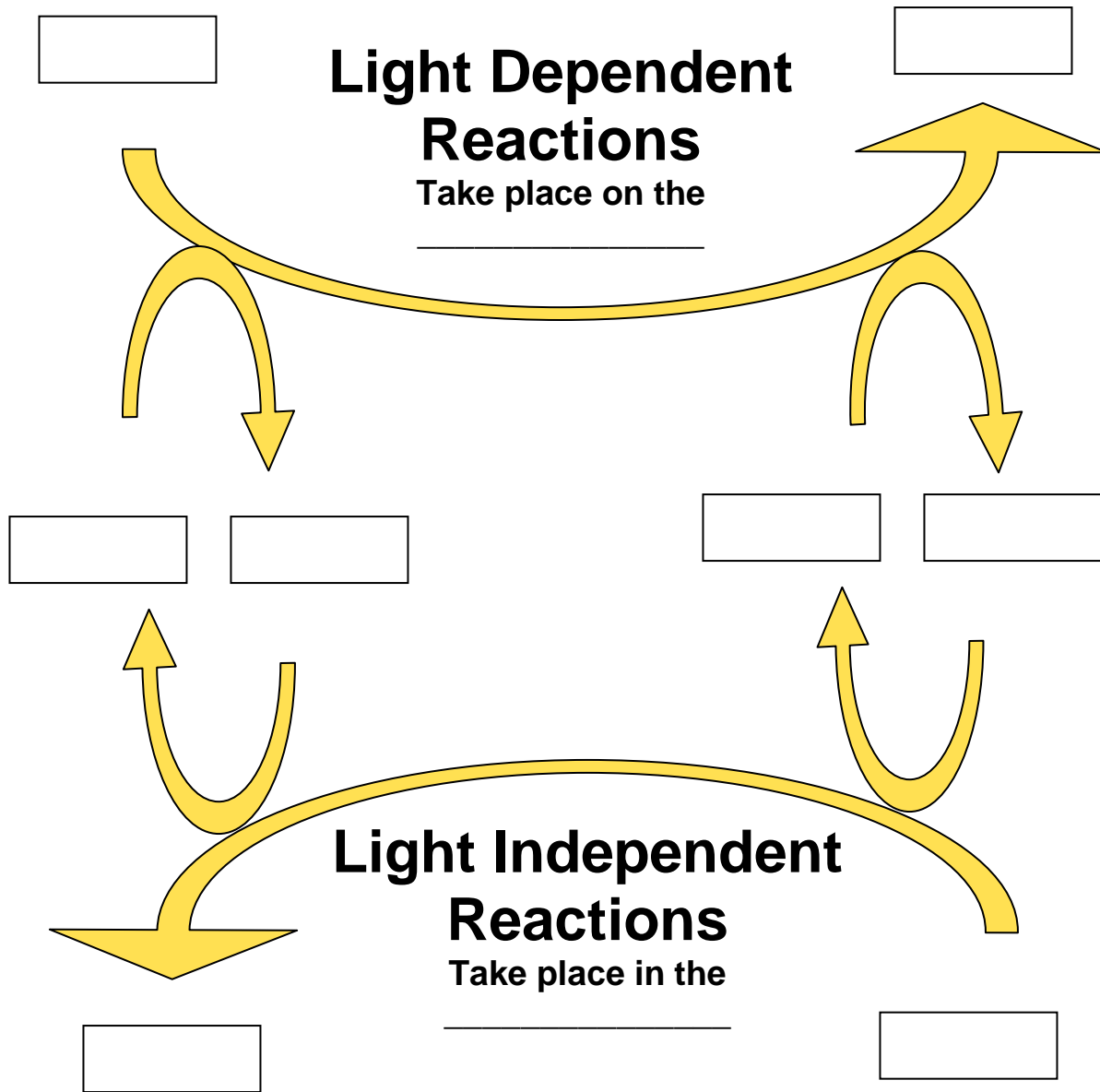


Photosynthesis

An Overview of the Light Dependent and Light Independent Reactions



Place the following terms into the proper boxes to make the diagram accurate:

- H_2O Carbohydrate O_2 $CO_2 + H_2O$
 ADP ATP $NADP^+$ NADPH

Place the following terms on the proper lines to make the diagram accurate:

