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Common laboratory tools, mistakes and precautions

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Abstract

In research laboratory there is used of lots of concentration and dully hard work. Lab instruction not only provides practical experience but also knowledge about hazard materials and laboratory safety practices to the students/researchers. Generally laboratory accidents occur by carrying chemicals from one place to another or transferring them from one container to another. The chemicals used in a laboratory are potentially hazardous, often toxic, corrosive or flammable and any accident involving these has the potential for individual injury. Proper storage of chemicals is necessary for safety with regard to chemical compatibility, fire/explosion control, and provides a "user friendly" system.

Keywords: Research, laboratory, safety, hazards, chemicals

Introduction

A chemical is a possible threat to personal health and your colleagues. In case of accident, causing the release of hazardous chemicals be calm, patient and determined action is required to prevent from emergency situation, so students/researchers should know about chemical composition, its handling, storage and toxicological effects. In this regard, students and researchers are advised to familiarize themselves with safe practices for laboratory operations. People working in research laboratories are exposed to various hazards.

Accreditation must be necessary for all laboratories. However, laboratories involve a variety of possible hazards and some of these hazards need precautions. While working in the laboratory with chemicals, if there is any hazard students/researchers are requested to inform to the concerned Lab Technician.

Ethidium bromide is mutagenic and moderately toxic; it must be handled with proper care. Its powder form is considered an irritant to the upper respiratory tract, eyes and skin when preparation of its stock solution, there is generating ethidium bromide dust so it should be conducted in a fume hood to prevent inhalation. Wear nitrile gloves, lab coat and eye protection goggle must be worn at all times. Preparing or handling with Phenol or Phenol/Chloroform formulation wear gloves, eye protection goggles and lab coat. Transfer of liquefied N₂ gases from one container to another should not be attempted for the first time without supervision and instruction of any experienced person, during this procedure cryo-glove and eye protection goggles should be worn.

To keep safe in the lab one thing *i.e.* common sense, but if you look at what people are doing in the lab, you might think that common sense isn't so common after all. This leads to a lot of time wastage and frustration, particularly during the early days when it was hard to diagnose the problem.










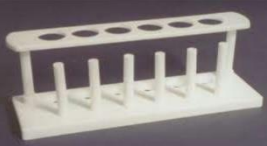






Objectives


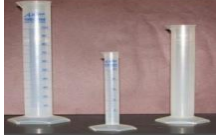













1. To avoid health hazardous and accidents in laboratory.
2. To be in a position to act appropriately in case of emergency situation.

Some Common Laboratory Tools (Glasswares and Equipments)

Handling of glassware's and equipments in proper way will helps and ensure safe laboratory practices.

Table 1: Show the Common Laboratory Tools

S. No.	Name of Tools	Use of Tools	Figure
1	Beaker	Beaker hold solids or liquid solutions, these are only used to estimate volume.	
2	Forceps	For holding of small objects/parts.	
3	Funnel	Made of plastic or glass. Generally use to pour liquid from one vessel to another for filtering of materials.	
4	Dropper	To transfer a small amount of liquid, usually one drop at a time.	
5	Disposable Pipette	It is also use to transfer a small volume of liquid.	
6	Spatula	To take the sample for weighing.	
7	Glass Rod	To manually stir solution and assist in pouring liquids.	
8	Rubber Stoppers	To seal a reaction vessel, can be flask or test tube.	
9	Test Tube Brush	To clean test tubes and graduated cylinders.	
10	Test Tube Rack	Useful for holding and organizing test tubes on the laboratory counter.	
11	Wash Bottle	To wash out the contaminants from samples.	
12	Watch Glass	To hold a small amount of solid.	
13	Petri dish	Petri dishes are widely use for culturing the microorganisms such as bacteria, yeasts and molds.	
14	Mortar and Pestle	To grind or homogenize sample.	
15	Bunsen Burner	For heating nonvolatile liquid and solids.	
16	Crucible and cover	For heating certain solids particularly metals at high temperature.	

