



Electrical Hazards

The greater hazards related to electricity are electrical shock and fire. Electrical shock occurs when the human body becomes part of the electric circuit, either when an individual comes in contact with both wires of an electrical circuit, one wire of an energized circuit and the ground, or a metallic part that has become energized by contact with an electrical conductor.



The hardness of an electrical shock depends on a number of factors, including the pathway through the body, the amount of current, the duration of exposure, and whether the skin is wet or dry. Water is a good conductor of electricity, allowing the current to flow more easily in wet conditions and through the wet skin. The effect of the shock may range from a slight tingle to severe burns and even a cardiac arrest.

The Table below show the human reaction to a 60 Hz hand-to-foot path of one second duration of an electric shock of various current amounts.

Current	Reaction
1 mA	Perception level
5 mA	Slight shock felt; not painful but disturbing
6-30 mA	Painful shock; "let-go" range
50-150 mA	Pain, respiratory arrest, muscular contraction
1000-4300 mA	Ventricular fibrillation
10000+ mA	Cardiac arrest; severe burns and probable death

Preventing Electrical Hazards

There are various ways of protecting people from the hazards caused by electricity, including insulation, guarding, grounding, and electrical protective devices. Laboratory workers can significantly reduce electrical hazards by following the precautions listed below:

- Avoid contact with energized electrical circuits.
- Disconnect the power source before servicing electrical equipment.
- Avoid handling electrical devices that are plugged in.
- If water or a chemical is spilled onto equipment, shut off power at the main switch or circuit breaker and unplug the equipment.
- If an individual comes in contact with a live electrical conductor, do not touch the equipment, cord or person. Disconnect the power source from the circuit breaker.
- For students in the power lab, do not operate the equipment unless your TA approves your connection.
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Student name

Student number

Signature



GENERAL LABORATORY SAFETY GUIDELINES

Awareness - Communication

- **BE FAMILIAR** with the locations and operation of safety and emergency facilities such as fire extinguishers, first aid kits, spill kits, emergency wash facilities, fire alarm pull stations, telephones, and emergency exits.
- **BE ALERT** to unsafe conditions.
- **PROMPTLY REPORT** unsafe conditions and accidents to your supervisor (TA, professor, lab technician).

Usage of Personal Protective Equipment - Proper Attire

- Wear clothing appropriate for the level of hazard. Lab coats (knee-length) and proper footwear are required for work involving chemicals, biohazards or radioisotopes. Gloves and safety glasses or safety goggles must be worn as required by the work being performed.
- **NEVER WEAR CONTACT LENSES** when working with hazardous chemicals, unless wearing safety goggles.
- Open and/or high-heeled shoes must **NEVER** be worn in laboratories.
- Long hair must be tied back or otherwise restrained when working with chemicals, biohazards, radioisotopes, open flames or moving machinery.
- Leave behind protective equipment (lab coats, gloves, etc.) when leaving the work area, except when going directly from one laboratory to another.
- Wash hands and arms with soap and water before leaving the work area.

Proper Usage of Laboratories

- Work spaces must be kept clean and free of clutter (chemicals, biological specimens, etc.).
- Smoking, eating, and drinking are NOT permitted in laboratories.
- DO NOT store food and drinks in laboratory refrigerators.
- DO NOT run in laboratories. Walk.
- All laboratory doors are fire doors. **THEY MUST BE KEPT CLOSED AT ALL TIMES.**
- **NEVER BLOCK** exits and passageways, or access to emergency equipment (i.e. eye wash stations, emergency showers, fire extinguishers, first aid kits and electrical panels).

Conducting Experiments

- **NEVER** perform unauthorized work, preparations or experiments.
- Consider safety issues **BEFORE** beginning work. Refer to Material Safety Data Sheets (MSDS) prior to using a product. Check all equipment for damage prior to setting up experimental apparatus.
- Select a suitable location. Experiments involving hazardous materials should be done in a vented fume hood.
- **ADVISE** supervisors of experiments in progress.
- **DO NOT** leave an experiment unattended if it represents a potentially hazardous situation.
- Perform a safety check at the end of each experiment. Make sure that gas, water, electricity, vacuum lines, air and heaters have been turned off unless required.



Proper Handling of Hazardous Materials

- Work with materials only when you know their flammability, reactivity, toxicity, and the emergency procedures associated with these materials. Refer to MSDS.
- Label reagents and samples according to WHMIS legislation.
- Keep an updated inventory of all chemicals stored in your laboratory.
- **DO NOT** remove chemicals from the laboratory without updating your chemical inventory.
- Store chemicals according to chemical compatibilities rather than alphabetical order.
- Store chemicals in appropriate locations (eg. flammable storage and acid storage cabinets).
- **DO NOT** leave reagent bottles, empty or full, on the floor or in the sink.
- Transport hazardous chemicals (eg. solvents) and chemical waste in approved bottle carriers or on special waste cart, if available.