

“ POTATO POLARITY TESTER”

Electrolysis is the passing of an electric charge through certain conducting liquids called electrolytes to produce a chemical change. The current is conducted by the migration of positive ions (cations) to the cathode (negative electrode) and negative ions (anions) to the anode (positive electrode). Reactions take place at the electrodes by transfer of electrons to or from them. The electric current generated by the battery used in this experiment will cause electrolysis of the water in the potato.

Materials: one nine volt battery; two pieces of insulated copper wire approximately 6 inches long with about 1 inch of insulation removed from each end of the wire; one potato cut in half; tape.

Procedure:

1. Attach one end of a wire to the positive pole and one end of the other wire to the negative pole. You may use a little tape to hold the wires in place.
2. Stick the free end of the wires into the potato about an inch apart.
3. Wait and watch. Record your qualitative observations in the data table.
4. Plug the voltage probe into *Channel 1* of the EA-100 and push the red **“ON”** button. If you do not see the word **“multimeter”** in the lower left hand corner, push the **MODE** button one time and it should appear. The words **“sampling”** and **“done”** should be flashing above the word multimeter. *Channel 1* and the v symbol should also be visible on your screen. A meaningless voltage of $\sim 2.00v$ will be on the screen at this point. Just ignore this reading.
5. Pull back on the red spring cap at the end of one of the probe wires exposing the copper hook at its end. Attach this hook to part of one of the exposed copper wires stuck into the potato. Repeat this procedure with the black hook and part of the exposed end of the other piece of wire.
6. When the voltage reading stabilizes, write down this value. If the reading is $-$, switch the position of the red and black clamps on the voltage probes. You should now get a positive reading. Describe any reaction occurring at the red or black clamp.
7. Touch a piece of **red** and a piece of **blue** litmus paper to the moist area around each piece of Cu wire stuck into the potato. Record the results for each piece of litmus paper on your data table.

Questions:

1. Write the equation for the decomposition of water.
2. Which product is being produced at the anode? At the cathode?
3. At which electrode is there a chemical reaction occurring between the product being formed and the Cu wire? Write an equation to describe this reaction.
4. What do your pH measurements at each electrode indicate? Write an equation to describe this process.
5. How do your observations with the volt meter confirm the identity of the anode and cathode? (i.e., why were you instructed to switch the cables in step 6 if you got a negative reading?)

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