

GRANDE PRAIRIE REGIONAL COLLEGE

DEPARTMENT OF SCIENCE *Fall 94*

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.		
	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.		

COURSE EVALUATION

First Midterms	October and November	10 Marks
Christmas Exam	December 1994	20 Marks
Second Midterms	February and March	10 Marks
Assignments		10 Marks
Quizzes		5 Marks
Final	April 1995	25 Marks
Laboratory		20 Marks
Total		100 Marks

The midterm examinations will be of 1 hour duration. The Christmas and final 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 15 Marks. You have to attend every Quiz to obtain full Marks.

Attendance to Classes and Seminars are strongly recommended. Laboratory Attendance to each specific experiment is Compulsory. A passing Grade in the Lab is required to pass the course. A doctors medical note is required for all excused absences.

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

SYLLABUS

Fall Semester.

Sept 6 - December 19, 1994

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

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

5.0

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 |

6.0

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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SYLLABUS

WINTER SEMESTER

January 3 to April 16, 1995

CHEMISTRY 1000

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