COURSE DESCRIPTION

Principles of Chemistry I is the first semester of a two-semester course designed to provide an overview of chemistry for the pre-med and science major. Principles of Chemistry I and General Chemistry II (CH104) provides nursing students with an honors experience. Topics in this course include atomic theory, molecular structure, stoichiometry, thermochemistry, solutions, chemical reactivity, and states of matter. Applications of chemistry to daily life processes are discussed.

TEST-OUT PRE-REQUISITE

To be eligible for this test-out, the student must have had a precious learning in chemistry for which college credit was not received. Since both lab and lecture credit is given, the previous experience must include a lab experience.

INSTRUCTIONAL OBJECTIVES

Knowledge

1. Learn fundamental principles of chemistry to provide a foundation for upper level courses.
2. Become familiar with the language of chemistry: formulas, nomenclature, and equations.
3. Examine the theories of atomic and molecular structure.
4. Understand concepts of chemical reactions, the nature of chemical and physical changes, and the accompanying energy changes.
5. Apply chemical principles to specific examples. (Descriptive chemistry and the periodic table of the elements.)
6. Understand the importance of experimentation in the growth and evolution of modern chemistry.

Skills

1. Develop study and mathematical skills.
2. Solve numerical problems relating to solutions, gas laws, chemical formulas and equations.
3. Develop powers of observation.
4. Demonstrate ability to use common laboratory equipment.
5. Behave appropriately in the laboratory and observe safety regulations.

Attitudes and Values

1. Recognize the limitations of scientific theories
2. Develop an awareness of the fact that chemistry is continually changing as a result of new ideas and discoveries.
3. Develop powers of observation, generalization and curiosity essential to the solution of problems and interpretation of data.

4. Realize that, in their search for knowledge, chemists rely on earlier work of scientists. Students will develop an appreciation for the work of others.

5. Become aware of the interdisciplinary nature of chemistry.

6. Appreciate how chemical knowledge is obtained, and how new ideas evolve and are examined.

7. Be aware of the importance of understanding and appreciating the forces of nature and the material world.

**LEARNING RESOURCES**

**Text**


**Solution Guide**


**TEST OUT FORMAT**

The test out involves 50 multiple choice questions. A passing score is 76%.

**TEST-OUT SUPPLEMENTAL MATERIALS**

Students may use a Periodic Table that is supplied with the test.

Students must supply their own calculator and writing instruments.

**COURSE OUTLINE**

Chapter 1: Matter and Measurement

Chapter 2: Atoms, Molecules, and Ions

Chapter 3: Stoichiometry: Calculations with Chemical Formulas and Equations

Chapter 4: Aqueous Reactions and Solution Stoichiometry

Chapter 5: Thermochemistry

Chapter 6: Electronic Structure of Atoms

Chapter 7: Periodic Properties of the Elements

Chapter 8: Basic Concepts of Chemical Bonding

Chapter 9: Molecular Geometry and Bonding Theories

Chapter 10: Gases

Chapter 11: Intermolecular Forces
SUGGESTED REVIEW

_Students should practice the following skills to prepare for the CH 105 TEST-OUT_

- Conversion of SI units (prefixes)
- Working density problems
- Reporting the correct number of significant figures
- Determining the number of protons, neutrons, and electrons in an isotope
- Identifying polyatomic ions
- Naming inorganic compounds (including those containing polyatomic ions)
- Predicting empirical formulas of ionic compounds from the most likely charge on the ions
- Balancing chemical equations
- Calculating molar mass
- Interconverting mass and moles
- Calculating mass % of an element in a compound
- Working stoichiometry problems
- Calculating the % yield
- Distinguishing between strong and weak electrolytes
- Working molarity problems
- Working dilution problems
- Distinguishing between combination, decomposition and metathesis reactions
- Working Hess’ Law problems
- Sign of $\Delta H$ in exothermic and endothermic processes
- Working specific heat problems
- Identifying the quantum numbers for an atomic orbital
- Drawing the shapes of the s, p, and d orbital
- Writing ground and excited state electron configurations and orbital diagrams for atoms and ions
Knowing the following trends

- Atomic size
- Ionization energy
- Electronegativity

Being able to identify the characteristics of

- Alkali metals, Hydrogen, Oxygen, Sulfur, Halogens, Noble gages

Identifying Lewis structures for molecules and polyatomic ions

Distinguishing between polar and non-polar compounds

Identifying oxidation number of an element in a compound or polyatomic ion

Predicting molecular geometry of an \( AB_n \) molecule

Identifying the hybrid orbitals on a central atom

Writing the molecular orbital energy level diagram for homonuclear diatomic molecules

(with a copy of Fig. 9.38 which you bring to the exam)

Identifying the characteristics of solids, liquids and gases

Working ideal gas law problems

Knowing the kinetic molecular theory of gases

Understanding intermolecular forces

Understanding energy changes accompanying phase changes

**Knowing the definitions of the vocabulary words in the textbook**

*Textbook chapter review exercises are good sources of review problems*