

University of Washington
Department of Chemistry
Chemistry 355

Final Exam Review: Spring Quarter 2005

The Final exam is scheduled for Monday, June 6, begins at 230 pm in Bagley 154, and ends at 420.

The final exam consists of two parts. The first half of the exam deals with material covered since the Midterm Exam. The second half of the final exam is a cumulative examination of all the course material.

- First Half of the Final Exam will cover
 - Chapters 5-8 and 11 in the text
 - Lectures 20-37
 - All Problems in Homework Assignments 6-8
- Second Half of the Final exam will cover all the course material, but will emphasize the material covered up to the first exam.
- Bring
 - Calculator (any type)
 - Pencil/Pen
 - Straight Edge (for drawing graphs)
 - Blue/Green Book
 - 2 pages of notes (double-sided, see below)
- Format:
 - Closed Book.
 - Open Notes.
 - Two pages, double-sided,
- Grading: Grading of the examination will be based on the standards stated in the Chemistry 355 course syllabus. Please review the standards section of the syllabus. Important points to keep in mind:
 - Partial credit is USUALLY given in units of 3-5 points.
 - Obtaining the correct numerical answer is counted in partial credit grading. An answer that is within 10% of the correct answer will be fully credited.
 - Calculations must include physical units and a proper dimensional analysis must be included in the calculation.
 - Students are expected to understand how to use their calculators properly. Students will NOT be forgiven for mistakes resulting from calculator errors.
 - When you are asked to explain an answer or are asked to define a term, a worded statement *in complete sentences* is required.
 - If you are given the option to choose from a list of problems (e.g. answer three of the following five questions) you will NOT be credited for answering more than the requested number. For example, if you are allowed to select three problems out of five for answering...and you answer all five... the graders

will NOT credit you for the highest three scoring problems out of five. The first three problems presented on the blue book will be graded.

Examination Study Guidelines: Here is a general outline of the first part of the examination that will be presented to you on 9 June. As mentioned above, the first four problems of the examination cover material introduced since the first exam.

Problem 1(20 pts)_Define 2 out of 6 Terms.

- Osmotic Pressure
- Membrane Equilibria
- Chemiosmotic Theory of Membrane Transport
- Donnan Effect
- Transport Concepts:
 - Frictional Forces and Buoyancy
 - Steady State and Steady State Velocity (terminal velocity)
 - Ficks' Laws
 - Random Walk
 - Frictional Coefficient and Molecular Shapes (
 - Spheres (Stokes' Law)
 - Non-spherical Molecules: Ellipsoids, Rods, Random Coil Polymers
- Centrifugation/Sedimentation
 - Velocity Centrifugation
 - Equilibrium Centrifugation
 - Centrifugation in a gradient
- Viscosity
 - Poiseuille Flow
 - Turbulence
 - Viscosity of Polymer Solutions: Intrinsic Viscosity, etc.
- Biology at Surfaces
 - Surface Tension
 - Capillary Action
 - Surfactants
 - Surface Adsorption
- Quantum Mechanics & Spectroscopy:
 - Quantum vs. Classical Linear Harmonic Oscillatore
 - Wave Functions & Wave Mechanics: Particle in a Box
 - UV-Vis, Fluorescence, Circular Dichroism, IR Spectroscopy

Problem 2 (20 pts)

- Qualitative problems involving any of the concepts above. Answer 2 out of 4 problems

Problems 3 (30 pts each) Short calculations. Perform two from four provided.

Possible topics...

- Calculation of friction coefficients and diffusion coefficients (Stoke's Law, Non-spherical Molecules)
- Calculation of hydrodynamic radius from diffusion coefficient
- Calculation of radius of non-hydrated molecule from specific volume and molecular weight
- Calculation of degree of hydration
- Rms displacement from Diffusion Coefficient
- Calculate sedimentation coefficient from data (i.e. by graphing $\ln(r)$ versus time)
- Calculate molecular mass from sedimentation coefficient
- Molecular Shape from Viscosity Measurements
- Particle in Box wave functions and energies.
- Bohr Atom energies.
- UV-Vis spectroscopy and fluorescence

Problems 4 (30 pts each) Multi-step calculations. Perform one problem out of two provided. Possible topics taken from the list provided under Problem 3.