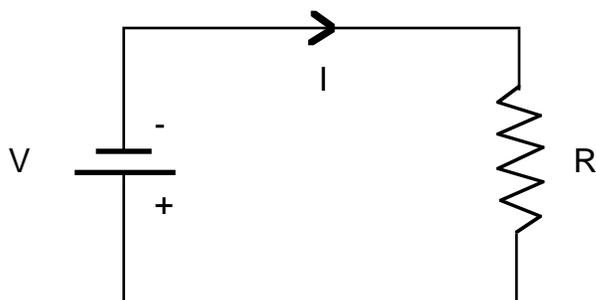# Chem12 Basic Electricity : Notes - 10

Before we continue our study of the practical uses of redox reactions, it is useful to review basic electricity and circuits.

A simple circuit is shown below.

A **circuit** is a complete path for electrons to flow. They flow from the negative terminal of the cell (V) through the copper wire to the resistor (R) and then back to the positive terminal. The cell gives the electrons electrical potential energy. The electrons move easily through the copper wire and do not lose energy there. All of their energy is lost in the resistor (mostly as heat). Once the electrons have lost their energy, they enter the positive terminal. In the cell, electrons gain energy by a redox chemical reaction. The cycle then continues.

The symbol **I** is for current. **Current** is the rate of flow of electrons in a circuit. It is measured in units called **Amperes** (A) or coulombs/second. One ampere is equal to a rate of electron flow of one coulomb/second. One **Coulomb** equals 6.25×10^{18} elementary charges. The symbol **V** is for voltage (also called potential difference or electromotive force). **Voltage** is the energy per coulomb of electrons. The units for voltage are **Volts** (V) or joules/coulomb. For the simple circuit above, the current is proportional to the voltage. The relationship is written as **V = I x R** or voltage equals current multiplied by the resistance R (a constant). This is known as Ohm's Law. The symbol for resistance is **R**. **Resistance** is a measure of the difficulty that electrons have in passing through a resistor. The units are **Ohms** (Ω, omega) or volts/ampere.

An example of the circuit above is the flashlight. The cell in this case is a 1.5 volt dry cell. The resistance is the thin tungsten wire in the light

bulb. Energy supplied to the electrons by the cell is lost as heat to the wire in the bulb. The wire becomes white hot and radiates light.

Problems :

1)   a) Define : Current -

            Voltage -

            Resistance -

        b) Give the units for the above quantities.

        2) 3.5 Coulombs = _____ electrons.

        3) If 15 Coulombs of electrons pass a point in a circuit in 60. s, the current is _____ amperes.

        4) One coulomb = _____ moles.

        5) If eighteen Coulombs of electrons pass through a 4.5 volt cell, the total amount of energy they receive is _____ joules.

        6) If the cell voltage is 2.6 volts and the current is 0.13 amperes, find the resistance of the circuit. R = _____ ohms.

Answers : 1)a) Current is the rate of flow of electrons. Voltage is the energy per coulomb of electrons. Resistance is a measure of the difficulty that electrons have in passing through a resistor. b) Amperes (symbol A), Volts (symbol V), Ohms (symbol Ω), 2) 2.2×10^{19}, 3) 0.25, 4) 1.04×10^{-5}, 5) 81, 6) 20..