STANDARD OPERATING PROCEDURE

Gel Electrophoresis

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Minimum Personal Protective Equipment Required: Lab coat, long pants, closed toed shoes, gloves, heat protective gloves when handling hot agarose, appropriate gloves for the chemicals and dyes being worked with.

Risks: Electric shock from the electrophoresis equipment power supply could cause burns, damage to the skin, muscles, and nerves or even death.

Burns from heated agarose solutions; superheated liquids that suddenly and unexpectedly boil.

Exposure to toxic substances: ethidium bromide, commonly used to visualize nucleic acid, is a potent mutagen that can be absorbed through the skin. Acrylamide is a potent nerve toxin in its unpolymerized state; the polymerization process is never fully complete and small amounts of acrylamide monomer are always present. Various catalysts, denaturants, stains and solubilizing agents contain a variety of chemicals, including formamide, phenol and acrylamide.

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

Special Handling:

- ✓ Always **THINK** and **LOOK** BEFORE YOU TOUCH any part of the apparatus
- ✓ Always be sure your HANDS ARE **DRY** before you TOUCH ANY electrical apparatus
- ✓ DO NOT TOUCH any part of the apparatus while the power is ON not even the plastic parts. A thin film of moisture can act as a good conductor of electricity.
- ✓ If electrophoresis buffer is spilled or leaks from the gel box, STOP the run and clean up the bench top.
- ✓ Be aware that high voltage surges can occur when the apparatus is first turned on, even if the voltage is set to zero.
- ✓ Remember: Power Supply ON last... OFF first!

Protocol/Procedure:

Prior to starting

1. Inspect the power unit, cords and electrophoresis chamber for any damage
    a. Check power cords and leads for frayed, cracked or dried out cords; exposed copper wire; corroded or loose-fitting plugs, loose electrode connection nut.
    b. Inspect the electrophoresis chamber for buffer leaks, caused by cracks in the plastic or deteriorating gaskets.
    c. Inspect the safety guards to ensure proper function, including no load sensors, open load sensors, and ground leakage detectors on the power supply and safety interlocks on the cover.

    d. Discard and replace any parts that do not pass inspection and alert Ying or Joy.
2. Avoid and remove any unintentional grounding points and conductors (jewelry, sinks, water sources, aluminum foil, etc.). Ensure that hands are dry while connecting leads.

Preparing gel (prepare gel per application-specific protocol)

1. Exercise caution when using a microwave to melt agarose solutions, don't use sealed containers
2. Wear insulated gloves and point the flask opening away from you when removing from microwave. Superheated liquids may suddenly and unexpectedly boil, which could cause hot agarose to overflow container.
3. Let hot agarose solutions cool to 50°-60°C before adding ethidium bromide or pouring into trays.
4. Cast gel into the electrophoresis chamber
5. Handle gels with caution, wear gloves and wash hands often.
6. Pour electrophoresis buffer into the gel box to cover the gel 1-2 mm.
7. Load samples and close the safety interlock lid.

Setting up apparatus

1. Make sure power is off and gloves are **dry**
2. Connect one lead at a time, using one hand only
3. Be sure that leads are fully seated
4. Make sure buffer has not splashed onto power unit, gel box, or around gel box

Running a gel (run gel per application-specific protocol)

5. Make sure gel is oriented correctly - DNA is charged negatively and will run towards the positive (red) electrode.
6. Turn power on and set voltage and current
7. Tiny bubbles will rise from the electrodes when the power supply is properly connected.
8. Do not leave electrophoresis equipment unattended while in operation.
9. In the event of a spill or leak during a run:
    a. Do NOT touch the buffer.
    b. Turn OFF the power supply.
10. Once run is complete, turn off the main power supply switch and wait 15 seconds to ensure complete voltage discharge.
11. Disconnect leads from the power supply one at a time, touching only the insulated part of the lead
12. Turn voltage and current setting back to 0
13. Open the safety-interlock lid and lift the gel from the buffer tray
14. Dump remaining buffer down drain, rinse gel box with water to remove salts, and place on glassware rack to dry
15. Make sure gel area is tidied up - empty trash, remove and items that do not belong in gel area, clean up any spills.