I. ENZYMES AS CATALYSTS (P&S Ch 1 & 2; Fer Ch 2; Palm Ch 1 & 16)
   A. Overview—proteins as catalysts (historical background)
   B. Enzyme characteristics and properties
   C. Enzyme nomenclature/classification
   D. Enzyme Purification and Assay
      (1) activity measurements
      (2) enzyme units
      (3) turnover number and properties
      (4) purification and purity
      (5) initial velocity measurements
      (6) assay conditions
      (7) methods for measurement
      (8) choice of assay method
      (9) practical considerations

II. ENZYME KINETICS (P&S Ch 4; Fer Ch 2, 3, 4, 6; Palm Ch 6-8)
   A. Kinetics of single substrate reactions
      (1) kinetic concepts
      (2) enzyme kinetics
         (a) Briggs-Haldane steady-state treatment
         (b) Michaelis constant ($K_m$)
         (c) specificity constant
      (3) graphical analysis
   B. Enzyme inhibition
      (1) Classification
         (a) competitive
         (b) noncompetitive
         (c) uncompetitive
         (d) substrate
   C. Multi-substrate reactions
      (1) convention
      (2) mechanisms
   D. Substrate binding analysis
      (1) derivation
      (2) methodology
III. MECHANISM OF ENZYME CATALYSIS (P&S Ch 5; Fer Ch 2, 9; Palm Ch 10, 11; Zub Ch 9)

A. Reaction Mechanisms and Catalysis
   (1) proximity effect
   (2) acid-base catalysts
   (3) electrostatic
   (4) functional groups
   (5) structural flexibility

B. Active Site Investigations
   (1) kinetic studies
   (2) detection of intermediates
   (3) x-ray crystallographic studies
   (4) chemical modification of amino acid side chains
   (5) site-directed mutagenesis studies

C. Specific enzymes
   (1) alcohol dehydrogenase
   (2) ribonuclease A
   (3) triose phosphate isomerase
   (4) amino acyl tRNA synthetases
   (5) carbonic anhydrase

IV. ENZYME REGULATION (P&S Ch 6; Zub Ch 10)

A. Partial Proteolysis

B. Phosphorylation, adenylylation, disulphide reduction

C. Allosteric regulation
   (1) sigmoidal kinetics
   (2) symmetry model
   (3) concerted model
   (4) kinetics and functions of allosteric enzymes
      (a) phosphofructokinase
      (b) glycogen phosphorylase

Fer = Ferst; Palm = Palmer, P&S = Price and Stevens; Zub = Zubay.

SUPPLEMENTARY TEXTS


Laboratory References, a selection of papers cited in the lab manual and collected in a binder for student use.

All indicated supplementary texts, papers and treatises are available at the Reserve Desk at the library on two hour loan.