17	Crucible Tongs	For holding hot crucibles. Not to use for picking up beakers.	
18	Graduated/ measuring cylinder	For accurately measure volumes of liquids.	
19	Burette	Used to accurately measure volumes of liquids and dispense small measurable amounts of liquids. (Titration purpose)	
20	Pipette	For accurately dispense volumes of liquids.	
21	Test Tubes	To mix chemicals for various biochemical reactions. Known makeup the final volume of the solution.	
22	Volumetric Flask	It is used to prepare and measure chemical solutions of a known volume.	
23	Conical Flask	For holding and collecting the solutions.	
24	Reagent Bottles	It is made of glass, plastic, borosilicate and topped by special caps or stoppers. Intend to contain chemicals in liquid or powder form for laboratories.	
25	Ring clamp	To hold or clamp the laboratory glassware and other equipment, to prevent fall down.	
26	Ring stand	A ring stand used to hold glassware, such as a beaker or a funnel.	
27	Analytical Balance	Accurately measure chemical or sample. Be sure balance always in calibrated position. Never place chemicals directly onto the balance pan always use a silver foil or paper.	
28	pH Meter	An electronic measuring probe used for calculating the pH (acidity or alkalinity) of a liquid.	
29	Centrifuge	Works on sedimentation principle, by spinning mixtures around a central axis. Used to separate skim milk from whole milk, water from clothes and blood cells from blood plasma.	
30	Hot water Bath	To incubate samples in hot water at a constant temperature for a long period of time instead of open flame to prevent ignition.	
31	Laboratory Oven	Used to sterilizing sample by dry heat, absorbed by the outside surface of the item, then heat pass towards the centre of the item layer by layer. The entire item will eventually reach the temperature required for sterilization to take place.	

Laboratory common mistakes

Working in a research/college laboratory it needs a lot of hard work and concentration. We can achieve success fast by decreasing the rate of failures. A few common factors that are responsible for most of the failures in a lab are not enough knowledge in the experiment, lack of experience and some of the very common, silly mistakes that we make in the research process. Of course, everybody makes a mistake and it's a part of our learning process but the more quickly we identify and rectify the mistake and we will achieve success in research for flawless experiment in future.

1. Dissolving hazardous solute/reagent improperly

This is the very common mistake where most of the students/researchers fail to dissolve the solutes/ reagents, completely and properly, thus they precipitate out from the buffer. Due to this the concentration of the solute will not be such as required and error comes in the experiment. So, we have to make sure that everything in the solutes/ reagents are dissolved properly and completely.

2. Used wrong chemicals/reagents in the experiment

Generally students/researchers make a common mistake in the lab experiment *i.e.* adding the wrong chemical/reagents in the experiment due to not reading the labels properly like adding beta-mercaptoethanol in place of polyacrylamide. Due to these sort mistakes result may be wrong so it is suggested that read the bottles labels properly and check again and again.

3. Improper labeling of samples

Very obvious mistake made by student/researchers in the laboratory while labeling the samples. While using handwritten label it may be sure that they are legit and when use a physical label, make sure they are appropriate for our requirements (*i.e.* freezing or water bath).

4. Choosing a Wrong chemicals/reagents

There are large numbers of chemical compounds, reagents that have proper navigation before use in laboratory. In hurry we often keep order for wrong products and loss both time and money.

5. Wearing laboratory coats outside the lab

Lab coats are used for keeping the hazardous chemicals away from our clothes and body. It contains all unwanted things, but some people feel lazy and forget to get them out while going outside lab *i.e.* coffee house or toilet *etc.* This way they pass these bad things to outside the environment and also carry outside bad things into the lab that may interfere with our experiments. Therefore, it is a very bad concept especially in research labs.

6. Forgot to wear safety glasses

We have only one pair of eyes that's precious. Therefore, it's a good habit to wear safety glasses while handling chemicals/reagents to avoid any eye injury.

7. Not wearing the UV shields

Working with UV transilluminators can cause serious damage. Therefore, it is must to take proper protection before handling experiments that require exposure to UV operations.

