



Electrophoresis

Description

This standard operating procedure outlines the process of electrophoresis, including the use of equipment and chemicals necessary for the process. Review this document and supply the information required in order to make it specific to your laboratory. In accordance with this document, laboratories should use appropriate controls, personal protective equipment, and disposal techniques when performing electrophoresis.

Electrophoresis uses electrical energy to separate molecules based on their size, structure, and electrical charge.

Potential Hazards

Electrophoresis equipment can pose significant electrical hazard in the laboratory. Typical electrophoresis units operating at 100 volts can provide a lethal shock of 25 milliamps. Take the following precautions:

Power Supplies:

- Inspect to ensure all switches and indicators are in proper working condition and that power cords and leads are undamaged and properly insulated.
- Label equipment with warning: "Danger Electrical Hazard."
- Connect to ground fault circuit interrupters (GFCIs).
- Use 3-prong plugs.
- Use power supplies with safety features that detect no-load, overload, sudden load change, short circuit, arc or ground leak, etc.

Connecting Leads:

- Turn off main power supply before connecting or disconnecting electrical leads.
- With dry gloved hands, connect one lead at a time using one hand only.
- Be sure that leads/banana plugs are fully seated.

Using Equipment:

- Don't run equipment unattended.
- Keep equipment clear of unintentional grounding points and conductors (e.g., sinks or other water sources, metal plates, jewelry, aluminum foil, pipes or other electrical/metal equipment).
- Gel chamber must have a lid or cover with safety interlocks to prevent accidental contact with energized electrodes or buffer solutions.
- Gel chamber exterior must be dry with no spilled solutions. Check for leaks.
- Switch off all power and unplug the leads before opening the gel chamber lid or reaching inside the gel chamber.

Hazardous chemicals

Commonly used in conjunction with electrophoresis work include:

- Ethidium bromide – mutagen, irritant
- Acrylamide – carcinogen, neurotoxin, irritant
- Phenol – corrosive, toxic
- Chloroform – suspect carcinogen, toxic

Always review the Safety Data Sheet prior to working with any hazardous material.

Laboratory personnel may be exposed to **thermal hazards** posed by liquefied gels.

Ultraviolet (UV) light boxes are often used in visualizing ethidium bromide gels and pose potential exposures to UV radiation.

Engineering and Work Practice Controls

- Read and follow manufacturer's instructions for electrophoresis equipment.
- Prepare Standard Operating Procedure relevant to health and safety.
- Consult with PI prior to initial use of electrophoresis equipment. Discussion should include special hazards and safety precautions.
- Measure, mix and handle all hazardous powdered chemicals or gel prep mixtures with hazardous components (e.g., acrylamide monomer, ethidium bromide, phenol, ammonium persulfate, and formaldehyde) in a fume hood.
- Purchase pre-made gels or pre-mixed acrylamide and ethidium bromide solutions instead of making your own.
- Consider using [ethidium bromide substitutes](#).
- Exercise caution when using microwave to liquefy gels – don't use sealed containers, beware of superheated liquids that may froth up unexpectedly. Let hot gel preps cool to 50°-60°C before adding ethidium bromide or pouring into trays. Wear insulated gloves and point the flask opening away from you.

Protective Equipment

- Wear lab coat with fully extended sleeves, safety glasses or splash goggles if appropriate, nitrile gloves (latex is not effective), pants, and closed-toe shoes.
- Wear appropriate skin and eye protection for UV radiation work.

Waste Disposal

Hazardous Waste Management: Handle and store hazardous waste following the guidelines above for work practice controls, transportation and storage. Contact Environment, Health and Safety with questions and to schedule a pickup of hazardous waste. For more information regarding chemical waste, refer to UM-Flint Hazardous Waste Management Program and EHS webpage <http://www.umflint.edu/ehs/environment-health-and-safety>.

Non-Hazardous Waste Management: Some gels may be considered non-hazardous but still present a health hazard if untreated or discarded into the normal trash. Contact EHS for proper collection and disposal.

