

Study Guide for the Second Exam – Chem 391 - Fall 2007

Exam period: Monday, 12/10 from 9 AM - noon

See web site for old reading assignments and problem set solutions. Exam will assume familiarity with all material in lecture notes and problem sets. Reading assignments are useful as they give additional perspective and clarification, but I will not expect familiarity with concepts that were not covered in class.

Basics

Amino acid and nucleotide structure

Basic thermodynamics and kinetics: ΔG° and K , ΔG^\ddagger and k

Intermolecular forces

Secondary and tertiary structure in proteins and polynucleotides

Enzyme Kinetics

Steady-state assumption and Michaelis-Menten equation

The five kinetic constants (k_{cat} , V_{max} , K_m , k_{cat}/K_m , K_i)

Competitive inhibition, Lineweaver-Burk plot

$\Delta\Delta G_{cat}^\ddagger$ and $\Delta\Delta G_{overall}^\ddagger$

Entropic and enthalpic issues in catalysis

Enzyme Catalysis

Transition state stabilization – antibody catalysis

General acid/base catalysis (TIM, RNase and ribozymes)

Nucleophilic (covalent) catalysis (serine proteases, PS examples)

Lewis acid catalysis by metals (carboxypeptidase, carbonic anhydrase)

Redox catalysis: Tuning redox potential (superoxide dismutase, catalase)

Ribosome as “entropy trap”

Specificity in Catalysis

RNA polymerase

aaRS and selectivity for amino acids, tRNA

Hopfield mechanism for kinetic proofreading

Ribosome structure and function: specificity and catalysis

G-Proteins (EF-Tu and EF-G), if I get that far