8. Opening chemical outside the environment

Many students/researchers open some hazardous chemical

like Beta – mercaptoethanol outside the fume hood. These types of act not to be perform because it can cause harm to the nasal passage and respiratory system of human beings.

9. Not properly storage of the reagents/chemicals

Improper storage of chemicals/reagents may cause damage to the human beings and ultimately reason for failure of experiment.

10. Eating inside a lab

Students actually do this, we should not eat food inside any lab whether, a research lab or chemical lab and in microbiology lab it should be completely forbidden due to this we might contaminating the food or the lab.

11. Using lab as kitchen

Many students/researchers are used the laboratory microwave for heating the foods, refrigerator for cold drinking water and sometimes used the distilled water for making coffee or tea, this kind of act should take seriously.

12. Balancing of centrifuge tubes

Many students / researchers weighed the centrifuge tubes with their open eyes instead of using an analytical balance. Due to this centrifuge is not properly balanced and can cause a serious problem so it is not a good habit to judge it by eyes whether the centrifuge tubes have the same amount of liquid.

13. Never take shortcuts

Never take such type of foolish steps. If incubation period is 25 min and we are in hurry, so it doesn't mean to bring sample out before time from oven. We have to calm and wait for the incubation period to get over otherwise it may not give accurate result.

So, these types of major laboratory mistakes must be avoided by students/researchers to make research work appropriate, fast and smooth.

Laboratory precautions /safety rules

- Do not wear outer shoes in the lab, if possible used only lab sleepers.
- Before working in lab learns about the location of the fire extinguisher, eye wash station, first aid kit and safety shower.
- Report all kind of accidents, injuries and breakage of glassware or equipment to instructor/ Laboratory Assistant immediately.
- Always be patiently and quietly before start the work; please know about the whole experiment detail. Make special attention to any cautions described in the laboratory exercises.
- Do not smell or taste any chemicals /reagents.
- Do not attempt unauthorized experiments in the lab.
- Unnecessary movements are absolutely forbidden in the laboratory. Students found in violation of safety rule will be barred from participating in future labs experiments.
- Follow the instructions given by teacher/lab assistant.
- Learn about transport of chemical materials and labs equipment safely.
- Do not eat or drink in the lab at any time.
- Wear suitable clothes so they do not get caught in a flame or chemicals.
- Wear safety goggles to protect eyes while heating substances, dissecting etc.

- Always clear lab running pathways and avoid extra items (books, bags, etc.) on the shelves or under the work tables.
- Student's long hair must be tied back to avoid catching the fire.
- Never look into a test tube while heating it.
- Wastage solid materials must be keeping out of the sink.
- Do not lean, hang over or sit on the laboratory table or stool.
- Do not leave your assigned laboratory work area without permission of the teacher/lab assistant.
- Do not lift any type of chemical solution, glassware or other types of apparatus above eye level.
- Before leaving the laboratory working area must be clean.



Source: <http://www.sigmaaldrich.com/sigma-aldrich/help/help-welcome/risk-and-safety-statements/risk-and-safety.html#pictograms>

Fig 1: Pictograms and Hazard codes commonly used to mark risks

References

1. Flinn Scientific safety rules and contract. www.flinnsci.com/media/396468/safety_contract_hs.pdf (accessed June 19, 2015).
2. Flinn Scientific safety quiz for students. www.flinnsci.com/media/396492/safety_exam_hs.pdf (accessed June 19, 2015).
3. U.S. Consumer Product Safety Commission; Department of Health and Human Services. School Chemistry Laboratory Safety Guide, Oct, 2006; p 6.
4. Laboratory Safety Manual, National Centre for Biological Sciences (NCBS) Institute for Stem Cell Biology and Regenerative Medicine (inStem) Centre for Cellular and Molecular Platforms, (C-CAMP), Revised July, 2016.
5. Georgia Institute of Technology Safety Manual. (2013). Retrieved from https://www.ehs.gatech.edu/sites/default/files/aaa_lab_safety_manual_april_29_2013.