Access to the fire extinguisher(s), safety equipment, or other emergency supplies must not be impeded by stacked objects or equipment. Access to emergency equipment and/or exits must be maintained dry and unhindered; this means there must be no storage, equipment, phone lines, or other obstructions in these areas. No flammable items, such as paper, wooden crates, pallets, etc., should be kept in hallways or under stairwells. So that exits and regular travel routes are not obstructed, hallways must be kept clear of boxes and other objects.

2. It is forbidden to eat or drink in laboratories. In collaboration with the Safety Committee, specific office spaces in all laboratories may be set aside for food. Physical separation is required between them and any laboratory procedures. No consumables, chemicals, or tools of any kind should be shared with work areas in the designated office spaces.

3. No food or drink may be kept in the lab refrigerators and freezers or cold rooms or on the working area in lab.

4 The typical working day at Patharkandi College is from 10:00 am to 4:00 pm (Monday-Saturday). Outside of the regular working hours, no employee shall work in a laboratory or chemical storage facility by themselves. Students and staff must receive written permission from the primary investigator (PI) in charge before working outside of core hours.

5 Lab attire should provide protection from splashes and spills and be simple to take off in case of an accident. Aprons made of nonflammable, nonporous materials provide the best protection for the smallest price. To make them easier to take off, lab coats and jackets should have snap fasteners rather than buttons. When working, these coats must be tied, and they must be taken off before leaving the lab. It is strongly advised that laboratory staff refrain from wearing sandals or open-toed footwear inside the lab. Laboratory attire should be kept spotless and changed as needed. Lab coats, gloves, closed-toed shoes, and safety glasses must be used for biosafety level 2 and chemical procedures.

6 Mouth pipetting is not allowed for acid/base.

Electrical Safety

A significant portion of the laboratory is made up of electrical equipment and wiring, creating a new set of potential hazards. Regular laboratory inspections should focus especially on electrical safety.

A list of possible wiring hazard are as follows:

- Spliced cables
- Worn-out cables
- Tripping hazards from poorly draped cables near hot plates etc.
- Sliced cables near sinks or other wet locations.

Are high current or high voltage a cause for concern? Actually, it has elements of both. It may be quite safe to touch an electrical circuit that can provide significant current if the voltage is not high enough. On the other hand, you can still be safe if the voltage is very high but the supply's maximum deliverable current is very low.

The passage of charged particles is all that electricity is. It is the movement of electrons in most of our everyday settings. From a high potential to a low potential, electrons move. When you are shocked, electricity travels through your body on its way from a high potential electrical circuit to the ground.

There are electrical resistances in your body. Normal circumstances call for a distance of around 100 km from the tip of your finger to your feet. The resistance can, however, decrease to roughly one kilo-ohm if you are moist. Therefore, under typical circumstances, if you are touching a 100 V terminal, the current that can pass through your body is roughly 1 milliamp. The subsequent shock scarcely registers (see table below)! Although harmful, once the current has passed through the body, its resistance falls and additional current begins to flow. The initial current can be up to 100 mA if your body is wet, which is lethal.

You are most likely safe, though, assuming the power supply is not malfunctioning and can only give a maximum of one milliamp of current. The resulting current could be fatal if there is a problem with the power supply's grounding. Therefore, refrain from touching any electrical terminals that seem odd.

One thing to keep in mind right now is that once the electricity begins to flow through your body, your resistance will significantly drop, allowing more current to flow A description of how the human body reacts to various current levels is provided in the box below.

[Source: https://pubmed.ncbi.nlm.nih.gov/19907637]

1 mA	Barely perceptible
16 mA	Maximum current an average man can grasp and "let go"
20 mA	Paralysis of respiratory muscles
100 mA	Ventricular fibrillation threshold
2 Amps	Cardiac standstill and internal organ damage
15/20 Amps	Common fuse or breaker opens circuit*

*Contact with 20 milliamps of current can be fatal. As a frame of reference, a common household circuit breaker may be rated at 15, 20, or 30 amps.

The following symbol can be used to identify lethal voltages in the lab.

