

CH 105

PRINCIPLES OF CHEMISTRY I Test Out Study Guide

(CH 105 Three Credits; CH 105 L One Credit)

Ursuline College Chemistry Department

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 previous 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

Brown, T.L., LeMay, H.U. , Bursten, B.E. (2006). *Chemistry: The Central Science*, 10th ed., NY: Prentice Hall.

Solution Guide

Wilson, R., (2006). *Solutions to Red Exercises in Chemistry the Central Science*, NY: Prentice Hall.

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.

COUSE 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 ΔH 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 gases

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