

Montgomery County Community College
 CHE 151
 Principles of Chemistry I
 (For the Science Major)
 4-3-3

COURSE DESCRIPTION:

This course is a study of the fundamentals of general chemistry for the science major. An emphasis is placed on atomic structure, molecular structure, bonding, periodic law, reactions and weight relations, gases, thermochemistry and an introduction to organic chemistry. The laboratory includes experiments from topics discussed in lecture. This course is subject to a course fee. Refer to <http://mc3.edu/adm-fin-aid/paying/tuition/course-fees> for current rates.

REQUISITES:

Previous Course Requirements

High school Chemistry within the last 5 years **OR** CHE 121 General Chemistry - Inorganic

Previous or Concurrent ~~ACT 101 0 1.02 3.00 0 g 0 0 10.15.02 10 g 0 G [17-3(c.35 Tm0 q0 G(Hi)4(a)6(h)-3/~~

- IV. Reactions in Aqueous Solutions
 - A. Precipitation Reactions and Gravimetric Analysis Calculations
 - B. Acid-Base Reactions and Titration Calculations
 - C. Oxidation-Reduction Reactions and Titration Calculations
 - D. Molarity of Solution Calculations
- V. Gases
 - A. Pressure of Gases
 - B. Gas Laws
 - C. Ideal Gas Equation
 - D. Gas Stoichiometry
 - E.
 - F. The Kinetic Molecular Theory of Gases
 - G. Real Gases van der Waals Equation
- VI. Thermochemistry
 - A. Types of Energy
 - B. Energy Changes in Chemical Reactions
 - C. Calorimetry: Bomb and Coffee Cup
 - D. Standard Enthalpy of Formation and Reaction
 - E. Heats of Solution and Dilution
 - F.
- VII. Quantum Theory and the Electronic Structure of Atoms
 - A. Classical Physics to Quantum Theory
 - B. Photoelectric Effect
 - C.
 - D. Dual Nature of E
 - E. Quantum Mechanics
 - F. Quantum Numbers
 - G. Atomic Orbitals
 - H. Electron Configuration and the Aufbau Principle
- VIII. Periodic Relationships Among the Elements
 - A. Development of the Periodic Table
 - B. Periodic Classification of the Elements
 - C. Periodic Variation in Physical Properties
 - D. Ionization Energy and Electron Affinity
 - E. Variation in Chemical Properties of the Representative Elements
- IX. Chemical Bonding: Basic Concepts
 - A. The Ionic Bond and Lattice Energy of Ionic Compounds
 - B. Covalent Bond
 - C. Electronegativity
 - D. Lewis Dot Structures and Formal Charge and Resonance
 - E. Expanded Octet, Reduced Octet and Free Radicals
- X. Chemical Bonding: Molecular Geometry and Hybridization of Atomic Orbitals
 - A. Molecular Geometry and Dipole Moment
 - B. Valence Bond Theory
 - C. Hybridization of Atomic Orbitals
 - D. Hybridization of Molecules Containing Double and Triple Bonds
 - E. Delocalized Molecular Orbitals

- XI. Organic Chemistry
- A. Classes of Organic Compounds
 - B. Aliphatic Hydrocarbons
 - C. Aromatic Hydrocarbons
 - D. Chemistry of Functional Groups

SEQUENCE OF EXPERIMENTS:

1. Laboratory Techniques and Glass Bending and Fire Polishing
2. Nomenclature and Reaction Stoichiometry
3. Determination of a Chemical Formula
4. Chemical Reactions
5. The Molar Volume of Gases
6. Thermochemistry
- 7.
8. Atomic Spectroscopy
9. Oxidation of Vitamin C
10. Recycling Aluminum

LEARNING MATERIALS:

Chang, R. and Goldsby, K. (2013). *Chemistry* (11th ed.). McGraw-Hill Publishers.

Chang, R. and Goldsby, K. (2013). *Student Solution Manual* (11th ed.). McGraw-Hill Publishers.

Van Koppen. (2008) 9780130365616 82459.43 0 612 792 reW*nBT/F1 12 Tf1 0 0 1 235.61 459.19 Tm0 g0 G3n

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Date: 5/11/2017

Date: 5/11/2017

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Date: 1/9/2018

Date: