Chemistry 11
Laboratory Safety Notes

General Rules:

- Absolutely no running or horseplay in the lab. What seems like simple fun can turn into a serious accident.
- Lack of pre-lab preparation is the main threat to safety in the lab. If you and your group are not prepared you will waste time, being unsure of yourself and have a greater chance of making mistakes that could lead to a problem.
- At the beginning of the lab you will be able to ask questions. Please ask if you are not clear about any step in the procedure. Be sure to pay close attention to any verbal instruction given at this time.
- Contact lenses are not to be worn in the lab at any time. Chemicals can get trapped underneath them causing irritation. It is almost impossible to remove them once chemicals have splashed in your eyes.
- Long hair and bulky clothing are dangerous in the lab. Be sure to pull back loose hair and tuck in any baggy clothing.
- Jewelry is not permitted as liquids may get underneath and cause irritation.
- Always be aware of your surroundings, what’s around you and who’s around you. Know where you are going and don’t turn around to quickly; you may spill chemicals being carried by someone else.
- Notify people if you are passing behind them when carrying or handling chemicals. That way they will not make any sudden moves which may cause you to spill what you are carrying.
• No unauthorized experiments. You must never mix chemicals unless you are told to do so. Certain chemicals are harmless by themselves, but when mixed they can be very reactive and even explosive.

• Wash your hands thoroughly at the end of each lab period.

• No eating or drinking inside the lab. Chewing gum is also not allowed.

• Never taste, touch or smell any chemical unless your teacher has given you permission.

• Use caution when heating and stirring solutions. Don’t let them boil over and take care in preventing the solution to splash.

• Please wear appropriate foot shoes. Nothing open toed. Chemicals might spill on your feet.

• Above all remain calm. A minor problem can become a major problem if you don’t. Report all accidents immediately, no matter how small.

Above all, always use common sense and have a conscious safety attitude. This means you should always think about the possible safety related consequences of any action you are planning.

**Emergency Equipment:**

This equipment is only intended for use in the event of an emergency.

Students DO NOT HAVE TO ASK PERMISSION TO USE ANY EMERGENCY EQUIPMENT, but you must be prepared to justify why you used the equipment and the consequences for misuse.

**Fire Extinguishers:**

Generally, the teacher will use the fire extinguisher, but in certain situations you may need to use it.

If the fire is controlled and small enough to be put out with a fire extinguisher, use one. If there is any doubt about weather a fire extinguisher will do the job, quickly evacuate the lab, close the door and pull the fire alarm.
How to use:
- Grab the extinguisher by the handle and pull the safety pin with a sharp pull.
- Aim the extinguisher at the base of the flames and pull the trigger.
- Be sure to sweep the spray back and forth over the area in flames.

Small fire extinguishers will last about 10 seconds. They must be within 4-5 m (12-15 ft) for the spray to be effective. Therefore, don’t waste the extinguisher contents with practice sprays or by spraying to far away.

**Never spray the contents of a fire extinguisher on a person. The spray from the extinguisher can instantly freeze flesh or drive powder into the eyes or lungs.**

**Eyewash Station:**

The eyewash station must be used any time a chemical or solution gets into the eyes. As soon as something gets into your eyes yell for help and go to the eyewash station. If you cannot see or require assistance, yell for someone to help guide you.

How to use:
- Push the vertical paddle back with your hands
- Put your face down into the stream of water so that it strikes your eyes DIRECTLY.
- You must keep your eyes open in the stream of water, blinking rapidly to help wash underneath the eyelids.
- Keep washing for at least 15 minutes. Your eyes may be sore from the cold water, but pain is better than blindness.

If you are panicking someone may have to hold your head down and give encouragement and reminders about what to do.

**If you get dilute acid or base in your eyes you have less than 1 second before damage can start. When you yell for help, EVERYONE must get out of the way and clear a path to the eyewash station.**

**Emergency Shower:**

The emergency shower is used when hazardous chemicals spray over a large area of the body.

