

# 3.4 Photosynthesis

Name: \_\_\_\_\_ Class: \_\_\_\_\_ Date: \_\_\_\_\_ **Total: 11 marks**

**KEY WORDS** photosynthesis 光合作用 • light reactions 光反应 • calvin cycle 卡尔文循环

## Objective

Build the skills to answer exam questions on **photosynthesis**.

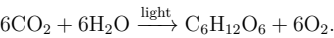
**You must be able to:**

- write the overall equation and locate the two stages
- describe the **light reactions** 光反应 and the **Calvin cycle** 卡尔文循环
- state the inputs and outputs of each stage

## 1 Worked examples

Study these first. Each one shows the method for a question type used later — follow the steps and you can do the Practice and Exam-style questions yourself.

### ■ The overall reaction



Plants use light energy to build glucose from CO<sub>2</sub> and water, releasing O<sub>2</sub>.

### ■ The light reactions

In the **thylakoid** membranes, light energy splits water (releasing O<sub>2</sub>) and makes **ATP** and **NADPH**. Inputs: light, water. Outputs: O<sub>2</sub>, ATP, NADPH.

### ■ The Calvin cycle

In the **stroma**, the ATP and NADPH power the **Calvin cycle**, which fixes CO<sub>2</sub> into **glucose** (sugar). Inputs: CO<sub>2</sub>, ATP, NADPH. Output: sugar.

### ■ A worked link

The two stages connect: the light reactions supply the ATP and NADPH that the Calvin cycle needs to build sugar from CO<sub>2</sub>.

## 2 Practice

Now apply the methods above.

**2.1** Write the overall equation for photosynthesis. [2]

**2.2** Where do the light reactions occur? [1]

**2.3** What gas is released by the light reactions? [1]

## 3 Exam-style questions

**3.1** The Calvin cycle uses ATP and NADPH to make [1]

|   |   |
|---|---|
| A | B |
| C | D |

- A** oxygen
- B** sugar (glucose)
- C** water
- D** light

**3.2** A plant is photosynthesizing.

(a) State the inputs and outputs of the light reactions. [2]

(b) Explain how the two stages of photosynthesis are connected. [2]

**3.3** Explain why the release of oxygen comes from the splitting of water, not from carbon dioxide. [2]