

# Investigation 11.B: Modelling Resting Membrane Potential

## HANDOUT

**Question:** How does the resting neural membrane generate an electric potential?

## Safety Precautions

Wash your hands after completing this investigation, or immediately if your skin is exposed to the solutions used. Wear goggles to protect your eyes against accidental splashes. The solutions used are irritating to the eyes.

## Materials

- 3 mol/L sodium
- 22 cm of moistened
- string
- elastic band
- pen
- 3 mol/L potassium chloride solution chloride solution
- 2 strips of uninsulated dialysis tubing copper wire, each 40 cm long
- DC millivolt meter
- 400 mL beaker

## Procedure

1. With your group, take the two 40-cm strips of copper wire and tightly wind one end of each around a pen in order to form a coil of about 8 cm.
2. Attach the uncoiled ends to the millivolt meter, as shown below. Each wire will serve as an electrode.
3. Pour about 300 mL of the sodium chloride solution into the 400 mL beaker. Take the copper electrode attached to the positive terminal of the meter, and immerse the free end in the solution.
4. Tie off one end of moistened dialysis tubing. Fill two thirds of the tubing with potassium chloride solution. Place the free end of the other copper electrode in the solution in the tubing. Secure the end of the tubing around the wire with an elastic band.
5. While another group member observes the needle on the millivolt meter, place the dialysis tubing in the beaker that contains the solution of sodium chloride. (If sensor probes are available, these can be used to measure and monitor the electric potential.)
6. Leave the dialysis tubing in the beaker, and continue to monitor the electric potential every 5 min, until a trend is established. Record each value in the data table on the following page.



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Time (min)	Electric potential (mV)

### Analysis

1. Graph the data from your data table.
2. Explain what the dialysis tubing, potassium chloride solution, and sodium chloride represent in this model of a resting neuron.
3. Compare the electric potential created in this model with a resting membrane potential in a neuron.



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7. a) How did your model illustrate the mechanism of ion channel diffusion?

b) Summarize all the factors that establish resting membrane potential in a neuron, including the mechanism of ion channel diffusion illustrated by your model.