Standard Operating Procedure: SDS-Polyacrylamide Gel Electrophoresis

- Acrylamide is a suspected carcinogen and a known neurotoxin. Handle unpolymerized solutions of acrylamide with great care.
- Wear a lab coat, gloves, and eye protection when working with acrylamide. Avoid any contact of acrylamide solutions with skin. Replace gloves if they become contaminated.
- Pour gels in a fume hood when possible. Areas where gels are poured should be protected with a lab bench cover. Avoid splashes.
- Avoid handling powdered acrylamide by purchasing premixed solutions (in its powder form, the monomer is extremely dangerous because the dust can easily become airborne and enter the respiratory system).

Health Hazards for Acrylamide:

- Toxic! Ingestion may cause systemic poisoning. May cause drowsiness, tingling sensations, fatigue, weakness, stumbling, slurred speech, and shaking. May cause central and peripheral nervous system damage.
- Severe intoxication may cause permanent nerve damage. May affect reproductive system and act as a teratogen.
- Skin exposure may cause irritation and redness. Can be absorbed through the skin causing systemic poisoning; symptoms may parallel ingestion. For eye or skin exposure, flush with water for at least 15 minutes.

Refer to MSDS for additional safety information on Acrylamide. Refer to EH&S fact sheet (attached)

Running the Gel

Use caution when operating electrophoresis units, as the combination of high voltage and exposed liquid can be hazardous. Never operate the unit without its cover in place. Turn off power supply and, be careful when plugging and unplugging the electrical cables (it's safest to use one hand when doing this), and verify that the power supply is working properly.

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EH&S FACT SHEET Environment, Health and Safety Information for the Berkeley Campus

Electrophoresis Equipment: Guidelines for Safe Use

Electrophoresis units present electrical, chemical, and radiological hazards. All of these hazards need to be addressed before using the units. The Office of Environment, Health & Safety (EH&S) has prepared these guidelines and the accompanying checklist to assist researchers in safely operating electrophoresis units.

equipment setup

Proper Place electrophoresis units and their power supplies so that the on/off switch is easy to reach and the power-indicator lights are easily seen. Locate the equipment where it will not be easy to knock over or trip on.

Because electrophoresis work involves handling conductive liquids around electricity, power supplies should be protected by ground fault circuit interrupters (GFCIs). GFCIs act as very sensitive circuit breakers and, in the event of a short circuit, will stop the power before it can hurt a person. You can identify GFCIs by their "test" and "reset" buttons. They are found on some outlets or breaker boxes. An adapter type, which plugs into a standard outlet and does not require installation by an electrician, can be purchased at local hardware stores at prices starting at \$10.

Addressing electrical hazards

Electrophoresis units use very high voltage (approximately 2000 volts) and potentially hazardous current (80 milliamps or more). This high power output has the potential to cause a fatal electrical shock if not properly handled.

Routinely inspect electrophoresis units and their power supplies to ensure that they are working properly. Power supplies should be inspected to ensure that all switches and lights are in proper working condition, that power cords and leads are undamaged and properly insulated, and that "Danger—High Voltage" warning signs are in place on the power supply and buffer tanks.

Inspect the buffer tanks for cracks or leaks, exposed connectors, or missing covers. If your units have such hazards, replace the units with new models that have these safety features built in, or contact EH&S for information on individuals approved to perform retrofitting.



E H Office of Environment, Health & Safety University of California 317 University Hall #1150 Berkeley, CA 94720-1150 http://www.ehs.berkeley.edu (510) 642-3073