Electricity can kill. Respect it!

Handling Glassware

1. Injuries caused by broken glass frequently occur in laboratories. Use only glass that is in good condition.
2. Before shipping glassware for repair, clean it all. Before being disposed of or repaired, glass that has come into touch with infectious substances must be cleaned.
3. When installing glass tubing, wear leather gloves to protect your hands. When handling tubing, keep your elbows close to your torso to minimise movement.
4. Use glasses that are the right size. Give at least 20% of the space away. A three-neck flask should be held by the centre neck, not a side neck.
5. It is forbidden to pressurise or apply vacuum on standard laboratory glassware.

Fume Hood Safety and Ventilation

Airflow from non-laboratory regions into the laboratory and out to the building's outside must be provided through general laboratory ventilation. Except for exit and entrance, laboratory doors should always be kept closed. Every reaction needs to be carried out in a fume hood. While working in the lab, the hood sash should be kept closed or at the lowest safe height. The concerned lab supervisor should be notified of any ventilation issues or fume hood alarms so that they can submit repair requests to facilities maintenance.

Safe Handling of Chemicals

General Guidelines.

In a laboratory, working with potentially dangerous chemicals is commonplace. The utilisation of toxicological information and protocols for handling and storing chemicals is requested of all employees. The Material Safety Data Sheet has comprehensive instructions for the majority of commercially accessible chemicals (MSDS). For each lab, a hard copy of the MSDS is needed.

Gathering General Information on Chemicals

The Material Safety Data Sheet (MSDS) for the commercially available compounds you are working with explains their characteristics, reactivities, potential chemical risks, and safe

handling practises. All lab staff members must be aware of the location of the folder where these sheets are stored, which must be designated. This MSDS log needs to be updated frequently. Employees must get information from the Material Safety Data Sheets on a chemical-by-chemical basis, as required by law.

Since MSDSs are often created for chemicals used in industrial settings, some of the information inside might not be suitable to use in laboratories. The environment in which chemicals are employed in a laboratory is typically more controlled than it is in an industrial setting, and far lower amounts of the chemical are utilised at any given time. However, reading the MSDS will give you a lot of information about the risks related to laboratory chemicals.

Learn the pictograms and Hazard codes that are frequently used to indicate dangers.

PICTOGRAMS AND HAZARD CODES

Figure source: http://www.sigmaaldrich.com/sigma-aldrich/help/help-welcome/risk-and-safety-statements/risk-

Security and Risk Every user who handles chemicals during laboratory processes should be familiar with the phrases because they are frequently used. Fluka Brand F Code provides further details about chemical stability.

Handling and Transportation of Chemicals

1. Transferring chemicals from one location to another or from one container to another is a common cause of laboratory accidents. Any mishap involving the caustic, poisonous, or combustible chemicals employed in laboratories carries the risk of serious personal injury. Consequently, it is wise to treat all compounds as potentially dangerous.
2. Only one large bottle of an acid, a solvent, or other liquid should be carried at once when moving it around the lab without a trolley. Both hands should be used to hold the bottle, one on the neck and the other underneath. Avoid putting your finger through the glass ring that surrounds the bottle's top and letting it dangle while you're moving. Never pick up a bottle by the cap or carry it that way.
3. Specialized storage chambers or cabinets for corrosive materials must be used to store large amounts of concentrated mineral acids, such as sulfuric, nitric, and hydrochloric acids.

Chemical Storage

To ensure employee safety with relation to chemical compatibility, spill control, fire/explosion control, and security, proper chemical storage is required.

Chemical Spills

Any chemical could be dangerous to your health and the health of your coworkers. A calm and deliberate response is needed in the event of an accident that releases dangerous substances to stop the emergency situation from getting worse..

Therefore, it is essential to isolate the spill and/or secure the area before notifying pertinent staff of the event, if possible. This should be carried out in accordance with all information available on the chemical make-up of the spill. A laboratory coat, safety glasses, and gloves should always be utilised for personal protection.

