



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 EHS at (313) 593-0921 with questions and to schedule a pickup of hazardous waste. Also, refer to EHS's [Hazardous Waste Webpage](#) for more information.

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 HMM 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 Public Safety at (313) 593-5333 or 911 from a campus phone to request assistance.

Report all work related accidents, injuries, illnesses or exposures to WorkConnections within 24 hours by completing and submitting the [Illness and Injury Report Form](#). Follow the directions on the WorkConnections website [Forms Instructions](#) to obtain proper medical treatment and follow-up.

Complete the [EHS Laboratory Incident and Near-Miss Report](#) form.

TREATMENT FACILITIES:

Midwest Medical Center -- *Campus Employees (including student employees)*

Mon-Fri 7:30 am - 4:30 pm

9301 Middlebelt Road

Romulus, MI 48174

Phone: 734-941-1000

After hours - go to:

Midwest Medical Center

Open 24/7

4700 Schaefer

Dearborn, MI 48126

Phone: 313-581-2600

Henry Ford Medical Center-Fairlane -- *University students (non-life threatening conditions)*

19401 Hubbard Drive

Dearborn, MI 48126

Phone: 313-928-8278

Click [here](#) for more information.

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 Public Safety by calling at (313) 593-5333 or 911 from a campus phone. Register with the University of Michigan-Dearborn [Emergency Alert System](#).

Training of personnel

All personnel are required to complete the ***Comprehensive Laboratory Safety*** session (**BLS009** or equivalent) via [MyLINC](#). 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 _____