

ELECTROPHORESIS SAFETY

(For assistance, please contact EHS at (402) 472-4925, or visit our web site at <http://ehs.unl.edu/>)

Electrophoresis units do not need to be operating at high voltages required for procedures such as DNA sequencing to present an electrical shock hazard. Even agarose gel electrophoresis operating at 100 volts or less can cause a lethal shock at a current of 25 milliamps. Precautions for safely operating electrophoresis apparatus to prevent electrical shock during use are described below.

General Precautions

- When locating, or working around or near an electrophoresis unit, avoid unintentional grounding points and conductors (e.g., sinks and other water sources, metal plates, aluminum foil, jewelry, pipes, or other metal equipment). If a darkened box is needed for light sensitive work, a black photographer's cloth will work as long as it does not come in contact with the buffer. Non-conducting benches (wood or plastic) and floors (and/or rubber mats) are recommended.
- Always think and look before touching any part of the apparatus. A thin film of moisture can act as a good conductor of electricity.
- Some power supplies produce high voltage surges when they are first turned on, even if the voltage is set to zero. Do not ignore safety rules just because the voltage is low. Changes in load, equipment failure, or power surges could raise the voltage at anytime.
- Do not touch any cooling apparatus connected to a gel. The current can be conducted through the tubing.
- Do not run electrophoresis equipment while unattended.
- If electrophoresis buffer is spilled or leaks from the gel box, stop the run and clean up the bench top immediately.
- Post "Danger—High Voltage" warning signs on the power supply and buffer tanks.

Selecting a Good Location for the Equipment

- Locate the equipment where it will not be easy to knock over or trip on.
- Place the electrophoresis unit and its power supply so that the on/off switch is easy to reach and the power-indicator light is easily seen.
- Always maintain adequate clearance around the apparatus. Do not permit leads to dangle below the lab bench. At the lab bench, position the power supply so that it is not necessary to reach across the apparatus to make connections to

turn the power on or off. Whenever possible, set the power supply on a shelf above the gel box. Good housekeeping is essential.

Pre-Operation

- Test the power supply to ensure that all switches, lights, and the floating output circuit is functioning properly. Record the inspection date and test for open circuit and GFI protection, if the power supply has this feature.
- Inspect insulation on the high voltage leads for signs of deterioration (e.g., exposed wires, cracks or breaks, etc.) and ensure that these items are not hanging over the benchtop.
- Check all safety interlock features, including alarms, for proper functioning. Don't override safety devices.
- Inspect the buffer tanks for cracks or leaks, exposed connectors, or missing covers, and correct deficiencies prior to use.
- Connect both supply leads at the same time (to prevent one lead from being live in your hand) to the power supply before turning on the power supply, or connect one lead at a time using one hand only.
- Ensure that your gloved hands are dry while connecting the leads or touching any electrical apparatus.

Post-Operation

- Turn off the power supply before opening the lid. Do not rely on safety interlocks, as they can fail.
- The user should always turn off the main power supply switch and wait 15 seconds (the voltage may not be completely discharged from internal capacitors) before making any disconnection or connections. After use, turn the power supply off before disconnecting both leads from the power supply.

Personal Protective Equipment and Training

- Principal Investigators or Lab Managers are responsible for providing instruction and demonstrating safe use of electrophoresis units to laboratory workers. Instruction should cover operating procedures written by the manufacturer and/or laboratory, as well as the associated hazards, the correct personal protective equipment (lab coats, gloves, and eye protection), and applicable emergency procedures.

References: Information contained in this SOP was gathered from the following sources: University of California-Berkeley, University of Vermont, and the University of California-Santa Cruz.