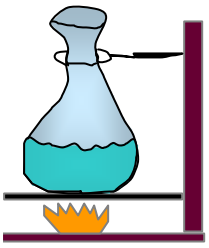
CHEMISTRY

Projects

Science



Electrochemical Cells

Purpose:

1. To utilize oxidation-reduction reactions in the construction of a voltaic cell (chemical battery)
2. To study its properties.

Materials:

(2) 250-mL beakers, Paper towel, Electrodes, Voltmeter, 1M aluminum nitrate, 1M lead nitrate, 1M sodium chloride

Procedure:

1. Attach the lead electrode to the negative side of the voltmeter and the copper electrode to the positive side.
2. Fill one beaker with $Al(NO_3)_3$ and the other with $Pb(NO_3)_2$.
3. Place the aluminum strip in the 1M $Al(NO_3)_3$ and the copper electrode in the 1M $Pb(NO_3)_2$ solution.
4. Prepare a salt bridge by soaking a rolled paper towel in the 1M NaCl solution. Put one end of the paper salt bridge in the 1M $Al(NO_3)_3$ solution and the other end in the 1M $Pb(NO_3)_2$ solution.
5. Allow the cell to run for a few minutes. Examine the two metallic electrodes during this period. The lead electrode should begin to dissolve and will become pitted. Aluminum metal will begin to form at the surface of the aluminum metal electrode.
6. After you have allowed the cell to run for a few minutes, disconnect the wires from the metallic electrodes.

Data & Observations

Write a balanced equation for the reaction taking place in this reaction.

Questions:

1. Voltages listed in references for voltaic cells are given in terms of standard cell potentials (voltages). What is meant by a standard cell? Was your initial voltaic cell a standard cell?
2. As a standard voltaic cell runs, the voltage delivered by the cell drops. Why does this happen?
3. Would you expect the voltage delivered by a voltaic cell to change with temperature? Why or why not?