Electrical switches should only be used to turn off motorised equipment if combustible fumes are present. If it's safe to do so, try to remove or turn off heat sources. OFFSET THE ELECTRICITY AT THE MAINS, NOT AT SWITCHES WITHIN THE LABORATORY.

Do not touch the spill without safety gear, such as gloves. Try to limit the spread or volume of the spill if there is no imminent danger to your safety. This can entail closing a door, relocating neighbouring equipment to stop contamination, turning over containers with holes in the bottom or sides, building an absorbent dike around spills, or opening the sashes on fume hoods to make it easier to remove vapours. Never assume gases or vapors do not exist or are harmless because of lack of smell.

Ventilation can be improved by fully or 12 inches opening the closed fume hood sashes. It is possible to evacuate non-toxic gases by opening exterior doors.

Utilize absorbents to gather materials. Covering the surface of a liquid spill with absorbent will lower vapour concentrations. By dredging with absorbent, the spill area can be kept from expanding.

Spilled Liquids

1. Keep the spill contained to a small area. Keep it from spreading.
2. To neutralise or combine absorbent materials with inorganic acids or bases in modest amounts, employ a neutralizer (e.g., soda ash or diatomaceous earth). Use a nonreactive substance to mop up spills involving minor quantities of other materials (such as vermiculite, clay, dry sand, or towels).
3. Flush with a lot of water if there are a lot of inorganic acids and bases (provided, the water will not cause additional damage refer to MSDS for this information). Flooding is not advised in storerooms where violent spattering could result in additional risks or in locations where there could be chemicals that react with water.
4. Clean up the mess with a mop, wringing it out in a sink or a bucket with rollers.
5. Carefully remove any splashed or submerged cartons or bottles and clean them.
6. Vacuum the area if necessary using a HEPA-filtered vacuum cleaner that has been tested

and approved for the material in question.

7 Allow the spilt material to evaporate and be exhausted by the lab hood if it is very volatile (provided that the hood is authorised for use with the spilled chemical).

Spilled Solids

Typically, low toxicity spilled solids should be collected in a dustpan and put into a container made for that chemical. When cleaning up accidents of more highly poisonous solids, extra measures may be required, such as the use of a vacuum cleaner with a HEPA filter

Use safe disposal techniques to dispose of wastes. Keeping in mind that certain goods, such as brooms, dustpans, and other personal protective equipment, can call for specific disposal techniques.

Inform the laboratory in-charge of the chemical spill in writing as specified above.

Guidelines for Phenol/Chloroform

Handle phenol or phenol/chloroform formulations only while wearing lab coats, gloves, and eye protection. These liquids must be disposed of in containers designed specifically for organic solvents.

In the chemical fume hoods in the common equipment rooms, the tubes should be collected individually and allowed to dry.

BIOLOGICAL SAFETY GUIDELINES

Wash your hands thoroughly

1. Before and after working with any biohazard
2. After removing gloves, laboratory coat, and other contaminated protective clothing
3. Before eating, drinking, smoking, or applying cosmetics
4. Before leaving the laboratory area
5. Do not touch your face when handling biological material 6.Never eat, drink, smoke, or apply cosmetics in the work area

Clothing Guidelines:

6. Always wear appropriate lab clothes and gloves when working with biological agents.
2. Wear gloves over gown cuffs.
3. Remove gloves by peeling them from the inside out.
4. Never wear contact lenses when dealing with infectious agents.
5. Do not wear potentially contaminated clothing outside the laboratory area.
6. Additional appropriate protective clothing should be selected and worn based upon the task and degree of exposure anticipated.

Handling Procedures liquid infectious materials:

7 Use mechanical pipetting device (examples; pipette aid, pipetteman or bulb).

8 Minimize aerosol generation. Decanting culture supernatants, opening of culture and streaking of plates should only be done in Safety cabinets or in a circular area around a burner of 0.5 meter radius. Decanting/Transferring of cultures in common equipment rooms outside of safety cabinets is forbidden.

9 Add disinfectant to water baths for infectious substances.

10 Use only closed tubes for centrifuging procedures. Inspect the tubes before use.

11 Use secondary leak-proof containers when transporting samples, cultures, inoculated petri dishes, and other containers of biohazardous materials within the institute.

