

# CHEM 0001X - PROBLEM SOLVING FOR CHEMISTRY 1A

## Catalog Description

Prerequisite: Completion of CHEM A or equivalent with grade of "C" or better; and completion of MATH D or MATH G with grade of "C" or better, or placement by matriculation assessment process, or equivalent; and satisfactory score on the Chemistry Placement Examination

Corequisite: Concurrent enrollment in CHEM 1A

Advisory: Eligibility for ENGL 1A strongly recommended

Hours: 18 lecture

Description: Optional problem solving course to accompany CHEM 1A. Students use critical thinking and problem solving strategies to solve general chemistry problems in topics that include atomic structure, the mole concept, gas laws, stoichiometry, redox, intermolecular forces, solid state chemistry, solution 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

1. Solve problems related to unit conversions, atomic structure, the mole concept, gas laws, stoichiometry, oxidation/reduction, states of matter, solutions, and chemical bonding;
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. Build a conceptual model of the given chemical system and explain the system using the model in a written or oral form;
4. Apply mathematical problem solving techniques (algebraic equation, unit factor method, etc.) to solve problems in chemistry; and
5. Develop rules and strategies for problem solving that are effective in 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

- Objective Examinations
  - Example: Compare and contrast the following terms: limiting reactant, excess reactant, theoretical yield, actual yield, and percent yield.
- Problem Solving Examinations
  - Example: 1. To a beaker containing 25 g of zinc, 25 mL of 0.100 M HCl is added. Decide which reactant is the limiting reactant and justify your answer with the appropriate calculations. Rubric grading. 2. Calculate the grams of oxygen produced by the decomposition of 25 grams of hydrogen peroxide. Rubric grading. 3. If 95.5 grams of zinc reacts with excess hydrochloric acid producing 2.5 grams of hydrogen, calculate the percent yield. a. 14.4% b. 2.62% c. 85.6% d. 117%

## Repeatable

No

## Methods of Instruction

- Lecture/Discussion
- Distance Learning

Lecture:

1. After a presentation on solving stoichiometry problems, instructor provides thought provoking questions on problems that probe student's knowledge on stoichiometry. The instructor facilitates the students as they work individually or in small groups. As they work on assigned questions or problems. These questions can stem from simple and straightforward or complex and multifaceted.

Distance Learning

1. The instructor highlights problem solving techniques involving gas laws either through a live or recorded video conference lecture or a pre-recorded lecture video. The recorded video lecture can be from a slide lecture presentation or a OneNote style video. The students are responsible for attending or watching the videos provided. Students are then tasked to solve problems in the LMS discussion board or virtual groups.

## Typical Out of Class Assignments Reading Assignments

1. Read a section from the textbook. Be prepared to use the content to participate in the classroom and to complete assigned problems from the textbook. For example: Read the section on stoichiometry from the textbook. Be prepared to use the content to participate in the classroom and to complete assigned problems from the textbook. 2. Read a sample

problem from a handout. For example: Read the stoichiometry problem from the handout and be prepared for discussion.

## Writing, Problem Solving or Performance

1. Write a short answer. For example: Compare and contrast molecules and formula units. 2. Solve problems given through worksheets assignments and in classroom example problems. For example: Calculate the energy required to raise the temperature of 50 grams of water 50 K.

## Other (Term projects, research papers, portfolios, etc.)

### Required Materials

- Chemistry: A Molecular Approach
  - Author: Nivaldo J. Tro
  - Publisher: Pearson
  - Publication Date: 2020
  - Text Edition:
  - Classic Textbook?:
  - OER Link:
  - OER:
- Laboratory Manual for Chemistry: A Molecular Approach
  - Author: Nivaldo J. Tro, John J. Vincent, Erica J. Livingston
  - Publisher: Pearson
  - Publication Date: 2020
  - Text Edition: 5th
  - Classic Textbook?:
  - OER Link:
  - OER:

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