LABORATORY SAFETY ISSUES

STUDENT GUIDELINES FOR PRACTICAL CLASSES

The Student Guidelines for Practical Classes have been prepared to assist students to become aware of the need for safe working practices during all practical classes.

Safety Matters
It should be noted that the practical laboratories are used for a variety of practical classes including Chemistry and Biology. Bench surfaces etc. may be contaminated with chemicals and organisms. Consequently, strict adherence to safety matters is of prime importance.

IMPORTANT SAFETY NOTICE!

Strict adherence to ALL safety measures and any subject-specific safety measures in individual practical manuals is essential.

CORRECT CLOTHING
APPROPRIATE CLOTHING AND FOOTWEAR, TOGETHER WITH LABORATORY COATS AND SAFETY GLASSES MUST BE WORN FOR ***ALL*** LABORATORY CLASSES.

LABORATORY (LAB) COATS
LAB COATS ARE TO BE WORN IN THE PRACTICAL CLASS ROOM AND ARE ***NOT*** TO BE WORN IN THE CORRIDORS OR ANY AREAS THAT ARE NOT CLASSIFIED AS LABS.

MOBILE PHONES
ALL MOBILE PHONES ARE TO BE SWITCHED ***OFF*** PRIOR TO ENTERING THE LABORATORY, AND ARE TO REMAIN OFF FOR THE DURATION OF THE CLASS.

Note: If behaviour is deemed unsafe or inappropriate, the offending student will be asked to leave the laboratory.

In case of any emergency contact a teacher immediately

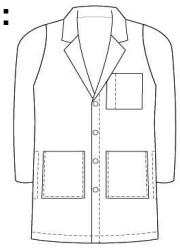
GENERAL SAFETY ISSUES

- Students must be familiar with the location of safety equipment (safety shower, eye wash station, first aid kit and all exits) in the laboratory.
- Eating, drinking, smoking and the chewing of gum are not permitted in any laboratory.
- Do not suck or chew pens, pencils etc – you don't know what's been on the bench!
- When first entering a student laboratory, do not touch any equipment, chemicals, or other materials in the laboratory area until you are instructed to do so.
- Follow all written and verbal instructions carefully. If you do not understand a direction or part of a procedure, ask the instructor before proceeding.
- You are personally responsible for turning off all gas, water and electrical outlets at your bench before you leave, and for removing power cords from power points.
- Students must remain in their allotted places during pracs. Other areas of the laboratory are off limits unless permission is received.
- Students must not operate unfamiliar equipment.
- Experiments must be personally monitored at all times.
- Students are expected to behave in an appropriate and professional manner at all times in the laboratory. Do not SIT on the benches
- All chemicals in the laboratory are to be considered dangerous. Do not physically touch, taste, or smell any chemicals.
- At the end of each working period, all apparatus & glassware must be carefully cleaned and put away. The benches, sinks, balances and fume cupboards must be cleaned and any waste put in the appropriate waste containers.

- Wash your hands at the end of the class and **before** leaving the laboratory.
- Be alert and proceed with caution at all times in the laboratory.
- Notify the instructor immediately of any unsafe conditions you observe.

The Minimum Dress Requirement for Entry into the Laboratory is:

- A **clean** laboratory coat of reasonable length.
  Sleeves are to be rolled up to wrist level, if necessary.



- **FULLY** closed-in, non-synthetic, low-heeled shoes.
  Open footwear is not permitted

- Hair longer than shoulder length must be tied back. Loose jewellery must be secured or removed.
- Safety glasses. (Reading glasses are not sufficient and contact lenses are only permitted when the correct safety glasses are wor**n**

GENERAL LABORATORY SAFETY ISSUES

PIPETTE SAFETY

Incorrect insertion of a glass pipette into rubber bulb or piston-driven pipetting devices is one of the commonest causes of injury in the lab. You will be shown how to do properly in your first lab class. The following photos are a reminder of the correct method.

