CHAPTER 17

DEFINITIONS

electrochemistry - the area of chemistry concerned with the interconversion of chemical and electrical energy.

electrochemical cell – a device in which an electrochemical reaction takes place.

galvanic cell - a spontaneous chemical reaction that generates an electric current (i.e., a battery).

electrolytic cell - a cell in which an electric current drives a nonspontaneous reaction.

derivation - electrolytic reactions can be broken up into two reactions--one representing oxidation and one representing reduction.

Daniell cell – a galvanic cell made with zinc and copper.

electrodes – a metal surface where oxidation and reduction occur in an electrochemical cell.

salt bridge – a device which helps maintain electroneutrality in a galvanic cell.

anode - the electrode at which oxidation takes place.

cathode - the electrode at which reduction takes place.

electromotive force (emf) [also known as the cell potential (E) or the cell voltage] - the driving force that pulls the electrons from the anode to the cathode.

Faraday constant (F) - the electric charge of one mole of electrons [F = 96485 C/mole e].

standard cell potential (E°) – the measured potential if the reactants and products are all in their standard states--solutes at 1 M concentrations, gases at a partial pressure of 1 atm, solids and liquids in pure form, with all at a specified temperature, usually 25°C

standard hydrogen electrode (SHE) – a half-cell consisting of a platinum electrode in contact with H₂ gas and aqueous H⁺ ions at standard state conditions [1 atm H₂ (g), 1 M H⁺ (aq), 25°C] that is assigned a potential of 0 V.

standard reduction potential (standard electrode potential) – tabular reduction reactions used to arrange oxidizing and reducing agents in order of increasing strength.

Nernst equation – a relationship which relates E° to E allowing the calculation of cell potentials under nonstandard-state conditions.

battery - one or more galvanic cells.

conproportionation - a reaction in which the product of both the anode and cathode reaction is the same.

fuel cell - a galvanic cell in which the reactants are not contained within the cell but are continuously supplied from an external reservoir.

corrosion - the oxidative deterioration of a metal.

galvanizing - the process of coating a metal with zinc to prevent/reduce corrosion.

cathodic protection - the technique of protecting a metal from corrosion by connecting it to a second metal that is more easily oxidized.
sacrificial anode - the metal electrode used in cathodic protection (typically magnesium).

electrolysis - the process of using an electric current to bring about a chemical change.

overvoltage - the additional voltage above the standard reduction potentials necessary to bring about electrolysis.

Hall-Heroult process - the electrolysis of a molten mixture of aluminum oxide (Al₂O₃) and cryolite (NaAlF) at about 1,000°C.

electrorefining - the purification of a metal by means of electrolysis.

electroplating - the coating of one metal surface with another using electrolysis.