
GRANDE PRAIRIE REGIONAL COLLEGE
DEPARTMENT OF SCIENCE
TWENTY-NINTH SESSION 1994/95

CHEMISTRY 1040: Introductory University Chemistry, SECTION A23

PREREQUISITE: Chemistry 30 or equivalent

PRE/COREQUISITE: Math 1130 or Math 1140

INSTRUCTOR: Les Rawluk, Office #J214
Telephone 539-2738 (Office)

TRANSFER CREDIT: U of Alberta: Chem 104, 6 credits
U of Calgary: Chem 201 and Chem 203, 6 credits
U of Lethbridge: Chem 1000 and Chem 2000, 6 credits

LECTURES: Monday, Wednesday, Friday 11:00 - 11:50 in J131

TEXT BOOK: *CHEMICAL PRINCIPLES*
Steven S. Zumdahl
D.C.Heath and Company, Toronto
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LABORATORY: Chemistry 100/104 Experiments, University of Alberta, 1994/95
Lab coats and safety glasses are compulsory, and are available at the Bookstore.

SEMINAR: Seminars consist of problem solving, discussion of weekly problem sets, quizzes, and a brief introduction to the upcoming Laboratory experiment.

COURSE EVALUATION

October Midterm	5%
November Midterm	5%
December Exam	20%
February Midterm	5%
March Midterm	5%
April Exam	25%
Quizzes	5%
Assignments	10%
Laboratory	20%
Total	100.0%

Assignments will be distributed on a weekly basis. Completion of assignments is essential to successfully understanding the course.

Attendance to all lectures and seminars is strongly recommended. Laboratory attendance to each specific experiment is compulsory; a passing grade in the laboratory component is required to pass the course. A doctor's medical note is required for **all** excused absences!

Students are required to maintain an overall average of 50% or better to pass the course.

FALL SEMESTER COURSE CONTENT

- A: Chemical Foundations** Chapter 1 Pages 1-13
- A.1 Units of Measurement
 - A.2 Uncertainty in Measurement
 - A.3 Significant Figures and Calculations
 - A.4 Dimensional Analysis
- B: Atom, Molecules, and Ions** Chapter 2 Pages 19-49
- B.1 Fundamental Chemical Laws
 - B.2 Modern Atomic Structure
 - B.3 Molecules and Ions
 - B.4 Periodic Table
 - B.5 Naming Simple Compounds
- C: Stoichiometry** Chapter 3 Pages 51-84
- C.1 Atomic Masses; the Mole
 - C.2 Molar Mass/Molecular Weight
 - C.3 Percent Composition of Compounds
 - C.4 Determining the Formula of a Compound
 - C.5 Stoichiometric Calculations using a Balanced Chemical Equation
 - C.6 Calculations involving a Limiting Reagent
- D: Types of Reactions and Solution Stoichiometry** Chapter 4 Pages 85-130
- D.1 The Nature of Aqueous Solutions
 - D.2 Molarity
 - D.3 Precipitation Reactions and Limiting Reagents
 - D.4 Acid-Base Reactions
 - D.5 Oxidation-Reduction Reactions
- E: Gases** Chapter 5 Pages 131-177
- E.1 Gas Laws of Boyle, Charles, and Avogadro
 - E.2 Ideal Gas Law
 - E.3 Gas Stoichiometry
 - E.4 Partial Pressures
 - E.5 Kinetic Molecular Theory
 - E.6 Effusion and Diffusion
 - E.7 Intermolecular Collisions
 - E.8 Real Gases

F: Thermochemistry	Chapter 9	Pages 325–370
F.1 Types of Energy; Work and Heat		
F.2 Enthalpy and Thermodynamics of Ideal Gases		
F.3 Calorimetry		
F.4 Hess's Law		
F.5 Standard Enthalpy of Formation		
G: Atomic Theory	Chapter 12	Pages 469–535
G.1 Electromagnetic Radiation		
G.2 The Nature of Matter		
G.3 Atomic Spectrum of Hydrogen		
G.4 Bohr Model		
G.5 Quantum Mechanics and the Atom		
G.6 Particle in a Box		
G.7 Hydrogen Wave Function and a Physical Interpretation		
G.8 Hydrogen Orbitals		
G.9 Pauli Principle		
G.10 The Aufbau Principle and the Periodic Table		
G.11 Trends in Atomic Properties		
H: Structure and Bonding	Chapter 13	Pages 537–597
H.1 Types of Chemical Bonds		
H.2 Electronegativity		
H.3 Bond Polarity and Dipole Moments		
H.4 Ions		
H.5 Binary Ionic Compounds		
H.6 Covalent Bonds		
H.7 Localized Electron Model		
H.8 Lewis Structures		
H.9 Exceptions to the Octet Rule		
H.10 Resonance		
H.11 VSEPR Model		
I: Transition Metals and Coordination Chemistry	Chapter 20	Pages 847–892
I.1 A Survey of the Transition Metals		
I.2 First-row Transition Metals		
I.3 Coordination Compounds		
I.4 Isomerism		

WINTER SEMESTER COURSE CONTENT

- J: Chemical Equilibrium** Chapter 6 Pages 179-210
- J.1 The Equilibrium Condition and Equilibrium Constant
 - J.2 Equilibrium Expression Involving Pressures
 - J.3 Activity
 - J.4 Heterogeneous Equilibria
 - J.5 Applications of the Equilibrium Constant
 - J.6 Le Châtelier's Principle
- K: Acids and Bases** Chapter 7 Pages 211-257
- K.1 The Nature of Acids and Bases
 - K.2 Acid Strength and the pH Scale
 - K.3 Calculating the pH of Strong/Weak Acids
 - K.4 Bases
 - K.5 Polyprotic Acids
 - K.6 Salts
 - K.7 Contributions to $[H^+]$ from Water
- L: Applications of Aqueous Equilibria** Chapter 8 Pages 259-323
- L.1 Common Ion Effect
 - L.2 Buffers
 - L.3 Titrations
 - L.4 Solubility Equilibria and the Solubility Product
 - L.5 Complex Ion Equilibria
- M: Thermodynamics: Entropy and Free Energy** Chapter 10 Pages 371-423
- M.1 Spontaneous Processes and Entropy
 - M.2 Isothermal Expansion and Compression of an Ideal Gas
 - M.3 Entropy: Physical Changes and the Second Law
 - M.4 Effect of Temperature on Spontaneity
 - M.5 Free Energy
 - M.6 Entropy and Free Energy in Chemical Reactions
 - M.7 Pressure Dependence of Free Energy
 - M.8 Free Energy and Equilibrium
 - M.9 Free Energy and Work

N: Electrochemistry	Chapter 11	Pages 425-467
N.1 Galvanic Cells		
N.2 Standard Reduction Potentials		
N.3 Cell Potential, Electrical Work, and Free Energy		
N.4 Cell Potential Dependence on Concentration		
N.5 Electrolysis		
O: Chemical Kinetics	Chapter 15	Pages 637-691
O.1 Reaction Rates		
O.2 Introduction to Rate Laws		
O.3 Determining Rate Law Form		
O.4 Integrated Rate Law		
O.5 Reaction Mechanisms		
O.6 Steady State Approximation		
O.7 Catalysis		