

TOOLS OF THE TRADE

LABORATORY WORK IN LIFE SCIENCES



Canbolat Gürses, Samet Kocabay, Hongling Yuan, Hikmet Geçkil
Department of Molecular Biology and Genetics
Inonu University

Week 1 Laboratory Safety Guidelines



Introduction

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The safety rules and guidelines are designed to help keep you safe when experimenting have two principal goals: *prevention* and *containment*. This manual provides guidelines and general basic rules for safe practices within the *Department of Molecular Biology and Genetics*. They are required reading for every person working in the Department as some equipment and chemicals in a biology laboratory can cause serious harm.

The following safety rules are a sample of the most basic rules that should be followed when in a lab.

Be Prepared:

Before you enter the lab, you should be prepared for and knowledgeable about lab exercises that are to be performed. That means you should read your lab manual (and additional material, if needed) to know exactly what you will be doing. Read all directions for an investigation several times. Follow the directions exactly as they are written. If you are in doubt about any part of the investigation, ask your teacher for assistance.

Be Neat:

When working in the biology lab, make sure you keep your area neat and organized. If you happen to spill something, ask for assistance when cleaning it up. Also remember to clean your work area and wash your hands when you are finished. Separate containers should be used for paper and broken glassware.

Be Careful:

An important lab safety rule is to be careful. You may be working with glass or sharp objects, so you don't want to handle them carelessly. Proper procedures in the use and disposal of chemical compounds which are known to possess hazardous properties such as high toxicity, shock sensitivity, reactivity with water or air etc. should be reviewed with your supervisor.

Wear Proper Clothing:

Accidents do happen and some chemicals have the potential to damage clothing. So, wear your lab coat all the time. As you may use some equipments with moving or spinning parts and burners and candles long hair must be suitably confined.

Be Cautious With Chemicals:

The best way to remain safe when dealing with chemicals is to assume that any chemical you handle is dangerous. Be sure you understand what type of chemicals you are using and how they should be properly handled. If any chemical comes in contact with your skin, wash immediately with water and inform your lab instructor. Wear protective eyewear when handling chemicals. Take extreme care not to spill any material in the laboratory. If spills occur, ask your teacher immediately about the proper cleanup procedure. Never simply pour chemicals or other substances into the sink or trash container. Reactions left to run unattended for extended periods of time should be labeled with the name and phone number of the appropriate research personnel.

Wear Safety Goggles:

To protect yourself from possible injury safety glasses or goggles should always be worn when you are working with chemicals, burners, or any substance that might get into your eyes. any type of heating apparatus. Never wear contact lenses in the laboratory.

Locate Safety Equipment:

Be sure you know where to find all safety equipment in the biology lab. This includes such items as the fire extinguisher, first aid kit, broken glass receptacles, and chemical waste containers.

Biology Lab Don'ts:

There are several things in a biology lab that you must always avoid.

Do Not

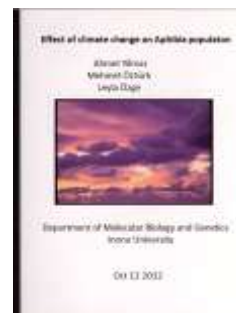
- eat or drink in the lab
- taste any chemicals or substances you are working with
- use your mouth for pipetting substances
- handle broken glass with bare hands
- pour chemicals down the drain without permission
- operate lab equipment without permission
- leave any heated materials unattended
- place flammable substances near heat

Have a Good Experience:

The lab work is an important aspect of any course in the *Department of Molecular Biology and Genetics*. In order to have a good lab experience, make sure that you follow these lab safety rules and any instructions given to you by your lab instructor.

Preparing a lab report

Lab reports are an essential part of all laboratory courses and usually a significant part of your grade. If your instructor gives you an outline for how to write a lab report, use that. Some instructors require the lab report be included in a lab notebook, while others will request a separate report. Here's a format for a lab report you can use if you aren't sure what to write or need an explanation of what to include in the different parts of the report. A lab report is how you explain what you did in experiment, what you learned, and what the results meant. Here is a standard format.



1. Title Page

- The title of the experiment.
- Your name and the names of any lab partners.
- Your instructor's name.
- The date the lab was performed or the date the report was submitted.

2. Title

The title says what you did. It should be brief (aim for ten words or less) and describe the main point of the experiment or investigation. An example of a title would be: "Ultraviolet Light on Borax Crystal Growth Rate". If you can, begin your title using a keyword rather than an article like 'The' or 'A'.

3. Introduction

Usually the Introduction is one paragraph that explains the objectives or purpose of the lab. In one sentence, state the hypothesis. Sometimes an introduction may contain background information, briefly summarize how the experiment was performed, state the findings of the experiment, and list the conclusions of the investigation. Even if you don't write a whole introduction, you need to state the purpose of the experiment, or why you did it. This would be where you state your hypothesis. Have a central message in the last paragraph.

4. Materials

List everything needed to complete your experiment.

