

GRANDE PRAIRIE REGIONAL COLLEGE

DEPARTMENT OF SCIENCE *Fall 93*

CHEMISTRY 1000

Instructor Dr. Barry Ramaswamy

Room J218

Telephone Office 539 2072
Residence 539 6239

Prerequisites CHEM 30 MATH 30

Transfer Credits University of Alberta CHEM 100 6 Credits
University of Calgary CHEM 201/203 6 Credits
University of Lethbridge CHEM 1000/2000 6 Credits

Text Book CHEMISTRY, 3rd Edition

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 maintaining Laboratory Results.

Lab Coats are compulsory and available at the Book Store.

Safety Glasses are compulsory and available at the book store. You cannot attend a Laboratory session without safety glasses.

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

First Midterm	Week of Oct 18 - 22	10 Marks
Christmas Exam		20 Marks
Second Midterm	Week of 14 - 18	10 Marks
Assignments		5 Marks
Quizzes		5 Marks
Final	April 1994	30 Marks
Laboratory		20 Marks
Total		100 Marks

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

Assignments will be handed out every week and are due the following Friday. 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 7 - December 10, 1993

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
- Chapter 1 Pages 1 - 32

[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 2, 3 Pages 41 - 115

[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 127 - 173

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 183 - 222

3.0

THERMOCHEMISTRY

- (i) Calorimetry
 - (ii) Hess's Law
 - (iii) Standard Enthalpies of Formation
 - (iv) First Law of Thermodynamics
- CHAPTER 6 Pages 233 - 269

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 41 - 71
- CHAPTER 7 Pages 279 - 330

[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
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| Chapter 8 | Pages | 341 - 392 |
| Chapter 9 | Pages | 403 - 430 |

V TRANSITION METALS AND COORDINATION CHEMISTRY

- (i) The Transition Metals: A Survey
 - (ii) The First Row Transition Metals
 - (iii) Coordination Compounds
 - (iv) Isomerism
 - (v) The Crystal Field Model
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| Chapter 20 | Pages | 935 - 968 |
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WINTER SEMESTER

CHEMISTRY 1020

January 5, 1993 to April 16, 1992

6.0 CHEMICAL EQUILIBRIUM

- (i) The Equilibrium Condition
- (ii) The Equilibrium Constant
- (iii) Equilibrium Expression Involving Pressures
- (iv) Heterogeneous equilibria
- (v) Le Chateliers Theorem and Principle
- (vi) Solving Equilibrium Problems and Applications of the Equilibrium Constant

CHAPTER 13

Pages

595 - 629

7.0 ACID BASE EQUILIBRIA

A ACIDS AND BASES

- (i) Acids and Bases: Introduction
- (ii) Acidity and pH Scale
- (iii) Calculation of pH of Strong and Weak Acids and Bases
- (iv) Bases and Concept of pOH
- (v) Polyprotic Acids
- (vi) Acids Base properties of Salts
- (vii) Solution of Acids and Bases containing a Common Ion.
The Common Ion Effect
- (viii) Buffers and Buffer Capacities
- (ix) Calculation Involving Buffers
- (x) Acid Base Titration and pH Curves
- (xi) Problems involving Titration
- (xii) Acid Base Indicators

Chapter 14

Pages

637 - 687

Chapter 15

Pages

697 - 735

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 15 Pages 736 - 757

8.0 CHEMICAL THERMODYNAMICS

SPONTANEITY, ENTROPY AND FREE ENERGY

- (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 ΔG°
 - (ix) ΔG° and the Equilibrium Constant
 - (x) The Temperature Dependence of ΔH , ΔS , ΔG and K_{eq}
- CHAPTER 16 Pages 767 - 803

9.0 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 17 Pages 811 - 851

10.0

CHEMICAL: KINETICS

- (i) Reaction Rates
- (ii) Rate Laws: Introduction
- (iii) The Integrated Rate Law
- (iv) Reaction Mechanism
- (v) The Steady State Approximation
- (vi) Catalysis

CHAPTER 12

Pages

543 - 584

11.0

NUCLEAR REACTIONS

(OPTIONAL)

- (i) Nuclear Stability and Radioactive Decay
- (ii) The Kinetics of Radioactive Decay
- (iii) Nuclear Transformations
- (iv) Nuclear Fission and Nuclear Fusion
- (v) Effects of radiation

CHAPTER 21

Pages

995 - 1029