Minnesota State University Moorhead

CHEM 450: Physical Chemistry: Thermodynamics

A. COURSE DESCRIPTION

Credits: 3

Lecture Hours/Week: 3

Lab Hours/Week: 0

OJT Hours/Week: *.*

Prerequisites:
MATH 261 - Calculus I AND CHEM 210 - General Chemistry II AND PHYS 161 - College Physics II & Lab; OR
PHYS 201 - General Physics II & Lab

Corequisites: None

MnTC Goals: None

Application of physics and mathematics to chemical phenomena, focusing on chemical thermodynamics and equilibrium.

B. COURSE EFFECTIVE DATES: 09/06/2018 - Present

C. OUTLINE OF MAJOR CONTENT AREAS

1. Basic concepts of thermodynamics and ideal gas behavior
2. First law of thermodynamics, internal energy, and enthalpy
3. Second law of thermodynamics and entropy
4. Material equilibrium, free energy, and chemical potential
5. Thermochemistry
6. Ideal gas reaction equilibrium
7. One-component phase equilibrium
8. Nonideal gas behavior
9. Ideal and nonideal solutions
10. Reaction equilibrium in nonideal solutions
11. Multicomponent phase equilibrium and colligative properties
12. Electrochemistry
13. Kinetic theory of gases

D. LEARNING OUTCOMES (General)

1. Apply the laws of thermodynamics to a variety of chemical and physical processes.
2. Use the concepts of enthalpy, entropy, free energy, and chemical potential to describe the spontaneity of a process.
3. Predict the equilibrium composition of a system.
4. Interpret phase diagrams.
5. Describe how the microscopic properties of atoms, molecules, and ions yield observable macroscopic properties.
6. Use the techniques of calculus to solve chemical problems.

E. Minnesota Transfer Curriculum Goal Area(s) and Competencies

None

F. LEARNER OUTCOMES ASSESSMENT

As noted on course syllabus

G. SPECIAL INFORMATION

None noted