

Chapter 3 Cell Metabolism

1. Define the following terms
 - a. Metabolism
 - b. Catabolic reaction
 - c. Kinetics energy
 - d. Energy
 - e. Potential energy
 - f. The Law of Mass Action
 - g. Coenzyme
 - h. Cofactor
 - i. Substrate
 - j. Product
 - k. Enzyme

- l. Chemiosmotic coupling
 - m. Substrate level phosphorylation
 - n. Oxidative phosphorylation
 - o. Glycogenesis
 - p. Glycogenolysis
 - q. Gluconeogenesis
 - r. Lipolysis
 - s. Beta oxidation
 - t. Lipogenesis
 - u. Proteolysis
2. Describe what occurs in the following basic types of metabolic reactions:
- a. catabolic metabolic reactions and anabolic metabolic reactions

 - b. *hydrolysis and condensation*

c. *phosphorylation and dephosphorylation*

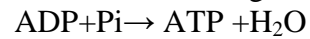
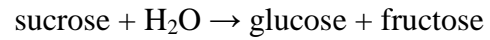
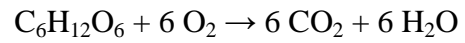
d. *oxidation and reduction*

3. Match following reactions and the examples

Phosphorylation

Hydrolysis

Oxidation



4. Is $\text{C}_6\text{H}_{12}\text{O}_6 + 6 \text{O}_2 \rightarrow 6 \text{CO}_2 + 6 \text{H}_2\text{O}$ a catabolic reaction? _____

5. Define *activation energy* and describe its influence on the rates of reactions.

6. Describe the properties of enzymes.

7. Enzyme speeds up chemical action by _____.

8. List the two models related to the mechanism of enzyme binding.

9. Discuss the various factors that influence the rates of enzyme-catalyzed reactions.

10. Interpret diagrams

a. According to Figure 3.3 (b),

- Which reaction is going to be a spontaneous reaction (forward or reverse)?
- Explain:

b. According to Figure 3.8 (pages 68- 69)

- With the increase of substrate concentration at the same level of [enzyme], what happen with the reaction rate?
- The reaction rate is faster with high enzyme concentration (high[E]) or low [E] at the same [S]. Why is that?

12. **Complete the table**

I. Aerobic Respiration

	Glycolysis	Pyruvate to Acetyl-CoA Reaction	Krebs Cycle (Citric acid cycle)	Oxidative Phosphorylation (Electron Transport Chain)
Location where it occurs				
Products				
Total ATP Produced				
How is ATP produced? (mechanism: substrate level phosphorylation/ Oxidative phosphorylation)				

II. Anaerobic Respiration: Fermentation

Requirement of Oxygen (yes/no)	Requirement of Mitochondria (yes/no)	Location where it happens in a Cell	Products	# of ATP Produced

13. Discuss the metabolic pathway involves in carbohydrates, lipids and proteins (Pages 85- 90).

14. Fill in the blanks with processes and locations:

- a. Processes: glycogenesis, glycogenolysis, gluconeogenesis, glycolysis, linking step, conversion of pyruvate to lactate, Krebs cycle, lipogenesis, lipolysis, β -oxidation, electron transport chain and oxidative phosphorylation, deamination, condensation, hydrolysis and proteolysis, ketogenesis
- b. Locations: liver, cytoplasm, muscle, mitochondria, adipose tissue

