

Flashcards Deluxe Mac PDF

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What is photosynthesis?

Photosynthesis is the process by which green plants, algae, and some bacteria convert light energy, usually from the sun, into chemical energy stored in glucose.

Why is photosynthesis important for life on Earth?

Photosynthesis is crucial because it produces oxygen as a byproduct, which is essential for the survival of most living organisms, and it forms the base of the food chain by providing energy-rich compounds.

What are the main components required for photosynthesis?

The main components required for photosynthesis are sunlight, water, carbon dioxide, and chlorophyll.

How does the process of photosynthesis differ from cellular respiration?

Photosynthesis converts carbon dioxide and water into glucose and oxygen using sunlight, while cellular respiration breaks down glucose and oxygen to produce carbon dioxide, water, and energy.

What role does chlorophyll play in photosynthesis?

Chlorophyll is the pigment in plants that absorbs sunlight, which is necessary to drive the photosynthesis process.

Describe the two main stages of photosynthesis.

The two main stages are the light-dependent reactions, which convert solar energy into chemical energy, and the Calvin cycle, which uses that energy to synthesize glucose.

What is the chemical equation for photosynthesis?

The chemical equation for photosynthesis is $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light energy} \rightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$.

How can photosynthesis be applied to solve environmental issues?

Photosynthesis can help reduce carbon dioxide levels in the atmosphere, thus mitigating climate change, and it can be harnessed in bioengineering to produce biofuels.

What are stomata, and what is their function in photosynthesis?

Stomata are small openings on the surfaces of leaves that allow gas exchange; they let carbon dioxide in and oxygen out.

Evaluate the efficiency of photosynthesis in different environments.

Photosynthesis efficiency varies; it is generally higher in environments with abundant sunlight and water and lower in extreme conditions like deserts or very cold areas.

How do C4 and CAM plants adapt their photosynthesis process?

C4 plants fix carbon dioxide into a four-carbon compound to efficiently use water, while CAM plants open their stomata at night to minimize water loss.

What is the significance of the Calvin cycle in photosynthesis?

The Calvin cycle is significant because it uses ATP and NADPH produced in the light-dependent reactions to synthesize glucose from carbon dioxide.

What is the role of water in photosynthesis?

Water provides electrons and protons for the light-dependent reactions and releases oxygen as a byproduct.

How does light intensity affect the rate of photosynthesis?

Increased light intensity boosts the rate of photosynthesis up to a point, after which it plateaus as other factors become limiting.

What adaptations do plants have to maximize photosynthesis?

Plants have adaptations like broad leaves, chloroplasts, and efficient stomatal regulation to maximize photosynthesis.

How does temperature affect photosynthesis?

Photosynthesis is temperature-dependent; too low or too high temperatures can slow down or inhibit the process.

What is photolysis, and what role does it play in photosynthesis?

Photolysis is the splitting of water molecules by light energy during the light-dependent reactions, providing electrons and protons.

How do environmental factors like pollution affect photosynthesis?

Pollution can reduce photosynthesis by blocking sunlight, damaging plant tissues, and altering the availability of essential nutrients.

What is the role of ATP and NADPH in photosynthesis?

ATP and NADPH are energy carriers produced in the light-dependent reactions and used in the Calvin cycle to synthesize glucose.

How can understanding photosynthesis contribute to advances in agriculture?

Understanding photosynthesis can lead to the development of crops with higher yields, better stress resistance, and improved efficiency in resource use.