

# Microbial Metabolism

## Chapter 7

- I. Review Reactions
  - A. Metabolism
    - 1. anabolism
    - 2. catabolism
    - 3. exchange reaction
      - a. exergonic
      - b. endergonic
    - 4. E source
- II. Enzymes
  - A. Collision theory
    - 1. activation E
  - B. Catalyst
  - C. Notes
  - D. Enzyme Structure
    - 1. substrates
    - 2. active site
    - 3. products
  - E. Naming
  - F. Cofactors
    - 1. apoenzyme
    - 2. holoenzyme
    - 3. cofactors
      - a. ions, metal atoms
      - b. coenzyme
        - 1) NAD<sup>+</sup>
        - 2) FAD
        - 3) coenzyme A
  - G. Activity
  - H. Inhibitors
    - 1. competitive
    - 2. noncompetitive
      - a. allosteric site
    - 3. Feedback inhibition energy
- III. Energy Use Comparison
- IV. Exchange Reaction Energy
  - A. Energy-carrier molecules
    - 1. ATP
    - 2. Electron carriers
      - 1) NAD<sup>+</sup>
      - 2) FAD
  - B. Pathways
    - 1. Linear, Branched, Circular

## V. Carbohydrate Catabolism

- A. Cellular respiration
- B. Fermentation

## VI. Glycolysis

- A. Notes
- B. In = glucose
- C. Out = pyruvate

## VII. Cellular Respiration

- A. Notes
- B. Decarboxylation - Hub reaction
  - a. in = pyruvate
  - b. out = acetyl CoA
- C. Krebs cycle
  - 1. Notes
  - 2. in = acetyl CoA
- D. Electron transport chain
  - 1. notes
  - 2. in = electrons
  - 3. out = proton gradient (water)
  - 4. chemiosmosis
    - a. proton motive force
  - 5. ATP synthase
  - 6. Totals
    - a. 36 or 38 ATP

## VIII. Phosphorylation

- A. Substrate-level phosphorylation
- B. Oxidative phosphorylation

## IX. Anaerobic Respiration

## X. Fermentation

- A. Overview
- B. Glycolysis
- C. pyruvate
  - 1. regenerate  $\text{NAD}^+$
- D. Products
  - 1. alcohol
  - 2. solvents
    - a. acetone, butanol
  - 3. organic acids
    - a. propionic acid
    - b. lactic acid