Fig. 1: ***Correct way*** to hold a pipette (as close as possible to the point of entry of the attachment) while inserting into bulb (left) or piston (right) pipetters. It is more difficult to break the pipette while holding in this position. The pipette will easily slide into the either device if the outside of the glass is first moistened with a drop of water. Use more pressure on the pipette with the thumb and forefinger, and as little pressure as possible with the other fingers and the palm of the hand. NB: **before** inserting the pipette into the body of the piston-driven pipetter, unscrew the white locking ring at the base of the device 2-4 turns. Insert the pipette not more than 6-10 mm, then screw up the locking ring. To remove the pipette, remember to unscrew the locking ring first.

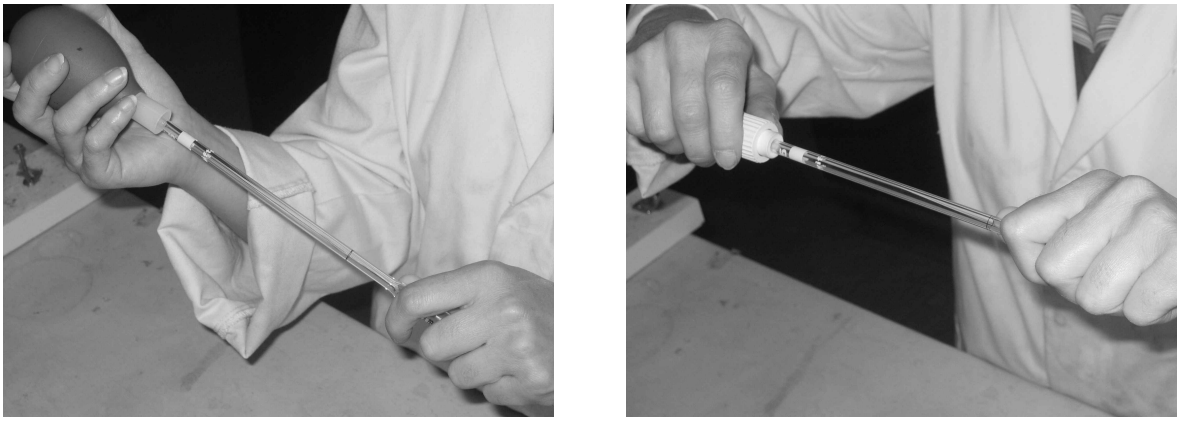


Fig. 2: **Wrong way** to hold a pipette while inserting into bulb (left) or piston (right) pipetters. If you hold the pipette in this way, it is much easier to snap the glass into two (or more) pieces, with the possibility of seriously cutting your hand or fingers.

GENERAL LABORATORY SAFETY ISSUES

GLASSWARE

Glass items and apparatus are widely utilised in laboratory work and are responsible for many laboratory accidents. So be sure to:

- ALWAYS carefully inspect glassware BEFORE using, check for the presence of cracks or chips. If you find even a simple test-tube with a chip or crack, place it in the broken glass disposal, or return it to your teacher or the technical staff;

- When you put a piece of glassware down on the bench, THINK about how you can be sure that the glassware won't accidentally roll off the bench, or might be knocked over by a careless action; and

- Always place round or cylindrical objects behind or between other objects that will not move easily on the bench. Better still, put items back in the drawer if they are not needed. Relocating or using equipment that has attached hoses or cords can be especially hazardous to glassware. Thermometers and pH electrodes are particularly at risk, as are tall items such as measuring cylinders and medium size (100 – 1000 mL) volumetric flasks.

Be very careful when selecting stoppers for glassware with ground glass necks – don't try to force in a stopper that is too big, as breakage can cause bad cuts or even permanent injury to hands, thumbs or fingers

ADDITIONAL GUIDELINES

Many chemicals are potentially dangerous due to their corrosive, toxic or flammable nature. Before using a reagent for the first time or **if in doubt**, you should inquire about it. For example, the mixing of acetone and chloroform can be sufficiently exothermic to ignite the mixture explosively.

Familiarise yourself with the emergency preparedness procedures and the specific precautions for the chemicals to be used. Read the material safety data sheets.
Know the location of the nearest emergency shower, first aid kit, eye wash station, fire fighting equipment and the nearest exit.

MATERIAL SAFETY DATA SHEETS

A material safety data sheet (MSDS) is available for every chemical in every lab and provides:

- detailed information on a dangerous or hazardous substance;
- information on the preferred way to handle the substance;
- specific safety precautions; and
- First aid details.

