

Biology and Wildlife
STANDARD OPERATING PROCEDURE
Electrophoresis with Agarose Gels and TAE/TBE Buffer

Location(s): Murie 204, 206, 211, 306

Chemical(s): varies depending on procedure; consult your procedure and the appropriate Safety Data Sheets (SDS). If using other hazards, follow any additional SOPs as appropriate.

Specific Hazards:

- Electrophoresis equipment can be an electrical hazard. Typical equipment operating at 100 volts can cause a lethal shock.
- If ethidium bromide is used in the gel or buffer, the SOP for ethidium bromide use must be followed. Ethidium bromide use in B&W teaching labs is strongly discouraged because safer, equally effective alternatives are available.
- If UV light will be used for visualizing bands, the SOP for UV light sources must be followed.
- If other hazardous materials are used, the appropriate procedures must be followed.

1. Purchasing:

- If materials are needed, the Laboratory Supervisor and Laboratory Technician should be contacted well in advance of the date materials are needed. Both must be contacted so that the purchase and the relevant safety concerns can be addressed.
- Gels are typically prepared following instructions in the lab protocol, but are sometimes ordered. Liquefied agarose poses a thermal hazard and must be handled with caution.

2. Storage:

- Electrophoresis equipment is stored in labs and in shared equipment areas. Equipment must be inspected prior to and after every use.

3. Authorized personnel:

- Instructors are authorized to train TAs on the use of electrophoresis equipment. Instructors may request training be done by the Laboratory Supervisor if they do not feel capable of providing training.
- TAs are authorized to train and supervise students on the use of electrophoresis equipment once the TAs have been trained.

4. Training requirements:

The user must demonstrate competency and familiarity regarding the safe handling and use of these materials prior to using them. Training shall include the following:

- Review of this SOP
- Review of other SOPs relevant to the specific materials to be used.
- In-person training on the set-up and use of the equipment.

5. Use location:

- Electrophoresis can be done in any of the teaching labs or prep rooms, on any of the tables or benches.
- If multiple electrophoresis power supplies are being used in a particular lab, or electrophoresis rigs and other equipment that requires power, they should be dispersed among tables to avoid overloading circuits.
- Electrophoresis rigs should be separated from other electrical equipment and from liquids to minimize electrical hazards.

6. Personal protective equipment (PPE):

All personnel are required to wear the following personal protective equipment (PPE) whenever conducting this procedure:

- Nitrile gloves
- Safety glasses

7. Spill equipment:

- No special spill equipment is needed for electrophoresis with TAE/TBE and agarose gels. Continue to wear PPE while attending to the spill.
- See section 12 of this SOP for instructions on handling a spill.

8. Procedure:

Materials needed:

- Electrophoresis power supplies and chambers
- Gel trays (optional, not necessary)
- Buffer (TAE (Tris Acetate-EDTA) or TBE (Tris Borate-EDTA), mixed to appropriate concentration as specified in lab protocols)
- Agarose gels
- Pipets and tips for loading samples
- Container for used tips
- Samples to be loaded
- Loading dye

Procedure Notes:

Whenever the chamber (rig) is open, the power should be off and the unit should be disconnected from the power supply. Never leave running equipment unattended.

Before beginning:

- Inspect the area to make sure that it is dry and free of conductive materials (aluminum foil, pipes, other electrical equipment, etc.) and all outlets are in working order.
- Inspect the unit to make sure that it is in working order. Make sure that all leads and cords are undamaged and in working order.
- Make sure that connections between the unit and any cords or leads are secure.
- Use ground fault circuit interrupters (GFCIs). Do not use outlets that are not GFCIs.
- Use only 3-prong plugs. Never modify plugs to fit an outlet.
- Make sure that the power unit includes safety features that detect no-load, overload, sudden load changes, short circuits, arcs, ground leaks, etc.

Procedure Steps:

- Don PPE.
- Gather materials.
- Load gel into the chamber so that it is positioned with the wells at the black (negative) end. This will allow the samples to move toward the positive end (“run to red”).
- Load buffer into chamber.
- Prepare samples for loading; add loading dye as specified in the procedure.
- Load samples.
- Secure lid on chamber.

8. Connect leads to power supply; red to red, black to black. The power supply should NOT be plugged in at this time. Wear dry gloves and connect only one lead at a time with only one hand. Be sure that the leads are fully connected. All chambers that will be connected to the power supply must be connected before the power supply is turned on. Plugging in a chamber while the power is running will cause a change in the load and trigger the power supply to display an error message and stop running.
9. Be sure the outside of the chamber and the workspace are dry.
10. Plug in the power supply.
11. Turn on the power supply. Set the parameters as specified in the procedure.
12. Allow the gel to run.
13. When done, turn off the power supply and unplug it.
14. Disconnect the leads from the power supply.
15. Remove the lid.
16. Remove the gel from the chamber for staining and/or visualization. Follow your specific lab protocols for this.

9. Waste disposal and clean up:

- The following apply only to procedures done without any hazardous chemicals.
- Used TAE and TBE can be disposed of down the sink. Flush sink with water.
- Gel rigs should be washed and thoroughly rinsed with tap water, then **rinsed three times with RO water**. Allow to air dry.
- Agarose and polyacrylamide gels stained with non-hazardous dyes (e.g. Bio-Rad's Fast Blast stain, GelRed, etc.) may be disposed of in regular trash.

10. Decontamination:

Not applicable for standard electrophoresis with non-hazardous chemicals.

11. Exposures: General emergency procedures to be followed are listed below. Users must review the SDS for any and all materials they will be using during electrophoresis and comply with the exposure protocols contained in the SDS. If the specifications in the SDS for a chemical are more restrictive than those listed below, follow the more restrictive exposure response specifications.

Eye contact for any or all chemicals used in these procedures

Flush eyes with water as a precaution.

Skin contact for any or all chemicals used in these procedures

Wash off with soap and plenty of water.

Ingestion for any or all chemicals used in these procedures

Never give anything by mouth to an unconscious person. Rinse mouth with water.

Inhalation

If breathed in, move the person into fresh air. If not breathing, give artificial respiration and call 911.

12. Spills:

- If a spill occurs, personal safety should come first.
- Alert everyone in the area where the spill occurred.
- Shut off and unplug the power unit if it is safe to do so. Shut off and unplug any other electrical equipment in the area that could pose a shock hazard.
- Clean up TAE, TBE or water with paper towels. Paper towels may be disposed of in the trash. If hazardous chemicals are being used in your electrophoresis procedure, follow the spill instructions in the appropriate SOP.

13. Phone numbers:

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| Biology and Wildlife Laboratory Supervisor | 474-5622 |
| EHSRM Hazardous Materials (if B&W Lab Supervisor not available, assistance with a spill) | 474-5617 |
| EHSRM Industrial Hygiene (if Hazardous Materials not available; assistance with exposures) | 474-6771 |
| EHSRM office (if Hazardous Materials or Industrial Hygiene not available) | 474-5413 |
| University of Alaska Fairbanks Emergency Response (serious accidents, fire) | 911 |

14. Other important information:

N/A

Training Record

I, the undersigned, have read and understand the above SOP. I have been trained to carry out this procedure and will follow the above SOP. I agree to contact my Supervisor and the Biology and Wildlife Laboratory Supervisor if I want to modify this procedure and obtain permission for any modifications before implementing them.

| Name | Signature | Date | Person Providing Training |
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Prepared by: Denise Kind
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