5. Methods

Describe the steps you completed during your investigation. This is your procedure. Be sufficiently detailed that anyone could read this section and duplicate your experiment. Write it as if you were giving direction for someone else to do the lab. It may be helpful to provide a Figure to diagram your experimental setup.

6. Data

Numerical data obtained from your procedure usually is presented as a table. Data encompasses what you recorded when you conducted the experiment. It's just the facts, not any interpretation of what they mean.

7. Results

Describe in words what the data means. Any graph and figure must be embedded in this section and they should be labeled with a descriptive title and legends. Label the axes on a graph, being sure to include units of measurement in scientific notation. The independent variable is on the X-axis. The dependent variable (the one you are measuring) is on the Y-axis. Be sure to refer to figures and graphs in the text of your report. Numbers and data are the core of most scientific research. Although there are many ways to present data, it is important to be consistent throughout the lab report.

8. Discussion

This is where you interpret the data and determine whether or not a hypothesis was accepted. Grammar and style are very important and helpful in meeting the writing process goal of ensuring the clear communication of ideas. This is also where you would discuss any mistakes you might have made while conducting the investigation. It is important that your lab report be written in correct English grammar, clear, and concise.

9. Conclusions

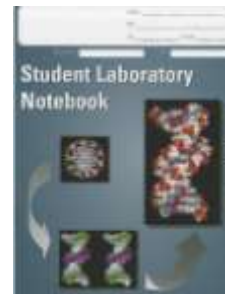
Most of the time the conclusion is a single paragraph that sums up what happened in the experiment, whether your hypothesis was accepted or rejected, and what this means.

10. References

If your research was based on someone else's work or if you cited facts that require documentation, then you should list these references.

The lab notebook

A lab notebook is your primary permanent record of your research and experiments. Here is a list of guideline that explains how to keep a lab notebook.