12 Avoid using syringes and needles whenever possible. Special care has to be taken when usage of needles is not avoidable: Use a needle-locking or disposable needle unit.

- Take care not to stick yourself with a used needle.
- Place used syringes into a pan of disinfectant without removing the needles.
- Do not place used syringes in pans containing pipettes or other glassware that require sorting. Do not recap used needles.
- Dispose of needles in an approved sharps container.

Work Area Management:

13 Keep laboratory doors shut when experiments are in progress.

14 Limit access to laboratory areas when experiments involving biohazardous agents arebeing performed.

15. Ensure that warning signs are posted on laboratory doors. These signs should include theuniversal biohazard symbol and the approved biosafety level for the laboratory.

16. Transport contaminated materials in leak-proof containers.

17 Keep miscellaneous material (i.e., books, journals, etc.) away from potentially contaminated working areas.

18 Follow a rigorous disinfection plan:

- Completely decontaminate equipment before having maintenance or repair work done. Decontaminate work surfaces daily and after each spill.
- Decontaminate all potentially contaminated equipment.
- Decontamination should only be performed with these disinfection solutions such as 70%Ethanol or 5-10% Sodium hypochlorite (bleach) solutions

Safety Equipment

Safety equipment includes a variety of personal protection items and laboratory devices which provide the ability to keep infectious agents in a specified contained area that is easily accessible. The biological safety cabinet is the principal device used to provide containment of infectious aerosols generated by many laboratory procedures. Open-fronted Class I and Class II biological safety cabinets are partial containment cabinets which offer significant levels of protection to laboratory personnel and the environment when used with good microbiological techniques. As part of the individual familiarization with laboratory procedures individual PIs are asked to ensure proper handling of the Safety cabinets.

Disposal of liquid cultures:

19 All culture supernatants in conical plastic tube never more than 25ml can be disposed inthe red biohazard bin.
Tubes have to be closed but not overly tight.

20 All cultures ≥ 25ml must be put in a glass beaker or Erlenmeyer flask and treated to become 10% with bleach **in a biosafety cabinet**. Examples; 30 ml culture/3-4 ml of straight bleach, 250 ml culture/25-30 ml straight bleach, let stand at least 30 minutes. Dispose off in sink: Turn on the water faucet, pour treated culture in, keep water running for a minute or two after you have finished pouring the culture.

21 Cultures with other hazardous chemicals and/or heavy metals must be disinfected as aboveand then disposed of according to the method prescribed in the MSDS.

Guidelines for Biohazard spills

Biological spills outside biological safety cabinets will generate aerosols that can be dispersed in the air throughout the laboratory. These spills can be very serious if they involve microorganisms that require Biosafety Level II and above containment. The Biosafety lab has its own procedures to follow.

General reaction plan for a biological spill:

1 Cordon off the area to stop anyone from spreading the contamination throughout the laboratory.

2 Cleaning procedures should be started in a timely manner by a person from the lab where the spill has occurred. Before starting to clean the spill, Personal Protection Equipment (gloves, face mask, safety goggles, long sleeve lab coat and shoe covers) must be obtained and put on.

3 Disinfect the area, all surfaces using 70% Ethanol in a spray bottle. Any material used to wipe up the spill must be placed in a biohazard bag and decontaminated using an autoclave.

Decontamination should only be performed with these disinfectants: 70%Ethanol or 10% Chlorox

A. Spills on the Body

1. Remove contaminated clothing.
2. Apply disinfection solution. Vigorously wash exposed area with soap and water for one minute.
3. Obtain medical attention.
4. Report the incident to the Laboratory in-charge

B. Organism Spill decontamination procedure.

1. Wear disposable gloves.
2. Soak paper towels in disinfectant (70% ethanol or 10% chlorox) and place over spill. Allow a 30-minute contact period on the spill.
3. Place towels in a biohazard bag and decontaminate using an autoclave before disposal.
4. Clean up spill area with fresh towels soaked in disinfectant.