First aid measures need to be applied quickly if they are to be effective. **Any incident must be reported at once to the teacher.**

LABORATORY SAFETY ISSUES

GUIDELINES FOR PRACTICAL CLASSES - CHEMISTRY

1. Chemicals

Many chemicals are potentially dangerous due to their corrosive, toxic or flammable nature. Before using a reagent for the first time or **if in doubt**, you should inquire about it and read the MSDS,

- **Corrosive Chemicals**

Concentrated acids (used only in fume cupboards), e.g. Acetic Acid (Glacial), Hydrochloric Acid, Sulphuric Acid, etc. and solutions of Sodium or Potassium Hydroxide are very corrosive and act rapidly. They are to be handled only in a well ventilated fume cupboard.
When splashed on the skin or clothing, wash off immediately with plenty of cold water.

- **Toxic Chemicals**

Liquids such as toluene, aniline, chloroform and chloroacetic acid and their vapours are extremely hazardous. They are to be handled only in adequately ventilated fume cupboards.
When spilt on the skin, wash off immediately with cold water and soap. DO NOT wash with other organic liquids, as these assist skin penetration.

- **Flammable chemicals**

Most common organic solvents are highly flammable, e.g, ethanol, toluene, petrol, acetone and diethyl ether. They are NOT to be handled near naked flames.

Precautions

- NEVER put your nose over a flask or beaker to smell a liquid
- NEVER pipette by mouth.
- Use a pipette aid or a Pasteur pipette.
- NEVER drink from laboratory glassware.
- NEVER eat, drink, chew gum or smoke in the laboratory. (No water bottles)
- NEVER work with corrosive chemicals in an open area. Always work with them in a well-ventilated fume cupboard.
- PROTECT the hands by wearing the appropriate chemical resistant gloves. (Available from your Teacher
- ALWAYS use a fume cupboard when using noxious or toxic reagents (Check the MSDS)

2. Glassware

Glass items and apparatus are widely utilised in laboratory work and are responsible for many laboratory accidents

Precautions

- NEVER use broken, chipped, cracked, badly scratched or dirty glassware.
- NEVER pick up small pieces of broken glass with bare hands, always use a brush and pan or suitable gloves.
- NEVER lay a pipette or burette down with its tip protruding over the edge of the bench.
- NEVER place glassware or any laboratory materials in your laboratory coat pockets - this would prevent a potential accident.

LABORATORY SAFETY ISSUES

3. Fire

If a fire occurs, immediately turn off gas or other heating devices. Call "FIRE" and alert the teacher to the danger. **NEVER try to deal with the fire by yourself.** Note: A small fire can often be extinguished by smothering it with a cloth. Burning clothes or hair should be smothered with the fire blanket.

For burning solids such as wood, water is satisfactory but DO NOT use water for burning ORGANIC LIQUIDS. These float on the water and continue to burn, thus spreading the fire.

The fire extinguishers are only to be used by a teachers.

Precautions

- NEVER heat an open vessel containing an organic solvent over a naked flame
- NEVER open a vessel containing an organic solvent near a naked flame
- NEVER transfer an organic solvent from one vessel to another near a naked flame
- NEVER heat a totally enclosed apparatus
- When heating a liquid in a test-tube turn the mouth of the test-tube away from yourself and others.

4. Hotplates

Hotplates are one of the most common items to cause injury.

- BE AWARE the hotplate is on and that it takes some time to cool once turned off.
- NEVER touch a hot plate when it is on

5. Clothing

As stated before,

- A **clean** laboratory coat of reasonable length. Sleeves are to be rolled up to wrist level, if necessary.
- FULLY **closed-in, non-synthetic, low-heeled shoes.** Sandals, thongs, running shoes, high heels etc are prohibited in the laboratory work areas.
- Hair longer than shoulder length must be tied back. Loose jewellery must be secured or removed.
- Safety glasses. (Reading glasses are not sufficient and contact lenses are only permitted when the correct safety glasses are worn.)

