

جامعة الانبار

قسم التقنيات الاحيائية

كلية العلوم

المادة: الاحياء المجهرية

مدرس المادة: ا. م. د. علي حازم عبد الكريم

المرحلة: الثانية

(Microbial Metabolism)

Catabolic and Anabolic Reactions

1. The sum of all chemical reactions within a living organism is known as metabolism.
2. Catabolism refers to chemical reactions that result in the breakdown of more complex organic molecules into simpler substances. Catabolic reactions usually release energy.
3. Anabolism refers to chemical reactions in which simpler substances are combined to form more complex molecules. Anabolic reactions usually require energy.
4. The energy of catabolic reactions is used to drive anabolic reactions.
5. The energy for chemical reactions is stored in ATP.

Enzymes

1. Enzymes are proteins, produced by living cells, that catalyze chemical reactions by lowering the activation energy.
2. Enzymes are generally globular proteins with characteristic three-dimensional shapes.
3. Enzymes are efficient, can operate at relatively low temperatures, and are subject to various cellular controls.

Naming Enzymes

4. Enzyme names usually end in -ase.
5. The six classes of enzymes are defined on the basis of the types of reactions they catalyze.

Enzyme Components

6. Most enzymes are holoenzymes, consisting of a protein portion (apoenzyme) and a nonprotein portion (cofactor) .
7. The cofactor can be a metal ion (iron, copper, magnesium, manganese, zinc, calcium, or cobalt) or a complex organic

molecule known as a coenzyme (NAD⁺, NADP⁺, FMN, FAD, or coenzyme A) .

The Mechanism of Enzymatic Action

8. When an enzyme and substrate combine, the substrate is transformed, and the enzyme is recovered.
9. Enzymes are characterized by specificity, which is a function of their active sites.

Factors Influencing Enzymatic Activity

10. At high temperatures, enzymes undergo denaturation and lose their catalytic properties; at low temperatures, the reaction rate decreases.
11. The p H at which enzymatic activity is maximal is known as the optimum pH.
12. Enzymatic activity increases as substrate concentration increases until the enzymes are saturated.
13. Competitive inhibitors compete with the normal substrate for the active site of the enzyme. Noncompetitive inhibitors act on other parts of the apoenzyme or on the cofactor and decrease the enzyme's ability to combine with the normal substrate.

Feedback Inhibition

14. Feedback inhibition occurs when the end-product of a metabolic pathway inhibits an enzyme's activity near the start of the pathway

Ribozymes

15. Ribozymes are enzymatic RNA molecules that cut and splice RNA in eukaryotic cells.

References': 1- Microbiology an introduction TWELFTH EDITION. Gerard. Tortora.2016.

2- Microbiology an introduction TENTH EDITION. Gerard. Tortora.2010.