How to use:
- Get under the shower and pull the handle.
- If hazardous chemicals or solutions soak into your clothing the affected clothing MUST be removed after the washing process.
Fire Blanket:

Fire blanket should be used when a student’s clothing or hair catches fire. The fire blanket must be used very quickly in order to minimize injury.

It can also be used to smother burning material on the floor or a bench. Provided you can approach the fire safely and the blanket can be placed over the entire area involved.

Since both a fire blanket and a fire extinguisher can be used in a small fire, use whichever one you can get to the fastest.

Be careful not to knock over any beakers or flasks containing flammable material.

**Never wrap a standing person in a fire blanket. This creates a 'chimney effect' bringing the fire directly into the person's face.**

How to use:

- Flip the latch at the bottom of the blanket 'tube' to get the blanket out.
- A person on fire must stop, drop and roll. Throw the fire blanket over the student as soon as possible.
- Once the fire is out, remove the burnt clothing (useless it is melted on the skin). It is very important to get burnt skin cool as soon as possible.

A standing person burns like a candle...but much quicker. Remember to stop drop and roll. If you are panicking and running around, someone must get a fire blanket around you and roll you on the floor.

Protective Equipment:

Safety Goggles:

Must be worn whenever chemicals are being used, solutions are being prepared.

When working with glassware, boiling or mixing solutions and all other time you are in the lab. Bottom line, glasses must be worn at all times. Putting on safety goggles at the start of a lab period must become an automatic reflex.

Lab Coats / Aprons:

Lab coats and aprons may be worn if you are concerned about protecting your clothing. Be sure to wear one that fits as you don’t want to have one with arms that are too long.
Emergency Situations

Fire

Back out of harm’s way and evaluate the situation. Is the fire small enough for an extinguisher? Is anyone hurt?

Turn off the gas immediately. Notify the teacher and other students with a shout.

Controlled fire

- If the fire is controlled, in the sense that it is in a beaker, test tube or flask, placing a watch glass or inverted beaker over the top of the container and smothering the fire can often put out the fire.
- Be careful not to spill the contents. If you are not sure what to do, call for help.

DO NOT PANIC. Even if NOTHING is done, the fire will normally burn itself out.

If there is a small amount of burning liquid on a bench top it might take a minute or so to burn itself out. You could use a fire extinguisher or fire blanket if the fire is small.

Uncontrolled fire:

- If the fire is not minor and likely to spread, everyone must be evacuated immediately except those using a fire extinguisher.
- If possible, turn off the main gas line, pull the fire alarm and evacuate the building.
- The last person out of the room should close the door.

Chemical Disposal

Disposal of unused chemicals

Never put unused chemicals back into their original containers. If you have taken too much ask if anyone else can use it and then ask the teacher for disposal instructions.

Putting chemicals back into their original containers poses two problems:

1) Chemicals may have been contaminated by using glassware that was not clean thus contaminating the whole container.

2) The chemicals may be put into the wrong container, spoiling the chemicals or starting a reaction.

Disposal of used chemicals

Students will be given instructions as to how to dispose of chemicals used in each experiment.

The sink or wastebasket is never used unless instructed.

Most of the chemicals are harmless to the environment, but some can be toxic.
**Broken Glass**

If glassware is broken, stop what you are doing and report it to the teacher.

Don't resume working until instructed to do so as there could be little slivers of glass that you cannot see.

If someone is cut, report it immediately. The teacher will clean up the broken glass, not you.

If you are using the equipment properly you will not get in trouble for breaking a piece of glassware.

**What is this thing called WHMIS?**

WHMIS stands for **Workplace Hazardous Materials Information System**. It is an information system that allows people to be aware of the safety and health hazards associated with the chemicals that they may use.

WHMIS conveys this safety information in three (3) forms, *special labels*, *symbols* and *material safety data sheets (MSDS)*.

**WHMIS Labels:**

All controlled products, where at school or in a workplace, will have a WHMIS label.