6. General Principles for Safe Working

- Be **alert** and **always think** about what you are doing.
- Develop habits of cleanliness in handling chemicals. Many chemicals have undesirable physiological effects which are immediately obvious on contact with the skin or lungs.
- Obtain information about possible hazards of new reagents or reactions before use.
- Read all directions for a laboratory procedure before proceeding with the first part.
- Wash your hands at the end of the practical class

LABORATORY SAFETY ISSUES

WASTE DISPOSAL
Waste should be disposed of in the appropriate manner:

SOLIDS

- **Solid materials** should not be disposed of down the sink. Solid materials, including powders (wrapped), contaminated gloves etc are to be placed in the appropriate bins; labelled "solid chemical waste".

- **Broken glassware, pipettes** etc. should be discarded in the appropriate bins; labelled "broken glass only". Broken glassware should be swept up with a brush and dustpan, being careful not to cut yourself on shards of glass. **DO NOT put any of these items in the general waste bins.**

- **Contaminated gloves and paper towel** used to wipe up spills are to be disposed of in a hazardous solids waste container; type will depend on the contamination. Ask your instructor if unsure.

- **Gloves, filter paper and weighing papers** used for non hazardous materials are to be disposed of in the "Non hazardous laboratory waste" containers.

SOLUTIONS

- **Hazardous solutions** are **not** to be disposed of down the sink. Place in the appropriate waste containers; such as halogenated, non-halogenated, corrosives and so on. Ask your instructor if unsure.

- **Non hazardous solutions** containing dyes or buffers may be carefully poured directly down the drain hole of the sink. Do not tip them out quickly or sloppily thereby making a mess of the entire basin. Ask your instructor if unsure.

OTHERS

- **Microbiological wastes** such as Petri dishes, slants and broths containing agar, are to be placed into the autoclave bags in the bins provided. This waste will be autoclaved **so the bags must only be half filled** to allow steam penetration.

- **Slides and cover slips** are to be treated as "Sharps" and discarded into the "Sharps" container

- Notify the instructor immediately when a mercury thermometer is broken. Do not attempt to clean up yourself. **Please Note: under no circumstances should the mercury be touched.**

If unsure of the correct disposal method please see your Teacher
– Remember **IF IN DOUBT, ASK!**

LABORATORY SAFETY ISSUES

GUIDELINES FOR PRACTICAL CLASSES - BIOLOGY

Students should bring the following to practical classes as requested:

- Safety Glasses:
- Laboratory coat
- Enclosed shoes
- Dissecting Instruments
- Water soluble marking pen

DISSECTION RULES

- When using knives and other sharp instruments, always carry with tips and points pointing down and away. Always cut away from your body. Never try to catch falling sharp instruments. Grasp sharp instruments only by the handles.
- Always wear disposable latex gloves when dissecting. These are provided in the laboratory. Wash your hands before leaving the laboratory.

- There are automated scalpel blade removers located in the Pharmacology practical laboratories. **DO NOT** attempt to remove a scalpel blade from the scalpel holder manually. If you really need to remove a scalpel blade manually, ask the teacher in charge for assistance. Replacement scalpel blades can be obtained from the technical staff.
- Animal carcasses/tissue must be disposed of in the provided wet waste bags.

LABORATORY SAFETY ISSUES

CHEMICALS/GLASSWARE/FIRE ETC

The procedures for the safe handling of these items in Biology classes are the same as those outlined in the Chemistry section of this manual.

WASTE DISPOSAL
Waste should be disposed of in the appropriate manner:

UNCONTAMINATED SOLIDS

- **Gloves, filter paper and tissues** used for non hazardous materials, are to be disposed of in the "Non hazardous laboratory waste" containers located under the sinks.

CONTAMINATED SOLIDS

- **Animal carcasses/tissues** must be disposed of in "wet waste' bags that are provided. Do not leave these on the bench for someone else to clean up.

- **Plastic Pasteur pipettes, plastic volumetric pipettes and swabs** are to be placed in the autoclave bag provided on the bench.

SHARPS

- **Slides and cover slips** are to be treated as sharps and discarded into the "Sharps" container.

- **Plastic syringes, loops and stabs** are to be placed directly into the "Sharps" container **at your bench.**

- **DO NOT** recap or otherwise manipulate by hand any used needle, scalpel or disposable instrument. Dispose of all sharps – scalpels, blades, needles and syringes in the puncture resistant yellow "Sharps" containers.
  Do not try to remove or recap the needle of a syringe.

