

**LOCAL JOINT HEALTH AND SAFETY COMMITTEE
DEPARTMENT OF BIOMEDICAL SCIENCES
STANDARD OPERATING PROCEDURE**

1. SAFE AND PROPER USE OF GEL ELECTROPHORESIS EQUIPMENT

Effective Date: January 2003

Author: Ann Maslen, Staff Technician

Purpose: To promote safe and proper use of electrophoresis power supplies and associated electrophoresis equipment.

Approvals Required: Faculty Supervisor, Local JHSC, EHS

1. DEFINITIONS:

Power Supply (Power Pack): A unit which can deliver a safe and precise amount of current (mA), voltage (V), or power (W) as required by the application.

Gel Electrophoresis: A method of separation of individual molecules through a gel matrix in an electric field which is dependent on ratio of charge to mass.

Electrical Shock: The effect produced on the body, and in particular the nerves, by an electrical current passing through it. **The magnitude of the shock depends on the current flow, usually measured in milliamperes (mA) rather than by voltage measured in volts.** It is possible to have extremely high voltages with little current and have no injury occur in the voltage discharge.

Watt (W): A unit of power equal to one joule per second.

Current (A or mA): The amount of electrical charge flowing past a specified circuit point per unit time. **Current is measured in amperes or milliamperes (A or mA).**

Volt (V): A unit of electrical potential.

Thus: Power (W) = Current (A) x Voltage (V)

Current (A) = Power (W) ÷ Voltage (V)

Voltage (V) = Power (W) ÷ Current (A)

Also: Voltage (V) = Current (A) x Resistance (*Ohm's Law*).

Short Circuit: A low resistance connection established by accident or intent in between two points in an electric circuit. The current tends to flow through it.

3. REQUIREMENTS:

All persons must have WHMIS training and have completed departmental safety orientation. University of Guelph Safety Policy Manual 851.07.13
Ontario Reg. 851, Sections 40, 44.

4. TASK:

- Read the owner's manual provided with the power supply before using the equipment.
- Ensure that the power supply is CSA inspected and approved and is placed in an area with adequate clearance (minimum 6 cm) on all sides. Vents must be unobstructed so fans and the unit **do not** overheat.
- The power supply should be located away from sinks or any area where it may be subjected to liquid spills or splashing. **Do not operate near solvents and/or their vapours** (therefore use caution when setting up in a fume hood). If the power supply is moved from a cold room to ambient room temperature, allow a minimum of two hours for it to equilibrate to room temperature, thus preventing condensation and possible short-circuits in the unit. Always plug the power supply into a grounded, three-pronged outlet.
- Set-up electrophoresis equipment. Make sure the proper buffer is added to the recommended level. Ensure that the apparatus is located away from the edge of counters and high traffic areas where it may get bumped or knocked, but placed close enough to the power supply so that the

wire leads connecting the tank to the power supply are not stretched or block other equipment. Place the lid on the electrophoresis tank. **Never operate the electrophoresis tank without a lid in place.** Correctly attach the wire leads to the electrophoresis tank, i.e. **Red to red and black to black.**

- With the power supply **OFF**, attach the wire leads to the power supply, i.e. **Red to red and black to black (or blue).** Turn the power supply on and set the controls so current or voltage is the limiting factor, then adjust the setting to what is appropriate for the application. **NB.** A single power supply can concurrently run more than one electrophoresis tank, but if current is the controlling unit, remember to multiply the setting by the number of gels being run. This multiplication factor does not apply to Voltage. Start the power to the electrophoresis tank by pushing the start or run button on the power supply.

- Post a warning sign at the tank, e.g. **!!CAUTION: HIGH VOLTAGE, EXPERIMENT IN PROGRESS, DO NOT TOUCH!!**

- At the conclusion of the electrophoresis run, push **STOP** or **END** on the power pack, then **turn off the power supply switch and remove the leads attached to the power supply first.** Only then is it safe to remove the leads and lid from the electrophoresis tank. If the electrophoresis run is left unattended, especially after normal working hours (overnight), appropriate warnings and information should be placed on or near the equipment in addition to the regular warning sign.

5. **CONTINGENCY PLAN AND REPORTING:**

Hazards in the use of electrophoresis equipment may include electric shock or death by electrocution, and fire or explosion from ignition of flammable vapours from other sources. Check that First Aid, CPR and Fire Safety measures are in place before starting the work.

6. **WASTE MANAGEMENT:**

Electrophoresis buffer can be flushed down the drain with adequate amounts of cold tap water. Transfer buffer containing 10% or more of methyl alcohol used for “Western Blot” electrophoresis is considered to be a flammable solvent and for environmental purposes must **not** be disposed of down the sink. Buffer containing 10% or more of methyl alcohol should be bottled up and sent out as flammable waste using the services of Environmental Health and Safety.

7. **REFERENCES:**

University of Guelph Safety Manual
Physics Text Books
Owner's manuals as applicable:
Amersham Pharmacia Power Supply EPS601
BioRad Power Pak 300

8. **DISTRIBUTION OF COPIES:**

Technicians, Graduate Students, Project Students, other employees of the University of Guelph working in the lab

Dr. _____, Faculty Supervisor
Environmental Health and Safety
Local Joint Health and Safety Committee

Written By: A. Maslen, Staff Technician

Approved By: Faculty Supervisor

Date: April, 2003