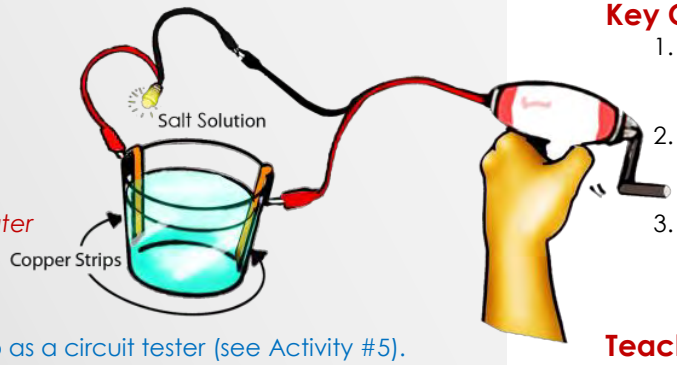
Activity 15

Salt Water Electrolyte

Materials

GENECON with output cord
1 bulb (3.8V, .3A) in socket
2 Coppers strips
- *Small clear plastic cup*
- *Table salt*
- *Stir stick*
- *Distilled and/or tap water*
- *Sandpaper*



Procedure

1. Set up the GENECON and bulb as a circuit tester (see Activity #5). Pour a small mound of table salt on to a piece of paper. Test the dry salt with the two open leads to determine if it is a conductor of electricity. (Since the bulb does not light, apparently salt is a non-conductor.)

2. Lightly use the sandpaper on the copper strips to remove corrosion. Bend the tops of each strip so that they can be suspended from the plastic cup. Fill the cup with tap water. Connect the open leads of the GENECON circuit tester to the copper strips as in the sketch above. Operate the GENECON to see if the water will conduct electricity and light the bulb. (Water is a poor conductor so this is not likely).

3. Now add about one teaspoonful of the table salt to the cup and stir it to facilitate its going into solution. Test the conductivity of the salt water. (If the bulb does not light, add a little more salt.)

Key Concepts

1. Dry table salt is not a good conductor of electricity.

2. Pure water is not a good conductor of electricity

3. An electrolyte is a solution which will conduct electricity. Salt is an electrolyte.

Teaching Tips

1. Students must understand that while pure water is not a good conductor of electricity, most water contains impurities which allow it to conduct current. If the current is large, as it is in houses and elsewhere, the combination of water and electricity can be dangerous, even fatal.

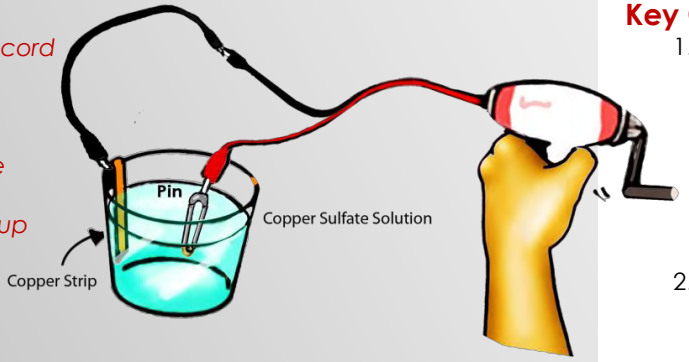
2. The roles of **ions** in forming electrolytes should be discussed here.

Activity 16

Electroplating

Materials

GENECON with output cord
Polarity tester
1 Copper strip
- *28 Grams of Copper Sulfate*
- *Safety pin*
- *Clear plastic cup*
- *Warm water*
- *Tissue paper*



Procedure

1. Dissolve 28 of copper sulfate in a clear plastic cup about ¾ full of warm water.

2. Lightly sand the copper strip prior to attaching it to the **positive** lead of the GENECON. Check the polarity with the tester provided if necessary (see Activity #2 for details). Attach the other GENECON lead to the safety pin. Immerse the copper strip and the safety pin in the copper sulfate solution at opposite sides of the cup. (You may wish to tape the leads to the lip of the cup to prevent slippage.)

3. Rotate the handle of the GENECON **slowly** in a **clockwise** direction for about 15-30 seconds. Almost immediately a dark deposit will form on the safety pin. Remove the red and gently wipe off the deposit. Note that the pin is already acquiring a light copper coating. Continue this same procedure, being sure to wipe off the dark deposits every 30 seconds or so. In a few minutes the safety pin should have a uniform copper appearance.

Key Concepts

1. Electroplating is the process of coating one metal with another metal by means of passing an electric current (DC) through an electrolyte. The "donor" metal becomes the positive electrode, and the "receiver" metal is the negative electrode.

2. The process of electroplating is essentially a special kind of electrolysis reaction.

3. Electroplating is commonly used to deposit a thin layer of a valuable metal (silver, nickel, copper) on the surface of a less valuable metal (iron or steel).

Teaching Tips

1. **Caution! Copper sulfate is poisonous. The solution should be prepared in advance by the teacher.**

2. The deposition of oxides on the safety pin will interfere with the planting process if not wiped off periodically.

3. Metals can be unplated by reversing the direction of the current.