

Activity 48: Catabolism and Anabolism

Learning Objective

Distinguish catabolism and anabolism and the energy exchange in each

Estimated Completion Time 25 Minutes

Instructor Information

This is a basic activity that assumes no prior knowledge of metabolism. If students have a lot of prior knowledge, they may overthink some of the questions.

ANSWERS TO QUESTIONS

1.

Type of Reaction	Reactants	Products
Catabolic	Large biological molecules	Small building blocks
Anabolic	Small building blocks	Large biological molecules

2. Catabolism exergonic (produce ATP); anabolism endergonic (require ATP)
3. The breakdown of large biological molecules into smaller building blocks. Energy is also produced.
4. The synthesis of large biological molecules by smaller building blocks. The reactions require energy.
5. The combination of reactions of catabolism and anabolism
6. Catabolism—oxidation or hydrolysis; anabolism; reduction or condensation
7.
 - a. Glycolysis—catabolism; gluconeogenesis—anabolism
 - b. The two pathways cannot use all the same enzymes because the reactions would then be completely reversible and would not produce any energy. (They could rest at equilibrium. Many answers would be acceptable here.)

8. No. Large amounts of heat cannot be dissipated by the body, which is why several chemical reactions occur during a metabolic pathway so that the energy changes of a single reaction are kept small.

Activity 48: Skill Development

1. It would require energy, and the reactants would be combining to form a larger product.
2. It would likely give off energy, and the reactant would be breaking up into smaller pieces.
3. ATP
4. Neither. A reversible reaction would be able to come to equilibrium and would have a ΔG of 0 (neither exergonic nor endergonic).