Chemical and radiological hazards	As with all research involving hazardous chemicals, laboratory personnel need to be familiar with any associated chemical and radiological hazards. Each laboratory must complete and post a UC Berkeley Chemical Hygiene Plan (CHP) flip chart and instruct laboratory users on its contents. The CHP flip chart has been developed to provide information on hazards, measures for controlling exposures, special precautions needed while working in the laboratory, emergency procedures, and additional resource information to help keep researchers safe. You can obtain a flip chart by calling EH&S at 642-3073. Laboratories that use radioactive materials must also obtain a Radiation Use Authorization and have their staff complete the associated training.
Training and work procedures	Principal investigators are responsible for providing instruction on the safe use of electrophoresis units to those in the laboratory who work with them. The instruction should cover the operating procedures written by the manufacturer or laboratory, as well as the associated hazards, the correct personal protective equipment, and applicable emergency procedures. As with all safety training, this instruction should be documented. Employees must wear all appropriate personal protective equipment when working with electrophoresis units, including lab coats, gloves, and eye protection. Do not leave electrophoresis units unattended for long periods of time since unauthorized persons may accidentally come in contact with the unit, or the buffer tank liquid may evaporate, risking a fire. Laboratories that perform electrophoresis work during off hours should consider using a "buddy system" to ensure that emergency services can be notified if someone is injured or exposed. It is also recommended that laboratory personnel be trained in CPR and in First Aid.
Electrophoresis safety checklist	The attached Electrophoresis Safety Checklist, can be used by laboratory personnel, principal investigators, department safety coordinators, or safety committees to determine whether the electrophoresis units and their power supplies are set up properly and are in safe working condition. Any hazards that are found must be addressed and the corrective actions documented. The equipment should not be used until all hazards have been safeguarded. Completed checklists noting corrective actions taken should be kept on file, and copies routed to the department's Safety Committee for review.
Additional resources	For additional information, please contact EH&S (642-3073).





UNIVERSITY OF CALIFORNIA, BERKELEY ELECTROPHORESIS SAFETY CHECKLIST

This form is to be used by researchers and other personnel involved in electrophoresis work to help ensure that the equipment and procedures are safe for use. The completed form should be discussed in lab groups and safety committees, and retained by the department.

Name of PI:	Department:	Department: Room #:			
Building:	Room #:				
Checklist Completed by:	Date:	_ Date:			
ADMINISTRATION AND TRA	INING ISSUES				
		YES	NO	N/A	
1. Is there an available manual or written procedure describing how to safely use the equipment					
2. Is instruction in the written procedure documented?					
3. Is the chemical hygiene plan (with emergency numbers) posted in the lab?					
4. Has training been provided and documented on associated chemical and electrical hazards?					
EQUIPMENT DESI	GN				
		YES	NO	N/A	
5. Is the power supply marked "DANGER - HIGH VOLTAGE"?					
6. Is the electrophoresis unit marked "DANGER - HIGH VOLTAGE"?					
7. Is the "ON" indicator light on the power supply working?					
8. Is the voltage indicator on the power supply working?					
9. Are all electrical contacts guarded?					
10. Are all power leads insulated and undamaged?					
11. Is the power supply electrical cord undamaged?					
12. Lotte power supply have a grounded 3-pin plug?					
13. Is the power supply plugged into a properly grounded outlet?					
14. Is there a ground-fault circuit interrupter (GFCI) in the circuit?					
15. Does the electrophoresis unit have interlocking safety covers?					
10. Is the power supply used as designed (with no piggybacking of	electrophoresis units):				
EQUIPMENT SETUP AND PERSONAL PR	OTECTIVE EQUIPMENT				
		YES	NO	N/A	
17. Are power and voltage indicators clearly visible from the workstation?18. Is the electrophoresis unit checked on a regular basis for adequate fluid level?19. Is the power supply "ON/OFF" switch readily accessible?					
20. Is the electrophoresis unit exterior dry with no spilled liquids?					
21. Are the electrophoresis units and power supply placed so as not to create another hazard?					
(e.g., reaching over energized units, leads crossing aisleways, easily knocked over, etc.)					
22. Do users wear eye protection, impermeable gloves, and lab coats?					
ADDITIONAL RECOMMENDED LABO	DRATORY PRACTICES				

- Use of a "buddy system" for staff working in the laboratory
- Providing CPR training for laboratory staff

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For each item marked "NO" above, list the needed corrective actions, a responsible person, and a correction due date. The unit should not be used until all hazards are safeguarded. Corrective actions should be documented here when complete.

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For additional information, contact the Office of Environment, Healt	h & Safety (642-3073).
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