FALL 2006
IONA COLLEGE
DEPARTMENT OF CHEMISTRY

Chemistry 417A
Instructor: Louis S.Campisi, PhD
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Class Meeting Times: MW 11:00am-12:18pm
Class Location: Room C205
Office Hours: M,W. 1:00pm, Th 10:00am
Or any time by mutual agreement

A detailed theoretical introduction to the concepts and chemical systems of inorganic chemistry including atomic structure, bonding theory, periodic law, symmetry and group theory acid-base theory, reaction mechanism and factors affecting chemical activity, crystalline solid state and coordination chemistry.

Three lecture hours a week for one semester.

Prerequisite: Chm 319-320
(or permission of department chair)

3 Credits

Course Objectives:

Inorganic chemistry is a vast area of study which critically contributes to the understanding of other areas of chemistry as well as other disciplines of science. In addition from both a synthetic and theoretical perspective inorganic chemistry has undergone impressive changes . However, since the chemistry major has been introduced to this field only fleetingly, as part of a general chemistry course, the nature, significance and import of the advances have not become realized to the student. Consequently, in order to foster the development of a modern, well versed chemist, a purely inorganic chemistry course of an intermediate nature is necessary.

It is the purpose of this course to establish the theoretical principles of inorganic chemistry; that is to cultivate within the student a fuller, deeper and more complete understanding of chemical reactivity, bonding, structure and physical and chemical properties as related to inorganic compounds. In order to achieve this end, it is necessary to establish the theoretical basis of inorganic chemistry via development from first principles.

In addition it is the purpose of this course to correlate the concepts studied to more specific cases in order that the student gain both in factual knowledge and have acquired a foundation for interpretation of new data. In order to encourage the student to mature as a scientist, and so that the knowledge be more meaningful, it will be required that the student be able to integrate facts and principles.

Procedures

The procedures essentially outlined for the lecture part of chemistry 109 - 110 apply; that is three formal lecture hours per week for one semester.

Required Text:

Inorganic Chemistry: G.L. Miessler and D.A. Tarr; 3nd Edition; Prentice-Hall; 2004

Grading Criteria:

Two, one hour semester exams and one take home exam	65%
Final Exam	35%

A letter grade will be awarded based on the numerical final grade. The following norm is employed:

A	100-90
B	89-80
C	79-70
D	69-60
F	59-0

Policy on Plagiarism and Academic Dishonesty

Plagiarism and/or Academic Dishonesty on exams, laboratory reports etc. will result in a grade of zero assigned to the work with no opportunity for a make-up.

Tentative Lecture Topics

Chapter I Introduction to Inorganic Chemistry

Chapter II Atomic Structure
(supplemented)

Black Body Radiation, Photoelectric Effect
Atomic Spectra, Bohr Atom
Bohr Theory, Extensions, Applications, Failure
Periodic Motion
Progressive Wave, Standing Wave
Matter Waves, Wave Equation
Particle in a Box
Hydrogen Atom-Wave Equation
Solution of Wave Equation
Radial and Angular Dependence
(Periodic Law, Basis for Classification)
Periodic Trends, Periodic Properties

EXAM I

Chapter III Simple Bonding Theory
Lewis Diagrams
Valence Shell Electron Pair Repulsion theory
Molecular Shapes
Polar Bonds
Computer Applications using Spartan Software

Chapter IV Symmetry and Group Theory
Symmetry and Elements and Operations
Point Groups
Brief Summary of symmetry operations
Documents and Settings\lcampisi\My Documents\groupth2.doc
Tutorial on Point Group Determination
pg20_7_10_06LSC.ppt
Properties and Representations of Groups
Examples and Applications of Symmetry
Computerized Tutorial illustrating point group determination
Using Spartan to calculate IR frequencies associated with normal modes of vibration
(Take Home Exam :Part I)

Chapter V Chemical Bonding
(supplemental)
Valence Bond Theory
Directed Bonding; Hybridization
Group Theory Applications
Molecular Orbital Theory
Variation Method; Secular Equations
Homonuclear Diatomic Molecules
M.O. Diagrams
Group Theoretical Approach
Orbital Symmetry and Electrocyclic Reactions
Using Spartan to calculate Molecular orbital energies of some example molecules

EXAM II

Chapter VII	Crystalline solid State Simple Structures Radius Ratios Thermodynamics of Ionic Crystal Formation Bonding in Ionic Compounds
Chapter VI	Acid Base Concepts Various Acid Base Theories Measurement of Acid Base Strength Hard and Soft Acids and Bases Frontier Orbitals
Chapter VIII	Chemistry of Main Group Elements (self study)
	(Take Home Exam:Part II)
Chapter IX	Coordination Chemistry I Isomerization Coordination Numbers and Structures
Chapter X	Coordination Chemistry II Theories of Electronic Structure Valence Bond Theory Crystal Field Theory Ligand Field Theory Angular Overlap Jahn Teller Effect
Chapter XI	Coordination Chemistry III Electronic Spectra
Chapter XII	Coordination Chemistry IV Reactions and Mechanisms
Dec. 13-18	**Final Exam**

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Campisi Disk# 2