PimaCommunityCollege

CHM 152IN General Chemistry II

Course Learning Outcomes (CLOs)
Upon successful completion of this course, the student will be able to:

1. **Define the rate of a reaction and the rate law, determine the components of the rate law, and describe the effects of concentration, temperature and catalysts on the rate of a reaction.**

2. **Write and calculate equilibrium constants for a chemical reaction, calculate equilibrium concentrations from initial concentrations, apply Le Chatelier's principle to a chemical reaction and predict how changes in concentration, temperature, pressure, and volume influence the equilibrium system.**

3. **Distinguish between Arrhenius and Bronsted acids and bases, identify conjugate acid/base pairs, predict the direction of a neutralization reaction, determine dissociation constants (K_a,K_b), pH and pOH in aqueous solutions, and relate molecular structure to acid strength.**

Performance Objectives:
Upon successful completion of this course, the student will be able to:

1. Define the rate of a reaction and the rate law, determine the components of the rate law, and describe the effects of concentration, temperature and catalysts on the rate of a reaction.

2. Write and calculate equilibrium constants for a chemical reaction, calculate equilibrium concentrations from initial concentrations, apply Le Chatelier's principle to a chemical reaction and predict how changes in concentration, temperature, pressure, and volume influence the equilibrium system.

3. Distinguish between Arrhenius and Bronsted acids and bases, identify conjugate acid/base pairs, predict the direction of a neutralization reaction, determine dissociation constants (K_a,K_b), pH and pOH in aqueous solutions, and relate molecular structure to acid and base strength.

4. Define equilibria of acid/base buffer systems, describe buffer capacity, buffer range, common ion effect, and discuss acid/base titration curves.

5. Define the first and second laws of thermodynamics, predict the change in entropy for a chemical reaction, define Gibbs free energy ΔG, relate the sign of the free energy, enthalpy and entropy to the spontaneity of a chemical system, relating Gibbs free energy ΔG and the equilibrium constant K.

6. Balance redox equations, use redox potentials to determine the relative strength of oxidizing and reducing agents, describe the construction and functioning of voltaic and electrolytic cells, determine the cell potential, and discuss applications of electrochemical principles in batteries, corrosion, and electrolysis.

7. Apply the above chemistry concepts and procedures in a “wet” laboratory setting with real laboratory equipment to:

    a) Continue the development of hands-on experience with a wide range of laboratory apparatus;

    b) Continue to gain exposure to the hands-on use of chemical instrumentation.

    c) Further individual expertise in a range of laboratory techniques;

    d) Continue development of the ability to take hypotheses and design / conduct real experimentation to verify/challenge those hypotheses.