Exposures/Unintended Contact



If the employee is in need of emergency medical attention, call 911 immediately.



For an actual chemical exposure/injury:

- Remove contaminated clothing. Flush exposed eyes or skin with water for at least 15 minutes. Seek medical attention (see below).
- For inhalation exposure, remove all persons from the contaminated area. **Get medical aid.**
- If an ambulance is needed, call the UM-Flint DPS at 911 from any university telephone or (810) 762-3333 from any cell phone or non-university telephone to request assistance.

Contact EHS for advice on symptoms of chemical exposure, or assistance in performing an exposure assessment.

Report all work related accidents, injuries, illnesses or exposures to UM-Flint DPS. Additionally, employees and supervisors must be sure to report the injury to EHS and complete and submit the [Illness and Injury Report Form](#) to WorkConnections within 24 hours. Follow the directions on the WorkConnections website [Forms Instructions](#) to obtain proper medical treatment and follow-up.

If you were involved in or observed an incident or near miss, please complete the [EHS Laboratory Incident and Near-Miss Report Form](#). This will be valuable in improving laboratory safety on UM-Flint campus.

TREATMENT FACILITIES:

<u>MAJOR INJURIES</u>	<u>MINOR INJURIES –During Business Hours</u>	<u>MINOR INJURIES –After Business Hours</u>
Genesys Hospital One Genesys Parkway Grand Blanc, MI 48439 (810) 606-5710 Hurley Medical Center One Hurley Plaza Flint, MI 48503 (810) 262-9000 McLaren Hospital Flint 401 South Ballenger Hwy Flint, MI 48532 (810) 342-2000	Genesys Occupational Health Network 1460 Center Rd. Burton, MI 48509 (810) 715-4620 Mon. to Fri. 7:30 am to 10 pm Sat. & Sun. Noon to 8 pm McLaren Flint-Burton OCC Center 1459 S. Center Rd. Burton, MI 48509 (810) 496-0900 Mon. - Fri. 8 am to 8 pm Sat & Sun 10 am to 2 pm	Downtown Flint 420 S. Saginaw St. Flint, MI 48502 (810) 762-1550 Genesys East 1096 S. Belsay Rd, Suite F Burton, MI 48509 (810) 743-3351 Genesys North 4154 W. Vienna Rd Clio, MI 48420 (810) 686-7397 Genesys South 8447 N. Holly Rd Grand Blanc, MI 48439 (810) 603-0856 Mon. - Fri. 6 to 10pm / Sat. & Sun. 1-10pm

Click [here](#) for more information on the UM – Flint Emergency Preparedness and Response Plan.

Spill Procedure

- When a spill occurs, ***personal safety should always come first.***
- Alert and clear everyone in the immediate area where the spill occurred.
- Follow spill procedures described in the SOP and SDS for the particular chemical spilled.

Report all emergencies, suspicious activity, injuries, spills, and fires to the UM-Flint Department of Public Safety (DPS) at 911 from any university telephone or (810) 762-3333 from cell phone or non-university telephone. Register with the [University of Michigan-Flint Emergency Alert System](#) via Wolverine Access. Also, preprogram the UM-Flint DPS telephone number (810) 762-3333 into your cell phone for quick, easy use.

Training of Personnel

All personnel are required to complete Laboratory Safety Training. Documentation of the training is required. This training can be accomplished by completing the ***Comprehensive Laboratory Safety*** session (**BLS009** or equivalent) via [MyLINC](#), or UM-Flint EHS on-line training or other equivalent approved by EHS. Furthermore, all personnel shall read and fully adhere to this SOP when performing electrophoresis.

Certification

I have read and understand the above SOP. I agree to contact my Supervisor or Lab Manager if I plan to modify this procedure.

Name	Signature	UM ID #	Date

Prior Approval required – Is this procedure hazardous enough to warrant prior approval from the Principal Investigator? YES NO

Principal Investigator _____

Revision Date _____