CHEM 0002X - PROBLEM SOLVING FOR CHEMISTRY 2A

Catalog Description

Prerequisite: Completion of MATH A with grade of "C" or better, or placement by matriculation assessment process, or equivalent
Corequisite: Concurrent enrollment in CHEM 2A
Advisory: Eligibility for ENGL 1A; completion of CHEM A with grade of "C" or better or equivalent; completion of MATH G with grade of "C" or better or equivalent
Hours: 18 lecture
Description: Optional problem solving course to accompany CHEM 2A. Students use critical thinking and problem solving strategies to solve chemistry problems in topics that include atomic structure, the mole concept, gas laws, stoichiometry, redox, acid-base theory, equilibrium, nuclear chemistry, and chemical bonding. (CSU)

Course Student Learning Outcomes

- CSLO #1: Solve problems related to structure and properties of matter, atomic and molecular structure, chemical formulas and stoichiometry, and chemical and physical equilibrium.
- CSLO #2: Apply mathematical problem solving techniques to solve problems in chemistry.
- CSLO #3: Develop rules and strategies for problem solving that are effective in solving new sets of problems.

Effective Term

Fall 2022

Course Type

Credit - Degree-applicable

Contact Hours

18

Outside of Class Hours

36

Total Student Learning Hours

54

Course Objectives

Students will:
1. Apply mathematical problem solving techniques (algebraic equations, unit factor method, etc.) to solve problems in chemistry; and
2. Identify by using a diagram, a list, an equation, and/or words, the basic chemical concepts and principles affecting a given chemical system;
3. Solve problems related to unit conversions, atomic structure, the mole concept, gas laws, stoichiometry, solutions, oxidation/reduction, acid-base theory, equilibrium, and nuclear chemistry;
4. Build a conceptual model of the given chemical formula and determine the shape, polarity and predict the physical properties;
5. Develop strategies for problem solving that can be applied to solving new sets of problems.

General Education Information

- Approved College Associate Degree GE Applicability
- CSU GE Applicability (Recommended-requires CSU approval)
- Cal-GETC Applicability (Recommended - Requires External Approval)
- IGETC Applicability (Recommended-requires CSU/UC approval)

Articulation Information

- CSU Transferable

Methods of Evaluation

- Classroom Discussions
  - Example: If 95.5g of zinc reacts with excess HCl and 2.5g of hydrogen gas is collected, what is the percent yield? After students work out the problem on their own, the instructor will guide a class discussion of how to solve the problem. Instructor will ask for feedback from students regarding what strategies were used. Both the problem solving and the discussion will be graded solely on participation.
- Problem Solving Examinations
  - Example: Problem Solving and Classroom Discussion: To a beaker containing 25g of zinc, 25mL of 0.100M HCl is added. Decide which reactant is the limiting reactant and justify your answer with the appropriate calculations. After students work out the problem on their own, the instructor will guide a class discussion of how to solve the problem. Instructor will ask for feedback from students regarding what strategies were used. Both the problem solving and the discussion will be graded solely on participation.

Repeatable

No

Methods of Instruction

- Lecture/Discussion
- Distance Learning

Lecture:

1. Instructor demonstrates problem solving skills/techniques for working on limiting reactant stoichiometry problems. Instructor presents problems regarding limiting reactant stoichiometry. Students are expected to use techniques demonstrated to work out problems related to limiting reactant stoichiometry. In the distance learned modality a video and/or worked out examples will be provided and the student will work on problems using the LMS quiz feature or will upload their hand written work for grading.

Distance Learning

1. Instructor demonstrates problem solving skills/techniques for working on gas law problems. Instructor presents problems regarding gas laws. Students are expected to use techniques demonstrated to work out problems related to gas laws. In the distance learned modality a video and/or worked out examples will be provided and the student will work on problems using the LMS quiz feature or will upload their hand written work for grading.

Typical Out of Class Assignments
Reading Assignments

1. Read a section from the textbook or other printed material on gases. Be prepared to participate in class discussion and complete assigned problems. 2. Read the sample problems from the handout and be prepared for discussion.

Writing, Problem Solving or Performance

1. Write a strategy for solving stoichiometry problems. 2. Solve problems provided on a problem-solving worksheet. For example, calculate the amount of energy required to raise the temperature of 50 grams of water 50 K.

Other (Term projects, research papers, portfolios, etc.)
Required Materials

- General, Organic, and Biological Chemistry
  - Author: Stoker
  - Publisher: Cengage Learning
  - Publication Date: 2015
  - Text Edition: 7th
  - Classic Textbook?:
  - OER Link:
  - OER:
- Chemistry: An Introduction to General, Organic, and Biological Chemistry
  - Author: Timberlake
  - Publisher: Pearson
  - Publication Date: 2017
  - Text Edition: 13th
  - Classic Textbook?:
  - OER Link:
  - OER:

Other materials and-or supplies required of students that contribute to the cost of the course.