Waste Disposal and Management in Patharkandi College

A. Types of waste at Patharkandi College

With its usual day to day activities, following four types of waste are generated at Patharkandi College.

1. **Organic waste:** Organic materials generally make up the largest portion of waste. Organic wastes are created during every meal. Clearing of jungles, weeds and trimming of plants also produces green wastes. When properly disposed of, these materials can be picked up by trash removal services and transported to a facility where it will be turned into compost, which can actually be used as fertilizer. In some occasion this includes paper and paperboard products which cannot be used for compost production due to the presence of unwanted chemicals.
2. **Recyclables:** Recyclables are types of waste that are non-biodegradable and can be converted into reusable material. Things like plastics, metals, and glass are all harmful to the environment when placed into landfills, but proper disposal can eliminate the need to manufacture even more of these materials, which are instead be reused in more products.
3. **Toxic Chemical Waste:** This section includes EtBr removal procedure. Since it fluoresces readily with a reddish-brown colour when exposed to UV light and with increased brightness when bound to double stranded-DNA and single-stranded RNA, it is commonly used in gel electrophoresis application for visualization of these molecules. EtBr may present a hazard if it is poured down the drain untreated or placed in the trash.
4. **E-waste:** This type of waste has become far more of an issue in recent years with the

surge in technology, such as computers and other sophisticated instruments with electronic circuits. This is related to regular recyclables in that most of these products are composed of plastics, metals, and glass.

B. Procedure of waste disposal & management system

It has been decided to follow a specific and well laid down wastes collection and management system at Patharkandi College till the classified materials are disposed by the authority.

In Patharkandi College, it is decided that there will be four types of waste bins of appropriate sizes atdifferent places. These are:

1. For Bio-degradable waste.
2. Toxic Chemical Waste
3. For Plastics (all types from recyclable type 1 to 7)
4. Sharp materials like metal and glass.

C. Management of bio-degradable waste

Organic and bio-degradable wastes are produced from dry leaf of trees, vegetable waste, food material remaining etc. Effort is to be made to educate people so that they grow the habit of depositing this type of waste in the specific bin excluding food materials. Dry leaves and vegetable waste collected from these bin are to be weighed using balance and to be processed to produce vermin compost. The i/c Vermin compost unit will guide the workers for the purpose.

These bins are labelled or coloured green and to be placed in the specified areas including thePatharkandi College lobby, Canteen, laboratories and also near the staircases.

Foods remaining are to be stored in a special type of covered trench with cement lining and metal container behind the existing Canteen of Patharkandi College. Food waste from Student and Scientist Home are also to be placed here and for this special hand trolley will be provided to the caterer. After few days, when this food waste are reduced and ideal for making compost, it will be shifted to vermin compost pit for further processing.

***D.* Management of toxic chemical waste**

1. Any EtBr waste should **NOT** be poured down the drain, or thrown in the trash, unless thewaste has been deactivated or filtered.
2. Handle EtBr gels, contaminated gloves similar to chemical hazardous waste. Use sealabledisposable plastic begs to store ethidium bromide gel waste.
3. Minimize free flowing liquids in these bags when they are brought for disposal. A bin is kept for gloves and gels contaminated with EtBr.
4. The liquid EtBr waste should be collected in an appropriately labeled 2-5 ltrs glass reagent bottles. A bind-ET ethidium bromide (EtBr) removal system (Elchrom Scientific) for final disposal of liquid EtBr waste is kept near the wash basin of the laboratory. The Bind-ET™ is a closed system which removes EtBr from aqueous solutions in the safest and simplest way. The most important part of the system is an

ion exchange column with a binding capacity of more than 2g of ethidium. The aqueous solution flowing out of the column contains no detectable amount of EtBr and can be treated as normal effluent. Because it is closed, the ion exchange column can be sent for incineration. This convenient way of disposing EtBr solution is not only safe, efficient and cost effective,

but fulfils ecological demands and regulations by completely removing EtBr from solutions.