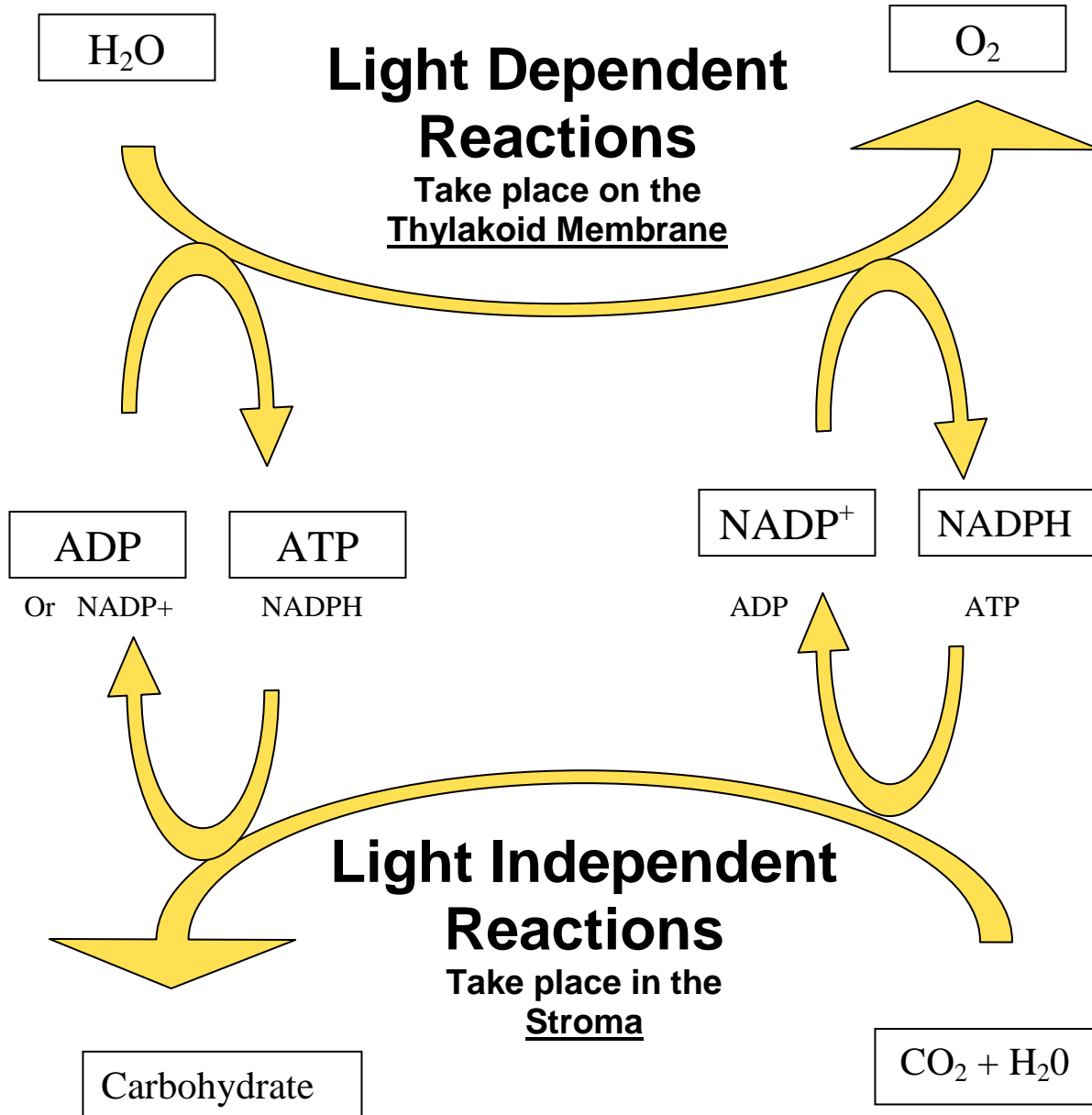
- Stroma Thylakoid membrane

Questions

1. When does the light dependent reaction occur?
2. When does the light independent reaction occur?
3. What are the resulting products of photosynthesis?
4. What are the reactants (substrates) required for photosynthesis?
5. As long as photosynthesis is occurring, which compound(s) is/are cycled?
6. In your own words, explain the light dependent reaction.
7. In your own words, explain the light independent reaction.
8. Explain why the light dependent-light independent reactions are often called “coupled reactions”

KEY for Photosynthesis

An Overview of the Light Dependent and Light Independent Reactions



Place the following terms into the proper boxes to make the diagram accurate.

- | | | | |
|--------|--------------|----------|---------------|
| H_2O | Carbohydrate | O_2 | $CO_2 + H_2O$ |
| ADP | ATP | $NADP^+$ | NADPH |

Place the following terms on the proper lines to make the diagram accurate.

- | | |
|--------|--------------------|
| Stroma | Thylakoid membrane |
|--------|--------------------|

KEY for Questions

1. When does the light dependent reaction occur?

Anytime the correct wavelengths of light are present for the particular autotroph (plant, algae).

2. When does the light independent reaction occur?

Anytime there is enough ATP, NADPH, CO₂ and H₂O present in the chloroplast.

3. What are the resulting products of photosynthesis? O₂ and carbohydrates

4. What the reactants (substrates) of photosynthesis? CO₂ and H₂O

5. As long as photosynthesis is occurring, which compound(s) is/are cycled?

ADP and ATP, NADP⁺ and NADPH

6. In your own words, explain the light dependent reaction.

1. The light dependent reaction occurs in the presence of light and 2. The light energy breaks down H₂O. 3. The H reacts with NADP⁺ and makes NADPH; 4. The O₂ is not needed and is released. 5. The energy also creates ATP from ADP. 6. This reaction takes place on the Thylakoid membrane in the chloroplast. (Many other enzymes and chemicals are present on the membrane).

All 6 ideas must be present to get all 6 points, the wording will be different.

7. In your own words, explain the light independent reaction.

1. The light independent reaction can take place with or without light; all that must be present are ATP, NADPH, H₂O and CO₂ (and of course, many other enzymes and chemicals that are present in the stroma). 2. The ATP to provide energy and NADPH to provide more H's were made 3. During the light dependent reaction, 4. The H₂O and CO₂ are present in the chloroplast. 5. These reactions take place in the stroma of the chloroplast. 6. Carbohydrates are made that store some of the energy released from the ATP, so ADP is formed and so is NADP⁺.

All 6 ideas must be present to get all 6 points, the wording will be different.

8. Explain why the light dependent-light independent reactions are often called "coupled reactions"

The energy that is stored in ATP in the light dependent reaction is used to operate the light independent reaction. One reaction provides the energy for the other reaction.