



Name _____

Period _____

Date _____

SECTION
4.3

PHOTOSYNTHESIS IN DETAIL
Reinforcement

CHAPTER 4
Cells and Energy

KEY CONCEPT Photosynthesis requires a series of chemical reactions.

Photosynthesis takes place in two main stages: the light-dependent reactions and the light-independent reactions. The light-dependent reactions capture and transfer energy. The light-dependent reactions mainly take place in the thylakoid membranes through two groups of molecules, called **photosystems**.

- **Photosystem II:** In photosystem II, chlorophyll and other light-absorbing molecules capture energy from sunlight. The energy is transferred to electrons that travel through a series of proteins in the thylakoid membrane called an **electron transport chain**. Water molecules are broken down. Hydrogen ions from the water molecules are pumped across the thylakoid membrane.
- **Photosystem I:** Additional energy is absorbed from sunlight and transferred to electrons in the electron transport chain. The electrons are used to produce a molecule called NADPH, which carries energy to the light-independent reactions.
- **ATP synthase:** Hydrogen ions flow through a complex enzyme called **ATP synthase** that produces ATP molecules that are transferred to the light-independent reactions.

The light-independent reactions use the ATP and NADPH from the light-dependent reactions, and carbon dioxide from the atmosphere, to make sugars. The light-independent reactions take place through the **Calvin cycle**. The Calvin cycle has several chemical reactions that are necessary to produce a high-energy sugar from low-energy carbon dioxide.

1. What are the three parts of the light-dependent reactions?

2. What are the functions of photosystem II?

3. What are the functions of photosystem I?

4. What is the function of ATP synthase?

5. What happens during the Calvin cycle?

Copyright by McDougal Littell, a division of Houghton Mifflin Company