5. Caution: Gel particles in the solution (usually from the agarose gels) would clog any packed column. Make sure that the solution is poured into the reservoir through the sieve.Never change the outlet position by attaching silicon tubes to the outlet port.
6. Change the cartridge after six months of continuous use, since after six month its capacity might get exhausted. Any maintenance/ service should be performed by authorized personnel only.

   For further details please refer to the standard operating procedures developed by Dr. Debajit Thakur and group, for the Microbial Biotechnology Laboratory (LSD)

E. Management of plastic wastes

All types of recyclable plastic are to be kept in this specified bin. Waste materials collected from these bins are to be stored in the Central big size dust bin and will be transferred to the Guwahati Municipality Corporation or their assigned agency's Garbage carrying vehicle on regular basis. Security Guards who are present at the time of entrance of the Garbage carrying vehicle will be responsible to oversee proper cleaning of the bin and should take utmost care so that no waste material litter the surrounding of the bins during waste unloading the bins. The detail procedure for this part of waste disposal system will be specified later.

These bins are labelled or coloured blue and to be placed in the specified areas including the Patharkandi College lobby, Canteen, laboratories and also near the staircases.

F. Regular picking up of inadvertently littered plastics

Although, plastic littering is prohibited strictly inside the campus, few plastics found spread due to inadvertent littering and wind action. NSS/NCC Students or casual workers are engaged for daily pick up such litter plastic by taking a round in the campus. This is being extended with a proper interval round by the worker and monitoring by the Principal.

G. Management of Sharp Materials Like Metal and Glass

Any sharp material, other than organic/biodegradable and plastic material are to be stored here mainly of metal and glasses. These are to be collected and transferred to the Central big sized dustbin. It will be cleaned by the Municipality Garbage carrying vehicle on regular basis. Security Guard who are present at the time of entrance of the Garbage carrying vehicle will oversee for maintaining cleanliness of the bins and should take utmost care so that no waste material litter the surrounding of the bins.

These bins are labelled or coloured red and to be placed in the specified areas including the Patharkandi College lobby, canteen, laboratories and also near the staircases. All these bins are to be marked with their uses and numbered accordingly.

Waste bins of above types will also be placed in selected places in all around the campus in specific locations according to the need. A location map for all the outside waste bins and those of within buildings is attached with this write up.

II. Wastes in the Laboratory Works

There are two types of wastes generated in the laboratories and disposal of these wastes will be done as follows:

1. Wastes of plastics, glass, sharp materials etc. will be kept in a box/bin inside the lab and at the end of the day these will be placed in designated bins placed in the corridorby the lab worker.
2. Waste materials of chemicals, reagents, toxic substance, gel, radioactive substances etc. will be disposed by the scientists concerned following prescribed technical procedure.

The volunteers will have to enter register and report regularly to the Registrar, Patharkandi College or the person nominated by the Director of Patharkandi College on the status of implementation.

Each laboratory will keep record of the approximate amount (by weight) of waste materials of different categories (i.e., paper, sharp materials, and plastics wastes) in a register on day today basis and total in a month.

The In-charge/caretaker engaged in vermicompost unit will arrange to collect the waste materials from the specified bins/pits earmarked for the purpose through their workers and utilize the materials as per the procedure.

Timings and procedure of clearance of wastes from dustbins of laboratories

Waste clearance from	**Time**	**To be done by**	**To be deposited at**	**To be Supervised/ monitored by**
Laboratories	Every working day or as and when laboratory waste appears	Lab Bearers	Respective dustbins placed at Corridors of each lab.	HoD/In-charge assigned byPrincipal.
Dustbins of corridors	Weakly	Casual workers	Designated Pit.	-do-

Special Attention for Waste Disposal on the Occasion of Large Gathering in the Patharkandi College Campus

1. On occasion of special days, sports events etc., gathering of large number of people cause littering of waste due to lack of sufficient number of dustbins as well as attendant to take special care for it, and diverse people attending the functions with no habit of proper waste disposal. To negotiate such a situation, strategy will be worked out thoughtfully before the beginning of event/gathering so that sufficient number of dustbins is placed and required personnel can be deployed with proper instruction, placard or banner.
2. When an event is organized in the campus, the organizer will keep a slot at the end of the programme for cleanliness drive where everybody will participate.
3. There may be a cleanliness drive by all sections of staff and students for an hour or so after the programme is over and it should be kept as an integral part of the programme.

