ADVANCED BIOLOGY: AN INTRODUCTION TO METABOLISM

( USE CHAPTER 8 AS A RESOURCE)

AN ORGANISM’S METABOLISM TRANSFORMS MATTER AND ENERGY

Metabolism

1. Metabolic pathways
2. Catabolic pathways
3. Anabolic pathways
4. Bioenergetics
5. Forms of energy
6. Chemical Energy
7. Thermal Energy
8. Free Energy and Metabolism
9. Exergonic Reaction
10. Endergonic Reaction

ATP POWERS CELLULAR WORK BY COUPLING EXERGONIC REACTION TO ENDERGONIC REACTIONS

Chemical Work

Transport Work

Mechanical Work

Energy coupling

1. The Structure and Hydrolysis of ATP



1. How the Hydrolysis of ATP Performs Work
2. Chemical Work
3. Transport Work
4. Mechanical Work

ENZYMES SPEED UP METABOLIC REACTION BY LOWERING ENERGY BARRIERS

Enzyme

Catalyst

1. The Activation Energy Barrier

 

1. How Enzymes Speed Up Reactions



1. Substrate Specificity of Enzymes



1. Substrate
2. Enzyme-Substrate Complex
3. Active Site
4. Induced Fit
5. Catalysis in the Enzyme’s Active Site

a.

b.

c.

d.

1. Rate of reaction
2. Effects of Local Conditions on Enzyme Activity



1. Effects of Temperature and pH
2. Cofactors
3. Cofactors
4. Coenzyme
5. Enzyme Inhibitors



1. Competitive Inhibitors
2. Noncompetitive Inhibitors
3. The Evolution of Enzymes

REGULATION OF ENZYME ACTIVITY HELPS CONTROL METABOLISM

1. Allosteric Regulation of Enzymes
2. Allosteric Activation and Inhibition



(1) Activator

(2) Inhibitor

1. Cooperativity
2. Feedback Inhibition



1. Specific Localization of Enzymes Within the Cell