

8.3 The Process of Photosynthesis

Lesson Objectives

-  Describe what happens during the light-dependent reactions.
-  Explain what happens during the light-independent reactions.
-  Identify factors that affect the rate at which photosynthesis occurs.

BUILD Vocabulary

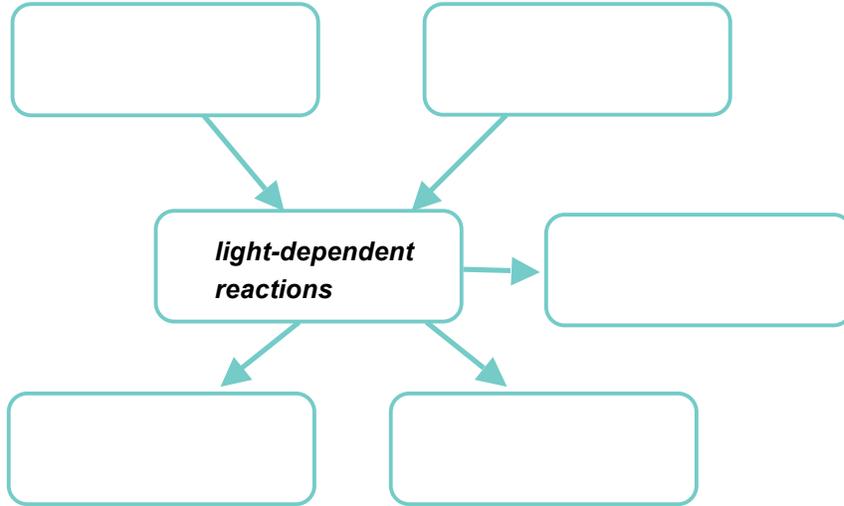
A. The chart below shows key terms from the lesson with their definitions. Complete the chart by writing a strategy to help you remember the meaning of each term. One has been done for you.

Term	Definition	How I'm Going to Remember the Meaning
ATP synthase	Enzyme that converts ADP and a phosphate group to ATP	<i>Many enzymes end in the suffix –ase, and ATP synthase is an enzyme that produces ATP.</i>
Calvin cycle	Another name for the light-independent reactions in which carbohydrates are produced	
Electron transport chain	Series of electron-carrier proteins that transport high-energy electrons during the process of making ATP	
Photosystem	Cluster of chlorophyll and proteins in the thylakoids essential to the light-dependent reactions	

B. As you work through this lesson, you may find these terms in the activities. When you write a key term or a definition, **highlight** the term or the definition.

BUILD Understanding

Flowchart A flowchart is a way to show the steps in a process. As you read, complete the flowchart to show the steps involved in the light-dependent reactions of photosynthesis.



Light-Dependent and Light-Independent Reactions

Photosynthesis involves two sets of reactions. The light-dependent reactions need sunlight. They use energy from this sunlight to produce energy-rich compounds, like ATP. The light-independent reactions use these energy-rich compounds to produce sugars from carbon dioxide.

Complete the T-chart. Write the phrases in the box that belong in each side of the chart.

<ul style="list-style-type: none"> Use energy from the sun Use carbon dioxide Produce oxygen Produce sugars Convert ADP into ATP 	<ul style="list-style-type: none"> Take place in the stroma Take place in thylakoids Require water Also called Calvin cycle
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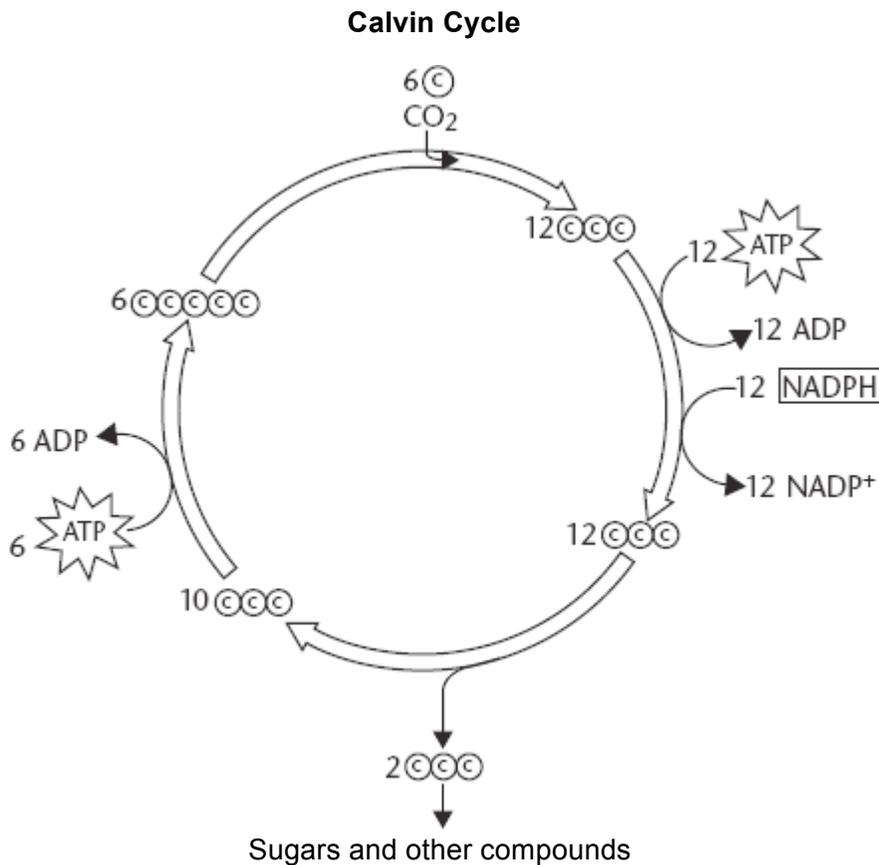
Light-dependent Reactions	Light-independent Reactions

The Light-Independent Reactions: Producing Sugars

Both ATP and NADPH are produced by the light-dependent reactions of photosynthesis. The Calvin cycle uses the energy in ATP and NADPH to produce high-energy sugars. A model of the Calvin cycle is shown below.

Follow the directions.

1. Circle the places where ATP and NADPH are used.
2. Draw an X over the two 3-carbon molecules that are removed from the cycle to produce sugars, lipids, and other compounds.



Answer the questions.

3. Circle the letter of each statement that is true about the Calvin cycle.
 - A. The main products of the Calvin cycle are six carbon dioxide molecules.
 - B. Carbon dioxide molecules enter the Calvin cycle from the atmosphere.
 - C. Energy from ATP and high-energy electrons from NADPH are used to convert 3-carbon molecules into higher-energy forms.
 - D. The Calvin cycle uses 6 molecules of carbon dioxide to produce a single 6-carbon sugar molecule.
4. Why are the reactions of the Calvin cycle also called the light-independent reactions?