EMERGENCY RESPONSE

A. FIRES

Fire Safety

Fire is the most common safety hazard in any organization. Therefore, it is very essential for everyone to know how to survive a building fire and what to do in case of a fire. The following section briefly explains some common protocols and procedures that may be followed during a fire emergency.

How to Survive a Building Fire

- Go out of the building immediately through the nearest exit.
- Always use stairs, not an elevator
- Close doors from outside in case of severe fire to prevent the fire from spreading
- In case of heavy smoke, crawl low and if possible tie a wet cloth on your nose
- Use a fire extinguisher, if the fire is very small and you know how to use it safely

If you are on fire - Stop, Drop and Roll If you get trapped:

- Close the door
- Open the windows if safe
- Do not jump out of a tall building
- Signal for help and call 101

Fire Extinguishers:

Patharkandi College is having 05 numbers of fire extinguishers at designated places. Apart from these, sand tubs and water pipes are also in stock to combat any such scenarios.

ACTION TO BE TAKEN IN CASE OF FIRE

If Emergency occurs: Announce the same over loudspeaker and evacuate the building.

If there are injured victims, provide the minimum necessary first aid '*Only If You Are Sure That There Is No Danger To Yourself*'. If providing assistance will endanger you, *DO NOT* attempt intervention and move the victim immediately to the nearest hospital. In case of urgency, call:

1. Ambulance - 108
2. Fire station - 101
3. Disaster management – 112
4. Assam State Disaster Management Authority (ASDMA)- +91- 361- 2237221
5. Assam State Emergency Service And Fire Station, Guwahati - 0361-2637680, 2734191 & 2735935 94359-60618 (M)
6. Patharkandi Police station: 03843255429
7. Patharkandi PHC:

The above list is not complete and there could be many other scenarios, not listed here. In such cases your response should be based on the given scenario.

B. CHEMICAL EMERGENCY

Chemical emergencies such as large spills, spills involving highly hazardous or flammable materials, releases of toxic or corrosive gasses or substances should be treated as other types of emergencies. **ANNOUNCE THE SAME VIA LOUDSPEAKER AND EVACUATE THE BUILDING.**

The above list is not complete and there could be many other scenarios, not listed here. In such cases your response should be based on the given scenario.

Summary of Safety Manual

Safety Manual will be reviewed whenever there is a necessity for a certain policy change.

A ***quick run through*** of lab safety rules/policies:

- Report "All" accidents, no matter how minor, to the In- Charge of the department immediately
- Do not work alone in the laboratory.
- Know the location (A Map should be there near gate) of the (i) "**Emergency Exits** in the lab and instrument room and (ii) **fire extinguishers**.
- Wear safety goggles and lab coat at all times. If you have spilled chemical in your eyes, flush with water in an eye wash station for 10 to 15 minutes. Use safety shower in case of chemical spillage on body. Notify the incident to Supervisor and Safety In-Charge.
- Always wear full sleeves and a lab coat while working in the lab
- Wear appropriate shoes while working in the lab. Feet must be adequately covered. Open toed shoes or sandals are not permitted in the laboratory.
- Confine long hair whenever working in the laboratory.
- NO tobacco products in the laboratory.
- Ensure safe handling of chemicals by referring to Material Safety Data Sheet (MSDS) or ask the supervisor
- Report all spills especially mercury spill to lab in-charge or HoD.
- Segregate the waste solvents and solid wastes appropriately for proper disposal.
- Do not use broken or chipped glassware and dispose them in the glass disposal box.
- Used syringe needles should be dropped in syringe disposal box, and do not dump waste paper in the broken glass/needle disposal boxes.
- Do not perform unauthorized experiments in the lab.
- Avoid crowding in lab benches (not more than **3** in each work bench)
- Do not use earphones/headphones while working in lab
- Follow all the special instructions and be careful while handling & disposing bio hazardous samples.

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