

Common Course Outline
CHEM 133
General Chemistry II
4 Credits

Community College of Baltimore County

Description

CHEM 133 – General Chemistry II serves as a continuation of CHEM 131; includes the study of liquids and solids, reactions and properties of solutions; discusses equilibrium, chemical kinetics, acid-base theory, thermodynamics, oxidation and reduction, and electrochemistry. The lab introduces additional aspects of laboratory chemistry to support concepts discussed in the lecture.

4 Credits: 3 lecture hours and 1 recitation hour per week; 3 laboratory hours

Prerequisites: Minimum grade of C in CHEM 121 and CHEM 122 or CHEM 131; and (ENGL 052 and RDNG 052) or ACLT 052 or ACLT 053

Overall Course Objectives

Upon completion of this course the student will be able to:

1. describe the models for the solid, liquid, and gas phases using kinetic molecular theory;
2. interpret phase diagrams;
3. demonstrate mastery of the concepts of molality and mole-fraction;
4. demonstrate ability to interconvert concentration units;
5. describe colligative properties and work problems associated with gases, liquids and solids;
6. give a general expression for the chemical equilibrium of gases, of ions in solution, weak acids and weak bases and solve problems associated with Le Chatelier's Principle;
7. determine the rate expression of a chemical reaction given kinetic data and other experimental results;
8. determine the activation energy of a chemical reaction given temperature and kinetic data;
9. balance oxidation/reduction equations via the method of half reactions or oxidation number;
10. determine the equilibrium constant from thermodynamic data;
11. determine the free energy of a chemical reaction from thermodynamic data (enthalpies and entropies of reaction);
12. determine the standard voltage of a given electrochemical reaction given a table of reduction potentials;

13. work equilibrium problems using the Nernst equation;
14. calculate nonstandard voltages using the Nernst equation;
15. use computers to gather and analyze data and/or to perform calculations;
16. use laboratory equipment and instruments appropriately;
17. use spectroscopic techniques for quantitative analysis;
18. perform titrimetric analysis; and
19. perform qualitative analysis of selected cations on a small or micro scale.

Major Topics

- I. Gases, Liquids, Solids and Changes in State
- II. Phase Diagrams
- III. Colligative Properties
- IV. Chemical Equilibrium of Gas Liquids, and Solids
- V. Chemical Kinetics
- VI. Redox Reactions
- VII. Thermodynamics (Gibbs' Free Energy, Entropy, Enthalpy and Equilibrium)
- VIII. Electrochemistry
- IX. Quantitative Analysis

Course Requirements

Grading procedures will be determined by the individual faculty member but will include the following:

Grading/exams:

Lecture component (75% of overall grade):

- a minimum of three examinations including a comprehensive final examination (at least 50% of overall grade);
- a minimum of three quizzes (at least 5% of overall grade); and
- electronic homework (at least 5% of the overall grade).

Laboratory component (25% of overall grade):

- assessment of experimental results by grading a minimum of 8 informal laboratory reports including pre-lab and post lab questions (at least 10% of overall grade);
- a minimum of three quizzes (at least 2.5% of overall grade);
- a minimum of two formal laboratory reports (at least 2.5% of overall grade); and
- a laboratory final examination that will be given as a closed book examination (at least 5% of the overall grade).

Written Assignments: Written lab reports will be required. For lecture, the individual faculty member will determine specific writing assignments. Students will utilize appropriate academic resources.

Other Course Information

While it is expected that these topics will be covered, faculty members may include additional topics consistent with department practices.