

# Electric Field Exploratory Lab

**Set-up: ( DO NOT TURN THE POWER ON UNTIL INSTRUCTED )**

1. Fill the bowl with  $\frac{1}{2}$  inch of water and place over a sheet of graph paper.
2. Attach the two alligator clipped ends of the wire to the power source where it reads 0-20 volts and has black and red connectors.
3. Attach the other two ends to the two wire electrodes and place in the dish that should have about  $\frac{1}{2}$  inch of water.
4. Clip one end ( the red end ) of the multimeter to the electrode that is attached to red connector on the power source.
5. Turn on the multimeter and the power supply and turn the power up to 10 volts.
6. On a separate sheet of graph paper, draw the placement of the electrodes as closely as possible to the places that they appear in the bowl.
7. Using the black probe, find eight points that all read the same voltage. Make these same places on a separate piece of graph paper. For Example: 6 places were the voltage is 7.00 volts. ( 70 decivolts )
8. Repeat the above for 4 other voltages (30 data points).
9. Cut another length of wire and form a different shape and repeat the experiment. Examples: bars, larger circles, and triangles.

## Analysis

1. Select a potential for which an equipotential line is to be prepared (60 decivolts for example) and scan the printout of [A] for spots having this potential. Mark these spots with a light dot. It may be necessary to estimate the location of a potential in a certain area based on potential values at neighboring points. For example, 60 decivolts may not appear in a certain row or column but you can estimate its position between neighboring data points of 53 and 62 decivolts. Identify a sufficient number of points to allow a reasonably smooth line to be drawn through these points.
2. Using the procedure described above, map about eight equipotential lines for the given electrode configuration. The lines should be uniformly spaced over the entire printout. Be sure to label the relative potential corresponding to each line.
3. Electric field lines are constructed by drawing a single line from one electrode to the other in such a manner that it will be perpendicular to every equipotential line it intersects. A representative field line may be drawn by first selecting a point on one electrode and lightly sketching a line to the closest equipotential so that the lines intersect perpendicularly. Continue moving from one equipotential to the next until you reach a point on the other electrode. Redraw the field line smoothly using a dotted line.
4. Electric field lines are directed from the positive electrode to the negative electrode. Be sure to indicate each line's direction on your field map diagram by using arrows.
5. Locate about 10 electric field lines for each electrode configuration. Space them as uniformly as possible and distribute them over the entire printout of matrix [A].