## chapter 10: Redox reactions

1. Review Fundamental Principles of Electricity
2. Redox (Oxidation-Reduction)
   1. Oxidation number/states
      1. Electron bookkeeping method
      2. Determining oxidation numbers/states of atoms in a molecule or polyatomic ion
      3. Rules for assigning oxidation numbers/states
   2. Oxidation Reactions
   3. Reduction Reactions
   4. Redox reactions
3. Electrochemistry
   1. Half-reactions
   2. Half-cells
4. Electrochemical cells
   1. Electrodes
      1. Cathode
      2. Anode
   2. Salt Bridge
   3. Activity or Electromotive Force (EMF) Series
      1. Predicting spontaneous redox reactions
5. Electrolytic cells
   1. Electrolytic Cell Reactions
   2. Electroplating
6. Balancing Redox Equations
   1. Oxidation Number Method
   2. Half-Reaction Method

## chapter 11: what if there no intermolecular forces

1. Kinetic-Molecular theory
   1. Ideal Gas Characteristics
   2. Deviations from
      1. Ideal Gas Behavior
      2. the gas laws
2. Atmospheric Pressure
   1. Pressure
      1. Pressure = Force/Area
      2. Barometer
      3. Atmospheric pressure
3. Standard temperature and pressure (STP)
4. Ideal Gas Law
   1. Boyle's law
   2. Charles' law
   3. Guy-Lussac’s Law
   4. Ideal Gas Equation
   5. Combined Gas Laws
   6. Avogadro's Law (hypothesis)

# LEARNING OBJECTIVES:

## Chapter 10:

1. Assign oxidation numbers to elements in various compounds, polyatomic ions and in the elemental state using the electron bookkeeping method.
2. Define oxidation and reduction in terms of the loss or gain of oxygen.
3. Define oxidation and reduction in terms of the loss, gain, or shift of electrons.
4. Define oxidation and reduction in terms of the change in oxidation number produced when electrons are lost or gained.
5. Give the characteristics of a redox reaction.
6. Use the oxidation-number change method to identify atoms being oxidized and reduced.
7. Identify the oxidizing and reducing agents in a redox reaction. (LEO GER)
8. Distinguish between a redox and non-redox reaction.
9. Break a redox reaction into oxidation and reduction half-reactions.
10. Write balanced oxidation and reduction half-reactions.
11. Use either the oxidation-number change method or half-reaction method to balance redox reactions.
12. Describe the nature of electrochemical processes.
13. Sketch a(n) electrochemical, voltaic or galvanic cell, labeling the anode, cathode, salt bridge, the direction of flow of electrons.
14. Explain why the masses of the anode and cathode change during the operation of an electrochemical cell.
15. Explain why the concentration of ions in each half cell change during the operation of an electrochemical cell.
16. Given a voltaic or galvanic cell, identify the half-cell in which
    1. oxidation occurs (AN OX)
    2. reduction occurs (CAT RED or RED CAT)
17. Predict the outcome of redox reactions using the Electromotive force series or the activity series (Table J).
18. Describe the operation of an electrolytic cell.
19. Distinguish between electrolytic and galvanic (voltaic or electrochemical) cells.
20. Explain the operation of a setup for electroplating with metals.

## Chapter 11:

1. Use the Kinetic Theory to explain the theoretical basis for the Gas Laws.
2. Distinguish between real and ideal gases.
3. Explain the conditions under which a real gas is most like an ideal gas.
4. Explain why real gases tend to deviate from ideal gas behavior at high pressure and low temperature.
5. Given a group of different gases, determine which real gas is most like an ideal gas.
6. State and explain the significance of Avogadro’s Hypothesis.
7. Understand the meaning of the term pressure.
8. Explain why the pressure of a solid varies with surface area.
9. Explain why air or atmospheric pressure varies with altitude.
10. Explain why a confined gas exerts pressure on the walls of its container.
11. Describe the uses and operations of a mercury barometer and a manometer to measure air pressure and the pressure of a confined gas.
12. Describe how the volume of a gas varies with pressure constant temperature.
13. Express the relationship between pressure and volume of a gas graphically.
14. State Boyle’s Law.
15. Solve problems using the mathematical equation for Boyle’s Law.
16. Describe the relationship between the temperature and volume of a gas constant pressure.
17. Show how the volume of a gas is directly proportional to the Kelvin (absolute) temperature.
18. Express the relationship between the volume of a gas and the Kelvin temperature graphically.
19. State Charles’ Law.
20. Solve problems using the mathematical equation for Charles’ Law.
21. Explain how the pressure of a gas varies with temperature at constant volume.
22. State Gay-Lussac’s Law.
23. Identify the numerical values for standard temperature and pressure.
24. Solve problems using the mathematical equation for the Combined Gas Laws.
25. Describe the effect on the pressure of a gas by changing the amount of gas.
26. Derive the relationship between the pressure, volume, and temperature of a gas to the number of gas particles and ideal gas constant.
27. State the Ideal Gas Law.
28. Employ Avogadro’s hypothesis to arrive at the conclusion that one mole of any gas at STP contains Avogadro’s number of particles and occupies a volume of 22.4 liters.
29. Solve problems based on the quantitative relationships between the mole and Avogadro’s number of particles and molar volume.