

MIDDLESEX COUNTY COLLEGE
EDISON, NEW JERSEY
DEPARTMENT OF NATURAL SCIENCES

Course ID and Name: CHM 126: General Chemistry II Laboratory

Department: Department of Natural Sciences

Chairperson: Dr. Donna Howell
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Prerequisites: CHM 121 and CHM 125 with a grade of “C” or better

Co-requisites: CHM 122

Course Description:

The laboratory course associated with CHM 122, General Chemistry II. The labs are related to the lecture topics and are meant to reinforce them. Computers are used for data acquisition and data handling using Microsoft EXCEL.

General Education Status: Science

Credits: 1 **Lecture Hours:** 0 **Laboratory Hours:** 3

Learning Outcomes:

Upon successful completion of this course, students will be able to:

1. Apply the scientific method to understand chemical nature of our world
2. *Recognize the importance of safety in a chemistry laboratory and practice appropriate safety rules and policies whenever conducting an experimental investigation.*
3. Demonstrate the ability to perform a variety of measurements, using a variety of instruments and an awareness of the uncertainties inherent in any measurement.
4. Demonstrate the ability to perform a variety of basic procedures in the chemistry lab, including weighing samples, titration, and determining pH.
5. Demonstrate the ability to collect, organize and analyze laboratory data

Course Requirements:

Students must attend every laboratory session. Laboratory performance is evaluated by laboratory reports, exams, and quizzes. Course grades should be assigned using percentages that are similar to those given below:

Assessment tool	% of Final Grade
Laboratory Reports	50%
Exams and Quizzes	50%

GRADING STANDARD:

Upon completion of the course, grades will be assigned using a similar scale as that given below:

92 – 100%	A
89 – 91%	A minus
86 – 88%	B plus
82 – 85%	B
79 – 81%	B minus
76 – 78%	C plus
70 – 75%	C
60 – 69%	D
Below 60%	F

Textbook for Course:

<u>Author</u>	<u>Title</u>	<u>Publisher</u>	<u>Copyright</u>
Steven P. Rowley	General Chemistry II Laboratory Manual – 4th Edition	Kendall/Hunt Publishing Company	2017

Laboratory Outline

- A. Manipulation of data with scientific spreadsheets and plotting of data.
Review the use of spreadsheets for calculation and graphing scientific data. Review the proper drawing and labeling of graphs. Review interpretation of graphs.
- B. Determination of the Heat of Vaporization of Water
Hypothesize the effect of increasing the temperature of a mixture of gases, measure the total pressure as a function of temperature, and draw a conclusion about the hypothesis.
- C. Determination of Molar Mass by Freezing Point Depression
Hypothesize on the effect of increasing the number of solute particles on the freezing point of the solution, measure the freezing point depression of a solution as well as the molar mass of the solute, and draw a conclusion about the hypothesis.
- D. Preparation of Ammine Complexes of Cobalt(III)
Hypothesize on the nature of stoichiometry in chemical reactions and the various colors of transition compounds, prepare the transition compounds, and draw a conclusion about the hypothesis.
- E. Measuring Reaction Kinetics

- Hypothesize on the effect of changing reactant concentration as well as temperature on the rate of the chemical reaction, measure the rates of a chemical reaction as a function of concentration and temperature, and draw a conclusion about the hypothesis.
- F. Determination of an Equilibrium Constant
Hypothesize on the effect of changing initial concentrations of the reactants on the equilibrium constant, measure an equilibrium constant with different initial concentration of the reactants, and draw a conclusion about the hypothesis.
- G. Laboratory Examination of Le Chatelier's Principle
Hypothesize on the effect of changing concentrations, changing pH, and changing temperature of a chemical equilibrium, and draw a conclusion about the hypothesis.
- H. The Effect of Hydrolysis on the pH of Solution and the Preparation and Use of Buffers
Hypothesize on the effect of hydrolysis of various salts on the pH of the solution as well as the effect of adding strong acids and strong bases to a buffer, measure the pH of various salt solutions and the pH of a buffer before and after the addition of strong acids and strong bases, and draw a conclusion about the hypothesis.
- I. Measurement of Titration Curves
Hypothesis on the effect of the pH of a weak acid and a strong acid upon adding a strong base during a titration, measure the pH of a weak acid and a strong acid during a titration with a strong base, and draw a conclusion about the hypothesis.
- J. Measurement of a Solubility Product Constant
Hypothesize on the nature of the solubility product of a sparingly soluble ionic compound, measure the solubility product of a sparingly soluble ionic compound, and draw a conclusion about the hypothesis.
- K. Determination of some Thermodynamic Data for the Dissolution of Borax
Hypothesize on the sign and magnitude of the enthalpy and entropy of the dissolution of borax, measure the enthalpy and entropy of the dissolution of borax, and draw a conclusion about the hypothesis.