The label will identify the chemical as well as alert the worker to the specific dangers of the product and how best to handle it.

The MSDS will provide a more detailed description of the chemical. It is important to *read the whole label* before using a product for the first time.

**WHMIS Symbols:**

The shapes of the symbols used on labels have been chosen to show the nature of the hazard that they represent.

**Compressed Gas**

- It is a gas that is kept under pressure.
- The container may explode if it is dropped, heated or punctured.
- Handle with care. Do not drop. Store away from heat or any source of ignition.
- *Examples*: Hydrogen, Oxygen, Fire Extinguisher
Flammable and Combustible Materials

- This material is a potential fire hazard and may burn at a lower temperature
- Sparks or friction could ignite it.
- Could burst into flame spontaneously or release a flammable gas on contact with air
- Should be kept away from any source of heat and other combustible materials.
  - Examples: Gasoline, Sodium, Ethanol, Diesel fuel, Methane, Propane

Oxidizing Materials

- This material is a fire or explosive risk near flammable or combustible material.
- May burn the eyes or skin on contact.
- Store away from combustible materials and wear proper protective equipment when handling.
  - Examples: sulphric acid, perchloric acid, hydrogen peroxide.

Poisonous and Infectious Materials Causing Immediate and Serious Toxic Effects

- These materials are immediately dangerous to life and health
- Avoid any contact and always wear the proper protective equipment.
  - Examples: potassium cyanide, strychnine, hydrogen sulphide, sodium fluoride, formaldehyde.

Poisonous and Infectious Materials Causing other Toxic Effects

- Material is poisonous, but not immediately dangerous to health.
- It may cause death or permanent damage through prolonged exposure.
- Avoid long periods of contact and wear proper equipment.
  - Examples: benzene, asbestos

Biohazardous Infectious Materials

- Includes any organism (bacteria, viruses) or toxins that are believed to cause disease.
- Avoid all contact. Wear extensive protective equipment.
  - Examples: HIV, anthrax, hepatitis B, salmonella
Corrosive Material

- This is material that is caustic or acidic. Can eat through the skin or corrode metals like steel or aluminum.
- Always handle with care and wear proper protective coverings.
- Examples: Sodium hydroxide, Chromic acid, Nitric Acid

Dangerously Reactive Material

- Materials that undergo dangerous reactions (polymerization, decomposition) when subjected to heat, pressure, shock or allowed to contact water.
- Examples: butadiene, copper and mercury azides.

International Safety Symbols:

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<th>Danger</th>
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The border that surrounds each symbol describes how dangerous the hazard is.

**Octagon** - Indicates danger. This represents the most hazardous material.

**Four-Sided Diamond** - Indicates warning. Moderate or medium hazard risk.

**Up Side Down Triangle** - Indicates caution. Low-level hazard risk. (But still hazardous!)
The N.F.P.A uses categories and numbers to label chemicals. Below you will see a sample hazard diagram.

**Category One - Health (Blue)**

4  Can cause death or major injury despite medical treatment.
3  Can cause serious injury despite medical treatment.
1  Can cause irritation if not treated.
0  No hazard

**Category Two - Fire (Red)**

4  Very flammable gases or very volatile flammable liquids.
3  Can be ignited at all normal temperatures
2  Ignites if moderately heated.
1  Ignites after considerable preheating.
0  Will not burn.

**Category Three - Reactivity (Yellow)**

4  Readily detonates or explodes
3  Can detonate or explode but requires strong initiating force or heating under confinement.
2  Normally unstable but will not detonate.
1  Normally stable. Unstable at high temperature and pressure. Reacts with water.
0  Normally stable. Not reactive with water.

**Key to Hazard (Special) Comments**

C - may be carcinogenic upon chronic exposure  Cor - corrosive
Exp - risk of explosion  Oxy - oxidizing agent
SC - suspected carcinogen  T - toxic
Pol - polymerizes under normal conditions  W - water reactive