

## Electrical Safety in the Laboratory Fact Sheet

The typical laboratory contains a wide variety of electrically-powered equipment including stirrers, shakers, pumps, hot plates, heaters, power supplies, ovens, and electrophoresis equipment. These and all electrical devices used in the lab setting present a potential danger of injury due to electric shock, fires due to poorly installed or maintained systems, or sparks serving as an ignition source for flammable or combustible materials.

### General electrical safety:

- Know the location of your electrical panels and shut-off switches so you can quickly disconnect power in the event of an emergency. Keep access to electrical panels and disconnect switches clear and unobstructed. The National Electric Code requires that the area in front of electric panels be kept clear for a distance of 3 feet.
- Please consider conducting periodic inspections of laboratory electrical equipment to be sure it is in good condition. Remove equipment from service if in poor condition and replace or have it repaired by a qualified repair person or company.
- Electrical outlets should have a grounding connection and accept three-prong plugs. Multiple plug outlet adapters should not be used.
- Do not use equipment with exposed electrical conductors.
- Do not modify or fabricate electrical equipment or power tools by yourself.



*Do not block electrical panel*

### Power supplies and cords:

- Inspect power cords periodically to be sure they are not frayed or have exposed wiring. Never use a homemade cord.
- Carefully place power cords so they don't come in contact with water or chemicals. *Contact with water may cause a shock hazard. Corrosives, oxidizers and solvents can degrade the cord insulation.*
- Cords should not dangle from counters or hoods. It may cause equipment to be unplugged, fall or be a trip hazard.
- Do not allow cords to contact hot surfaces to prevent melting insulation.
- Do not lift a piece of electrical equipment by the cord or pull the cord to disconnect from the outlet.
- Portable power supplies are commonly used in the labs and are extremely high electrical energy sources. Never attach an exposed connector such as an alligator clip to a power supply.



*Do not use frayed cords*

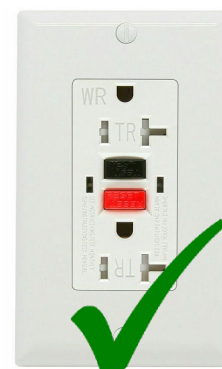
- Multi-strip outlets (cube taps) should not be used in place of permanently installed receptacles. If additional outlets are required have them installed by an electrician.
- Do not group gang electrical cords and power strips. The overload of electricity may cause the outlet to overheat and catch fire. Ensure that all cords are rated for the appropriate load and current.



*Do not group gang/overload power strips*

### **Circuit Protection:**

- No more than two high current draw devices such as ovens and centrifuges should be plugged into the same outlet to prevent an overloaded circuit. Overloading can lead to overheated wires and arcing. This can cause electrical shock injury and fire.
- Fuses and circuit breakers prevent over-heating of wires and other electrical components. This overload protection is useful for equipment that may be left on for a long time such as stirrers, drying ovens, vacuum pumps, etc.
- Ground-fault circuit interrupters, or GFCIs, disconnect current if a ground-fault is detected and protect the user from electric shock. GFCI outlets or portable GFCIs are used near sinks and potentially wet locations and are required by building code in such locations. Keep electrical equipment (and yourself while you are using electrical equipment) away from water/chemical or their spills unless you are sure the equipment is rated for this type of use.



*GFCI outlet*

### **Flammable materials away from electricity:**

- Keep flammable materials away from electrical equipment. The equipment may serve as a source of ignition for flammable or explosive vapors.
- Make sure that equipment used where flammable vapors may be present is specially rated to not produce sparks (i.e, is intrinsically safe). Many household appliances such as hot plates, refrigerators, vacuum cleaners, and drills don't meet this requirement.
- If refrigeration or freezing is needed, flammable materials should only be stored in intrinsically safe equipment that is rated for this purpose. These do not contain any spark sources such as lights and switches. See our [factsheet](#) for additional information.
- Use a variable autotransformer (i.e., a variac) to control the input voltage for heating mantles, heating tape, etc. as they may overheat, leading to fire hazard.



*Explosion proof refrigerator sticker*

### *References:*

1. Prudent Practices in the Laboratory – Handling and Disposal of Chemicals, National Research Council, National Academy Press, Washington, D.C., 1995
2. University of Iowa, Electrical Safety in the Laboratory. <https://ehs.research.uiowa.edu/electrical-safety-laboratory>