

UNIT 11 ELECTROCHEMISTRY

Textbook References: *Chemistry* Zumdahl 5th Edition Chapter 17

1. define vocabulary
2. describe an electrochemical cell or voltaic or galvanic cell
3. distinguish between electrolysis and a electrochemical cell
4. determine the cell potential under standard conditions
5. determine a cell position under non-standard conditions
6. calculate change in free energy from cell potential
7. predict reaction spontaneity
8. calculate the equilibrium constant knowing the cell potential
9. describe some common batteries
10. use Faraday constant to solve for amp, time or amount of metal deposited in electrolysis
11. describe corrosion and some common solutions to the problem
12. identify the oxidizing and reducing agent

Vocabulary

oxidation	Nernst equation	oxidation potential
reduction	Faraday's constant	emf
anode	electrolysis	volts
cathode	voltaic cell	amps
redox retain	batteries	coulombs
cell potential	reduction potential	salt bridge

AP Course Guide correlation:

c. Electrochemistry: electrolytic and galvanic cells; Faraday's laws; standard half-cell potentials; Nernst equation; prediction of the direction of redox reactions

IB course Outline correlation:

- 9.1.1 Define *oxidation* and *reduction* in terms of electron loss and gain.
- 9.1.2 Deduce the oxidation number of an element in a compound.
- 9.1.3 State the names of compounds using oxidation numbers.
- 9.1.4 Deduce whether an element undergoes oxidation or reduction in reactions using oxidation numbers.
- 9.2.1 Deduce simple oxidation and reduction half-equations given the species involved in a redox reaction.
- 9.2.2 Deduce redox equations using half equations.
- 9.2.3 Define the terms *oxidizing agent* and *reducing agent*.
- 9.2.4 Identify the oxidizing and reducing agents in redox equations.
- 9.3.1 Deduce a reactivity series based on the chemical behaviour of a group of oxidizing and reducing agents.
- 9.3.2 Deduce the feasibility of a redox reaction from a given reactivity series.
- 9.4.1 Explain how a redox reaction is used to produce electricity in a voltaic cell.
- 9.4.2 State that oxidation occurs at the negative electrode (anode) and reduction occurs at the positive electrode (cathode).
- 9.5.1 Describe, using a diagram, the essential components of an electrolytic cell.
- 9.5.2 State that oxidation occurs at the positive electrode (anode) and reduction occurs at the negative electrode (cathode).
- 9.5.3 Describe how current is conducted in an electrolytic cell.
- 9.5.4 Deduce the products of the electrolysis of a molten salt.
- 19.1.1 Describe the standard hydrogen electrode.
- 19.1.2 Define the term *standard electrode potential*.
- 19.1.3 Calculate cell potentials using standard electrode potentials.
- 19.1.4 Predict whether a reaction will be spontaneous using standard electrode potential values.

- 19.2.1 Predict and explain the products of electrolysis of aqueous solutions.
- 19.2.2 Determine the relative amounts of the products formed during electrolysis.
- 19.2.3 Describe the use of electrolysis in electroplating.