

F.92

## DEPARTMENT OF SCIENCE

### CHEMISTRY 1040

Instructor	Dr. Barry Ramaswamy	
	Room J218	
Telephone	Office	539 2072
	Residence	539 6239
Prerequisites	CHEM 30	MATH 30
Corequisite	MA 1130 or 1140 or Equivalent	
Transfer Credits	University of Alberta	6 Credits
Text Book	CHEMICAL PRINCIPLES	
Author	Stephen, S. Zumdahl D. C. Heath and Company Lexington, Mass.	
Laboratory Manual	University of Alberta Chemistry 100/104 Experiments.  One hard covered Laboratory Note Books is required for mainatining Laboratory Results.  Lab Coats are compulsory and available at the Book Store.  Safety Glasses are compulsory and will be provided.	

A Laboratory Breakage Deposit of \$30.00 has to be paid to the Cashier. Show the Receipt during the first Laboratory Class for Admittance.

## COURSE EVALUATION

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			Marks
1.	First Midterm	Week of Oct. 19 - 24	10
2.	Christmas Examination		20
3.	Second Midterm	Week of Feb 16 - 19, 1993	10
4.	Final Examination, April 1993.		30
5.	Laboratory Reports		20
6.	Assignments, Quizzes, etc		10
TOTAL			100

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*The two midterm examinations will be of 2 hour duration. The Christmas and Final examination will be three hours.*

Assignments will be handed out every week and are due the following Monday. late Assignments will not be accepted. Quizzes will be given as necessary during the Seminar and Class Hours. The Marks for the Quizzes and Assignments will be 10 Marks. You have to attend every Quiz to obtain full Marks.

Attendance to Classes and Seminars are strongly recommended.

Laboratory Attendance is Compulsory. A passing Grade in the Lab is required to pass the course.

A student is required to obtain an average of 50% to pass the course.

# SYLLABUS

Fall Semester.

Sept 2 - December 9, 1992

## 1.0 REVIEW

### [A] CHEMICAL FOUNDATIONS

- (i) Scientific Method
- (ii) Units of Measurement.
- (iii) Significant Figures and Calculations
- (iv) Dimension Analysis
- (v) Temperature, Density , etc

### [B] STOICHIOMETRY

- (i) Atomic Masses, The Mole
- (ii) Molecular Weight/ Molar Mass, Percent Composition of Compounds.
- (iii) Determining the Formula of a Compound
- (iv) Stoichiometric Calculations
- (v) Calculations involving Limiting Reagents.

## CHAPTER 3

Pages 51 - 78

### [C] SOLUTION STOICHIOMETRY

- (i) The Nature of Aqueous Solutions.
- (ii) The Concept of Molarity
- (iii) Precipitation Reactions
- (iv) Limiting Reagents in Aqueous Solutions.
- (v) Simple Acid Base Reactions Involving Stoichiometry.

## CHAPTER 4

Pages 85 - 125

2.0

## GASES

- (i) Early Experiments
- (ii) The Gas Laws of Boyles, Charles and Avogadro
- (iii) Gas Stoichiometry
- (iv) Daltons Law of Partial Pressures
- (v) Effusion and Diffusion
- (vi) Real Gases
- (vii) Intermolecular Collisions

CHAPTER 5

Pages 131 - 169

3.0

## ENTHALPY

- (i) Calorimetry
- (ii) Hess's Law

CHAPTER 9

Pages 331 - 346

4.0

## BONDING AND STRUCTURE

### [A] ATOMIC THEORY

- (i) Daltons Atomic Theory
- (ii) Early Experiments to Characterise the Atom
- (iii) Modern View of the Atomic Structure: An Introduction.
- (iv) Atomic Spectrum of Hydrogen
- (v) The Wave Mechanical Model of the Atom
- (vi) The Bohr Model
- (vii) The Wave Mechanical Model of the Atom
- (viii) Quantum Numbers
- (ix) Orbital Shapes and Energies
- (x) Electron Spin and Pauli Principle
- (xi) Polyelectron Atom
- (xii) The Aufbau Principle and the Periodic Table
- (xiii) Periodic Trends in Atomic Properties

CHAPTER 2

pages 19 - 37

CHAPTER 12

pages 469 - 525

**[B]            STRUCTURE AND BONDING**

- (i)            Types of Chemical Bonds**
- (ii)           Electronegativity**
- (iii)           Bond Polarity and Dipole Moments**
- (iv)           Ion: Electron Configuration and Sizes**
- (v)           Formation of Binary Ionic Compounds**
- (vi)           Partial Ionic Character of Covalent Bonds**
- (vii)           The Localized Electron Bond Model**
- (viii)           Lewis Structures and the Octet Rules**
- (ix)           Exceptions to the Octet Rules**
- (x)           Resonance**
- (xi)           Valence Shell Electron Pair Repulsion, VSEPR, Model**
- (xii)           Hybridization and the Localized Electron Model**
- (xiii)           The Molecular Orbital Model**

<b>Chapter 13</b>	<b>Pages</b>	<b>537 - 590</b>
<b>Chapter 14</b>	<b>Pages</b>	<b>599 - 628</b>



- (xi) Problems involving Titration
- (xii) Acid Base Indicators

**B SOLUBILITY EQUILIBRIA**

- (i) Solubility Equilibria and the Solubility Product
- (ii) Complex Ion Equilibria
- (iii) Precipitation and Qualitative Analysis
- (iv) Problems involving Complex Ion Equilibria

CHAPTER 7	pages	21 1-253
CHAPTER 8	pages	259-317

**8.0 CHEMICAL THERMODYNAMICS**

**A FIRST LAW OF THERMODYNAMICS**

- (i) The Nature of Energy
- (ii) Enthalpy and Calorimetry
- (iii) Hess's Law
- (iv) Standard Enthalpy of Formation
- (v) First Law of Thermodynamics

CHAPTER 9	pages	325 - 365
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ENTROPY, FREE ENERGY AND EQUILIBRIUM

- (i) Energy and Spontaneity: The need for a Second Law
- (ii) Reversible Processes
- (iii) Derivation of the Reversible Work of Expansion of an Ideal Gas
- (iv) Maximum Work
- (v) The Entropy Change for an Isothermal Process
- (vi) The Second Law of Thermodynamics
- (vii) Gibbs Free Energy Function
- (viii) Calculation of  $\Delta G^\circ$
- (ix)  $\Delta G$  and the Equilibrium Constant
- (x) The Temperature Dependence of  $\Delta H$ ,  $\Delta S$ ,  $\Delta G$  and  $K_{eq}$

CHAPTER 10

pages 371 - 416

10.0

ELECTROCHEMISTRY

- (i) Galvanic Cells
- (ii) Standard Reduction Potentials
- (iii) Cell Potential, Electrical Work and Free Energy
- (iv) Electrolysis
- (v) Application of Electrolysis and the Galvanic Cells

CHAPTER 11

pages 425 - 462