

## Chem 431C Test 1 guide

The test will be on April 24, 2009 Friday as scheduled. It will cover mainly chapters 8, 22, and 24. It is suggested that students study the lecture notes, the quizzes, the chapters in the book and the online quizzes in that order. The lecture notes would help you focus on the material which will be tested on. To help you focus your review, some items are presented below. These are meant to help you get started but not meant to limit your review.

### Chapter 8.

#### Nucleotides and nucleic acids.

- 1) general structures of purine and pyrimidine bases, nucleosides, nucleotides.
- 2) General structure of nucleic acids: DNA strands, polarity of the strand. Phosphodiester linkages
- 3) Classical experiments such as: Avery-MacLeod-McCarty experiment; Hershey-Chase experiment.
- 4) physical chemical properties and structure of the double helix: A, Z and B DNA. Palindromes, mirror repeats, cruciforms.
- 5) denaturation-renaturation experiments and what they show.
- 6) Sanger method of DNA sequencing
- 7) Go over the questions at the end of the chapter such as 1,2,4,5,7, 8, 9, 11, and 13

### Chapter 22 (and a bit of chapt 18 see below)

#### Nitrogen metabolism

- 1) Know the general features of nitrogen metabolism and know steps and features of nitrogen fixation and the nitrogenase complex.
- 2) Know about the central roles of Glu and Gln and the  $\alpha$ -keto acids in the incorporation of  $\text{NH}_3$  in the synthesis of amino acids
- 3) Know the transamination reaction: eg. try Ala and Asp. What is the coenzyme? vitamin? What are the steps (sequence & type of rxn steps is enough) in the "ping-pong" mechanism.
- 4) Allosteric regulation in amino acid synthesis and nucleotide synthesis (various types described: enzyme multiplicity, concerted, etc.)
- 5) amino acid breakdown: (in chapter 18)
  - a) Which amino acids are solely ketogenic? glucogenic? both? (see Ch 18.3, pages 671-672)
  - b) the glucose-alanine cycle, ammonia toxicity, urea cycle in general. (pages 664-667)
- 6) Nucleotide synthesis: key intermediates. Regulated enzymes. Strategy for synthesis of ribonucleotides. Synthesis of deoxyribonucleotides. Uniqueness of dTMP synthesis. Reciprocal regulation. Target enzymes of cancer treatment.
- 7) Nucleotide breakdown: significance of uric acid, for example.

### Chapter 24

#### Genes and Chromosomes

- 1) know the chromosomal elements and terms described in 24.1

- 2) describe the types of sequences found in the human genome (see fig. 24-8 for example)
- 3) Understand the topology of DNA supercoiling – to the extent discussed in class and in 24.2 . Types of topoisomers and what they do.
- 4) Structure of chromosomes: histones, nucleosomes, and various higher order structures. Sequences involved in the contact areas. 30 nm fiber. Nuclear scaffold.(see fig. 24-33 for summary). Condensins.