CHEM C130: PREPARATION FOR GENERAL CHEMISTRY

Item	Value
Top Code	190500 - Chemistry, General
Units	4 Total Units
Hours	108 Total Hours (Lecture Hours 54; Lab Hours 54)
Total Outside of Class Hours	0
Course Credit Status	Credit: Degree Applicable (D)
Material Fee	No
Basic Skills	Not Basic Skills (N)
Repeatable	No
Grading Policy	Standard Letter (S), • Pass/No Pass (B)
Local General Education (GE)	• CL Option 1 Natural Sciences (CB1)
California General Education Transfer Curriculum (Cal-GETC)	• Cal-GETC 5A Physical Science (5A) • Cal-GETC 5C Laboratory Activity (5C)
Intersegmental General Education Transfer Curriculum (IGETC)	• IGETC 5A Physical Science (5A) • IGETC 5C Laboratory Activity (5C)
California State University General Education Breadth (CSU GE-Breadth)	• CSU B1 Physical Science (B1) • CSU B3 Laboratory Activity (B3)

Course Description

Introduction to both principles and calculations of chemistry and lab techniques, especially for those who continue with future chemistry courses. ADVISORY: A course taught at the level of intermediate algebra or appropriate math placement. Transfer Credit: CSU; UC: Credit Limitations: CHEM C110, CHEM C130, CHEM C140 and PHYS C140 combined: maximum credit, 1 course; no credit for CHEM C130 if taken after CHEM C180 or CHEM C220.

Course Level Student Learning Outcome(s)

1. Use simple algebraic methods to solve computational problems in the areas of unit conversion, specific heat, stoichiometry, gas laws, and solutions.
2. Manipulate laboratory equipment so that he or she will be able to perform basic chemical experiments and determinations safely and accurately.
3. Apply the principles of electron configurations using Lewis structure and the vesper theory to predict the structure and the shape of simple inorganic and organic molecules.

Course Objectives

- 1. Analyze the fundamental features of chemistry, including measurements, mathematical conversion of measured physical properties such as mass, volume, density, pressure, temperature, solution concentrations, and dilutions
- 2. Manipulate laboratory equipment in order to perform chemical procedures and assess experimental determinations safely and accurately
- 3. Apply an understanding of electron configurations, Lewis dot structures, and VSEPR theory to predict the structure and shape of simple molecules
- 4. Demonstrate knowledge of the qualitative features of chemistry, including physical and chemical properties, naming and writing chemical formulas of compounds, and evaluating chemical reactions
- 5. Analyze chemical reactions to quantitatively determine theoretical yield
- 6. Differentiate typical acid and base formulas and compare and contrast the behaviors associated with acids and bases.

Lecture Content

MATTER AND MEASUREMENTS Measurement, uncertainty and significant figures Conversion of units Kinds and properties of substances Separation of mixtures ATOMS, MOLECULES AND IONS Atomic theory, parts of the atom Molecules and ions Atomic and molecular masses, the mole, and molarity Experimental methods CHEMICAL FORMULAS AND EQUATIONS Types of formulas Determining percent composition Names and formulas of ionic compounds Writing and balancing chemical equations Stoichiometry THERMOCHEMISTRY Enthalpy changes Thermochemical equations Measurement of enthalpy change and heats of formation First Law of Thermodynamics PHYSICAL BEHAVIOR OF GASES Measurements on gases The Ideal Gas Law The Kinetic Theory of Gases Avogadros Hypothesis and gas volume. Daltons Law of partial pressure ELECTRONIC STRUCTURE OF ATOMS Quantum Theory contrasted with the Bohr model The atom from a quantum mechanical standpoint Atomic orbitals, quantum numbers, and the arrangement of electrons PERIODIC TABLE Development of the periodic table Electron arrangements and periodic trends Properties of metals CHEMICAL BONDING Ionic bonds Covalent bonds Lewis structures MOLECULAR STRUCTURE Geometry and polarity of molecules Atomic orbitals and orbital hybridization Molecular orbitals SPONTANEITY OF REACTIONS Measurement and relationships of enthalpy, entropy and free energy The Second Law of Thermodynamics CHEMICAL EQUILIBRIUM IN THE GAS PHASE Equilibrium systems Expressions and applications of the equilibrium constant Le Chateliers Principle Free energy and the equilibrium constant REACTION RATES Meaning of reaction rate Factors affecting reaction rate Activation energy The effect of a catalyst Reaction mechanisms PRECIPITATION REACTIONS Solubility of ionic solids and solubility products Precipitation reactions ACIDS AND BASES General characteristics Water dissociation, acid, basic, and neutral solutions Strong and weak acids and bases Properties of salt solutions and pH Acid base titrations and other reactions Models for acids, bases, and reactions Acid-Base Equilibria The acid dissociation constant Determining the hydrogen ion concentration The base dissociation constant OXIDATION AND REDUCTION Electrochemical cells Assigning oxidation numbers and balancing equations Electrolytic and voltaic cells

Lab Content

Experiments: Measurement and Significant Figures Density Separation of a Mixture Nomenclature Practice Flame Tests and Electronic Configurations Specific Heat and Energy Empirical Formula of a Magnesium Oxide The Properties of a Hydrate Decomposition of NaHCO3 Ideal Gas Measurements Lewis Dot Structures and VSEPR Chemical

Reaction Types Acids, Bases, and pH Titration of an Antacid Metal Activity Series Properties of Group 2 and Group 17 Elements

Method(s) of Instruction

- Lecture (02)
- DE Live Online Lecture (02S)
- DE Online Lecture (02X)
- Lab (04)
- DE Live Online Lab (04S)
- DE Online Lab (04X)

Instructional Techniques

Lecture Laboratory Problem Solving

Reading Assignments

Textbook selections

Out-of-class Assignments

Problem Solving exercises

Demonstration of Critical Thinking

Problem-solving, Midterm Exam, Final Exam All of the homework assignments, exams, and pre- and post-laboratory analysis requires problem-solving strategies, critical assessment and the application of mathematical operations for stoichiometry values, gas law parameters, solution composition, and pH values.

Required Writing, Problem Solving, Skills Demonstration

Completion of mathematical problems in stoichiometry, gas laws, and solutions.Balancing equations, interpreting graphs.

Eligible Disciplines

Chemistry: Masters degree in chemistry OR bachelors degree in chemistry or biochemistry AND masters degree in biochemistry, chemical engineering, chemical physics, physics, molecular biology, or geochemistry OR the equivalent. Masters degree required.

Textbooks Resources

1. Required Zumdahl, Steven S.; DeCoste, Donald J. Introductory Chemistry, 8th ed. Houghton Mifflin, 2015 Rationale: - Legacy Textbook Transfer Data: Legacy text

Manuals Resources

1. Marcus, Ted. Catalyst: The Benjamin Cumming Custom Laboratory Program for Chemistry, Pearson Custom Publishing , 01-01-2007

Other Resources

1. Coastline Library