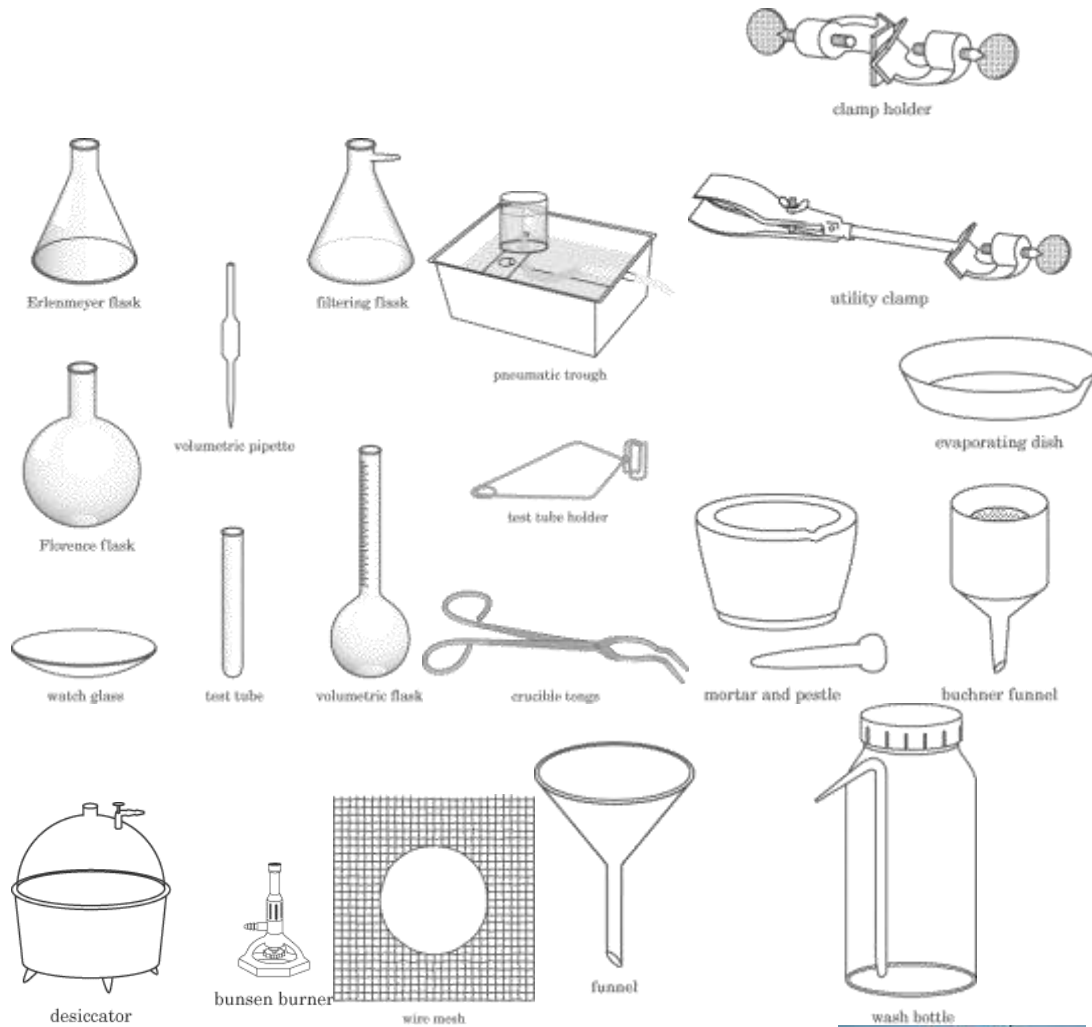


- Notebook must be permanently bound. It should not be loose-leaf or in a 2 or 3-ring binder. If your notebook is not pre-numbered, number every page.
- Never tear a page out of the lab notebook. If you make a mistake, you can cross it out, but you should not remove sheets or parts of sheets from your book. When you cross out an error, it should still be legible. You should explain the reason for the strikethrough and you should initial and date it.
- Take notes in permanent ink. It is not acceptable to take notes in pencil or erasable ink.
- Print your name, contact info, the date and other pertinent information on the cover of the lab book.
- Start a fresh page for each experiment.
- For each experiment, record the date(s) and list lab partners, if applicable.
- Record all information real-time. Don't wait to fill in information. It may be tempting to record data elsewhere and then transcribe it into your lab notebook, usually because it would make the notebook neater, but it's important to record it immediately.
- Include charts, photos, graphs and similar information in your lab notebook.
- Don't leave gaps or white space in the lab book. If you have a big open space, cross it out. The purpose of this is so no one can go back in and add false details at a later date.

TOOLS OF THE TRADE: Labware



Below are some glassware and other basic equipment used in laboratories of Molecular Biology and Genetics.



Colorimeter



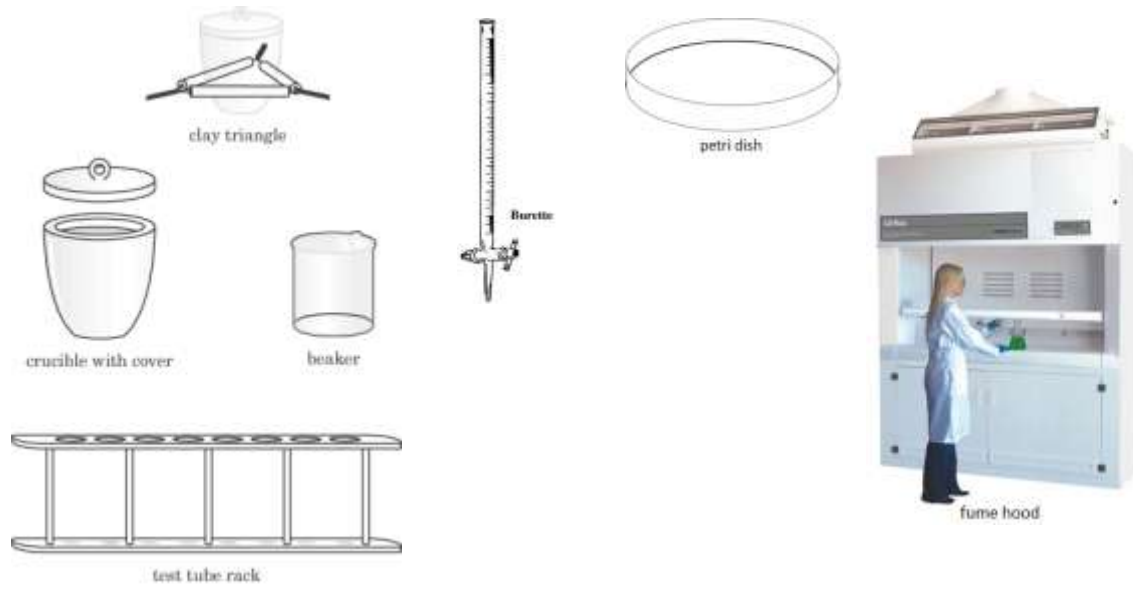
spectrophotometer



micropipettes and pipet tips



plastics bulbs



Safety Signs

Science labs, particularly biology and chemistry labs, have a lot of safety signs. This is a collection of public domain images you can use to learn what the different symbols mean or to construct signs for your own lab.



Eyewash Sign or Symbol



Safety Shower Sign or Symbol



First Aid Sign



Defibrillator Sign



Fire Blanket Safety Sign



Radiation Symbol



Biohazard



Radioactive Symbol



Ionizing Radiation Symbol



Recycling Symbol



Harmful or Irritant



Flammable



Explosives



Oxidizing



Corrosive



Environmental Hazard



Respiratory Protection Sign



Gloves Required Symbol

Week 1: Laboratory Safety Guidelines /Hikmet Geckil



Eye or Face Protection Symbol



Protective Clothing Sign



Protective Footwear Sign



Eye Protection Required Sign



Ear Protection Required Sign



Danger Sign



Caution Sign



Fire Extinguisher Sign



Fire Extinguisher



Fire Hose Safety Sign



Flammable Gas Symbol



Nonflammable Gas



Chemical Weapon Symbol



Biological Weapon Symbol



Nuclear Weapon Symbol



International Biohazard Symbol