

# Gel Electrophoresis

**Mindfulness Minute:** Incorporate safety into your workflow by considering the hazards associated with your equipment and procedures each time they are in use.

*Gel electrophoresis uses electrical current passed through a gel to separate molecules like DNA, RNA, and proteins by size. Some processes like Western blotting involve additional use of electrical current to transfer the molecules onto a membrane. Because of the use of electrical current through conductive solutions, gel electrophoresis poses an electrical hazard in the form of electrical shocks and burns. Voltages between 50-100 volts can cause serious injury. A current of 50 to 150 milliamps can cause respiratory paralysis, ventricular fibrillation, or even death in some cases. Some power supply units may only display voltage, leaving the actual current unknown. Your skin protects you from electrical shock by providing electrical resistance; however, having wet skin lowers your body's resistance, causing lower voltages to become more dangerous. Chemicals used in gels, buffers, and stains (like polyacrylamide, ethidium bromide, and ethidium bromide substitutes) can also present chemical hazards.*

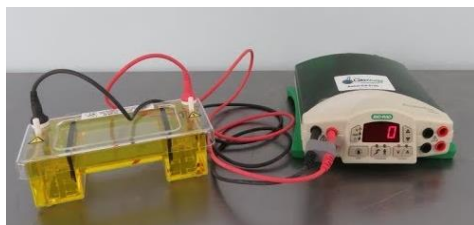
## Follow this list of dos and don'ts for gel electrophoresis system use:

**Do** keep the area around the apparatus clear. Position the power supply so that it is not necessary to reach across the apparatus to make connections or to turn the power on or off. Whenever possible, set the power supply on a shelf above the gel box.

**Do** have standard operating procedures (SOPs) for using your lab's specific electrophoresis apparatus including all pertinent safety information. You may use the template found here: [tiny.utk.edu/SOP](https://tiny.utk.edu/SOP)

**Do** dispose of gels and buffer contaminated with ethidium bromide and ethidium bromide alternatives according to the following guidance [tiny.utk.edu/ETBR](https://tiny.utk.edu/ETBR)

**Do** turn off the power supply and wait approximately 15 seconds before opening the lid and making any disconnections or connections as the voltage may not be completely discharged from the internal capacitors.



*The power supply will often show only the voltage (volts) or current (amps or milliamps) during the run, leaving the other value unknown.*

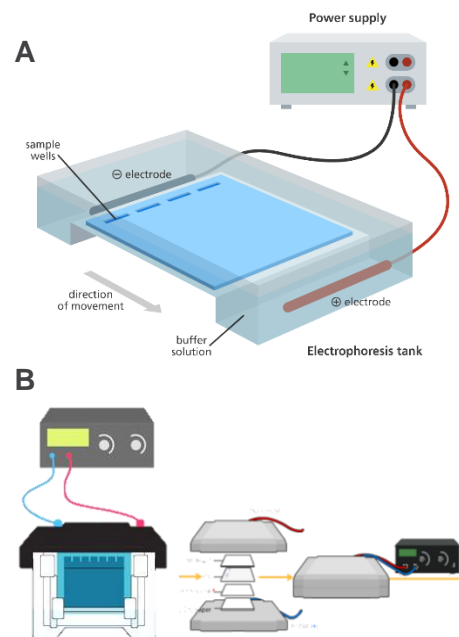
**Don't** rely on safety interlocks, as they can fail.

**Don't** ignore safety rules just because the voltage setting is low. Changes in load/resistance, equipment failure, or power surges could raise the voltage at any time. Some power supplies produce high voltage surges when they are first turned on, even if the voltage is set to zero.

**Don't** connect the leads or touch the electrical apparatus with wet hands or gloves, as this will lower your body's resistance which can increase the current going through your body.

## References:

[https://www.osha.gov/sites/default/files/2019-04/Basic\\_Electricity\\_Materials.pdf](https://www.osha.gov/sites/default/files/2019-04/Basic_Electricity_Materials.pdf)



A) Nucleic acid gel electrophoresis system set up.

B) Protein gel electrophoresis and Western blot transfer system set up.