- **Scalpel Blades** are to disposed of in the automated scalpel blade removers or a sharps container.

- **Biological wastes**, such as Petri dishes containing contaminated agar, are to be placed into the autoclave bags in metal bins on the side benches. This waste will be autoclaved **so the bags must only be half filled** to allow steam penetration.
  DO NOT PUT UNCONTAMINATED MATERIAL, SUCH AS OVERWRAPS, INTO THE AUTOCLAVE BAGS - USE THE RUBBISH BINS PROVIDED UNDER THE SINK.

NOTE: **DO NOT OVERFILL** waste containers. If the container is more than half-full, ask your teacher for a new one

If unsure of the correct disposal method please see your Teacher
– Remember **IF IN DOUBT, ASK!**

LABORATORY SAFETY ISSUES

MISCELLANEOUS MATTERS – ALL CLASSES

BEFORE COMMENCEING practical classes all students are to read, sign, date and submit their individual safety declaration

BEFORE EVERY practical class all students are expected to pre-read, and complete any associated pre-reading exercises. Teachers will assume that you have a reasonable understanding of the practical procedure to be followed in class. Be sure to clarify any matter pertaining to the prac. that you are unsure of.

FOR EVERY practical class:

- Students should come to class prepared. Please read the pratical before the class.
- Students are to be punctual
- Unsatisfactory behaviour/performance will not be tolerated.

If, for any reason, you are unable to attend your allocated practical session, please consult the practical course co-ordinator.

IMPORTANT HEALTH NOTICE

ANY STUDENT WHO HAS A MEDICAL CONDITION OR ALLERGY THAT THEY FEEL MAY BE PROBLEMATIC WITH ATTENDING ANY PRACTICAL SESSION OR EXERCISE SHOULD CONSULT THEIR MEDICAL PRACTIONER AND, IF NECESSARY, THE COURSE CO- ORDINATOR PRIOR TO THE PRACTICAL.

1. For your own safety and the safety of others we ask you to observe all laboratory safety guidelines and heed the health notice above while working in the laboratory.

2. Note the **number** and **location** of the following safety features in the laboratory

Exits.	Fire extinguishers.	Eye wash stations.
Fire blankets.	Safety showers.	First aid cabinets.

Prep room (For assistance with spills and breakages)

STUDENT DECLARATION:

Please note that this declaration applies to <u>all practical classes</u>.

- **I have read and understood the student laboratory guidelines.**
- **I have read and understood the "Important Health Notice" in the box above.**
- **I understand that special safety regulations may apply to some practical classes and will abide by them.**
- **I agree to abide by ALL safety requirements, including the wearing of the recommended personal protective clothing, enclosed footwear, long hair tied back and safety eye wear, and understand that non compliance will result in my expulsion from the practical class.**

This declaration has been duplicated on the following page. Please sign and date <u>BOTH COPIES</u>. Hand in one copy and retain the other.

Please Note: Fully enclosed shoes must be worn at all times in the laboratory

Examples of acceptable footwear




SAFETY DECLARATION

Student copy

I have read and understood “Student Guidelines for Practical Classes”, as well as the above “Health Declaration”.

I am aware of the safety requirements for working in a practical class lab and will note the number and location of the safety features on my arrival. I am aware of the special safety considerations and waste disposal guidelines that apply.

I will abide by ALL safety regulations as outlined in the manual.

This declaration has been duplicated.

PRINT your FULL name,
with your surname underlined: _____

Student I.D.: _____

Course and Year: _____

Your Signature: _____

Date: _____

LABORATORY SAFETY ISSUES

SAFETY DECLARATION

To be completed and returned before practical classes start

I have read and understood "Student Guidelines for Practical Classes", as well as the above "Health Declaration".

I am aware of the safety requirements for working in a practical class lab and will note the number and location of the safety features on my arrival. I am aware of the special safety considerations and waste disposal guidelines that apply.

I will abide by ALL safety regulations as outlined in the manual.

This declaration has been duplicated.

PRINT your FULL name,
with your surname underlined: _____

Student I.D.: _____

Course and Year: _____

Your Signature: _____

Date: _____