Camosun College

Department of Chemistry and Geoscience

Chemistry 121 Winter 2005

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Texts: Chemistry: The Central Science. Brown, Lemay and Bursten Ninth edition

The Essentials of Organic Chemistry George, Field and Hambley

Chemistry 121 laboratory manual

Study guide for the text.

Duotang binder for lab reports

These items are available from the bookstore. Students must have their own set of safety glasses in order to work in the laboratory. People who normally wear glasses do not have to purchase another pair.

Assessment: The final grade in the course will be based on the following components

Quiz 1	Chapter 25 + organic text	20%
Quiz 2	Chapters 14,15,16 &17	20%
Comprehensive final	+Chapters 5,19 &20	35%
Laboratory		25%

Grades: The following percentages refer to the composite total at the end of the course .

A range	85% to 100%
B range	70% to 84%
C range	60% to 69%
D range	50% to 59%
F range	<50%

Note: This table is given only as a guide and the exact equivalency will be determined by the instructor when all the marks are available. In cases where there is a major difference between the mark on the final examination and the composite total, the instructor reserves the right to adjust the final grade to reflect this difference. The passing grade is C and to pass the course, students must obtain passing grades in both the lecture and laboratory portions of it.

Sequence of Topics

1. Organic Chemistry (14 lectures) (Chapter 25 + The Essentials of Organic Chemistry)

- Hydrocarbons, alkanes, alkenes, alkynes and aromatics.
- Nomenclature; structural isomerism, stereoisomers, Z/E nomenclature.
- Chemical properties of hydrocarbons including mechanisms of addition reactions to alkenes (Markovnikov's rule) and aromatic substitution.
- Functional group chemistry including: alcohols, ethers, aldehydes, ketones, carboxylic acids, esters, amines, amides and alkyl halides.
- Synthesis, properties, chemical reactivity, and nomenclature.
- Optical isomerism and enantiomers; Cahn, Ingold, Prelog nomenclature.
- Biologically important compounds: amino acids, proteins, carbohydrates, fats.
- Polymers.

2. Kinetics (6 lectures) (Chapter 14)

- Reaction rates, measuring reaction rates, factors influencing reaction rates.
- Rate laws, types of rate laws, determining the form of the rate law, method of initial rates.
- Integrated rate laws, zero order, first order, and second order, half-life.
- Temperature and rate, models for chemical kinetics, collision theory, activated complex theory.
- Arrhenius equation and Arrhenius parameters.
- Reaction mechanisms, rate-determining step, deducing the rate law from the mechanism.
- Catalysis, enzymes, industrial catlysis, ozone layer depletion.

3. Chemical Equilibrium (Chapter 15) (3 lectures)

- Equilibrium condition, K_c, K_p, heterogeneous equilibria reaction quotient, relation between K_p andK_c.
- Calculating unknown equilibrium concentrations and/or equilibrium constants.
- Le Chatelier's principle, the Haber process.

4. Acids and Bases (Chapters 16 and 17) (6 lectures)

- Nature of acids and bases, Arrhenius and Bronsted-Lowry models, conjugate acids and bases.
- Autoionization of water, the pH scale, strong and weak acids, strong and weak bases.
- pH calculations for strong acid and base solution, weak acid and base solutions.
- Relating structure to acid/base strength, acid/base properties of salts.
- Lewis acids and bases, common ion effect, buffers, Henderson-Hasselbalch equation.
- Solubility equilibria, formation of complex ions..

5. Thermochemistry and Chemical Thermodynamics (Chapters 5 and 19) (9 lectures)

- Nature of energy, first law of thermodynamics, enthalpy, enthalpy of reaction.
- Calorimetry and the bomb calorimeter.
- Hess's law, enthalpy of formation.
- Fuels.
- Spontaneous processes; reversible and irreversible processes.
- Entropy and the 2nd law, molecular interpretation of entropy.
- Third law of thermodynamics; third law entropies and calculating entropy changes.
- Gibbs free energy, standard free energy.
- Free energy, temperature and equilibrium: free energy and work,
- Driving non-spontaneous processes.

6. Electrochemistry (3 lectures) (Chapter 20)

- Review of redox reactions, balancing redox equations.
- Galvanic cells, electrical energy, standard electrode potentials.
- Cell emf, free energy and electrical work.
- Nemst equation.