

Subject: Biology

Topic: Photosynthesis

Subtopic: The effects of environmental factors on the rate of photosynthesis

Level: S.4

Background information:

This is the third lesson in a series of six. The activity is in the middle of a double lesson. The teacher has introduced the set-up of the experiment that investigates the effect of light intensity on the rate of photosynthesis.

Learning objectives:

1. Content

Students should be able to investigate and explain the effects of light intensity on the rate of photosynthesis

2. Language

Students should be able to write two short paragraphs in the following pattern to explain the effects of light intensity on the rate of photosynthesis:

At the start, as the light intensity _____, the rate of photosynthesis _____.

This is because _____ is a limiting factor.

As light intensity increases above a saturation point, the rate of photosynthesis_____.

This is because _____ is the rate limiting factor

S.4 Biology
Photosynthesis
Worksheet 1A

Name: _____ Class: _____ No: _____ Date: _____



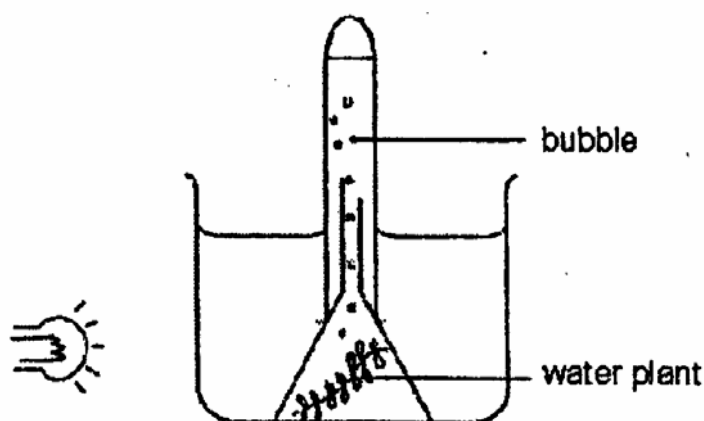
Instructions:

1. Work in pairs. Student A uses Worksheet 1A. Student B uses Worksheet 1B.
2. Each student reads the worksheet carefully and completes the questions.
3. When both have finished, explain your answer to your partner.
4. Use the information from your explanations to write a paragraph to explain the overall effects of light intensity on the rate of photosynthesis.

Experiment to show the effect of light of low intensity on the rate of photosynthesis

The diagram below shows a set-up for measuring how fast a water plant can carry out photosynthesis at 20 °C. The plant is exposed to different light intensities and the rate of photosynthesis is estimated by counting the number of bubbles released in a given time.

The results are summarized in the table below.



Light intensity (arbitrary unit)	1	2	3	4	5
----------------------------------	---	---	---	---	---

Numbers of bubbles released per min. (min^{-1})	5	9	15	21	23
--	---	---	----	----	----

- Plot the results shown in the table on the graph paper provided.
- What happens to the rate of photosynthesis when light intensity increases? (At low light intensity)

As light intensity increases from _____ to _____, the rate of photosynthesis _____.

- You have learnt that the four factors affecting the rate of photosynthesis are carbon dioxide concentration, the presence of chlorophyll, the amount of water and light intensity. What is a possible factor limiting the rate of photosynthesis when light intensity is low?

_____ is the factor limiting the rate of photosynthesis.

What evidence from the graph can support your answer?

When you have finished, show your graph and explain your answer to your partner.

- Now put the information in the two curves together and complete the following paragraph to describe the overall effects of light intensity on the rate of photosynthesis.

At the start, as the light intensity _____, the rate of photosynthesis _____.

This is because _____ is a limiting factor.

As light intensity increases above _____, the rate of photosynthesis _____.

S.4 Biology
Photosynthesis
Worksheet 1B

Name: _____ Class: _____ No: _____ Date: _____



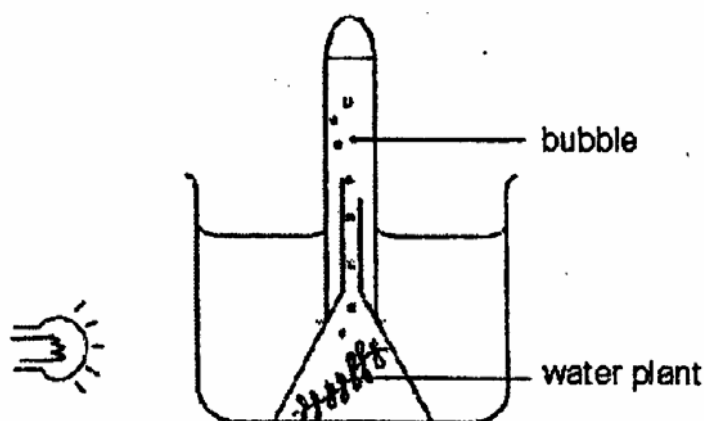
Instructions:

1. Work in pairs. Student A uses Worksheet 1A. Student B uses Worksheet 1B.
2. Each student reads the worksheet carefully and completes the questions.
3. When both have finished, explain your answer to your partner.
4. Use the information from your explanations to write a paragraph to explain the overall effects of light intensity on the rate of photosynthesis.

Experiment to show the effect of light of high intensity on the rate of photosynthesis

The diagram below shows a set-up for measuring how fast a water plant can carry out photosynthesis at 20 °C. The plant is exposed to different light intensities and the rate of photosynthesis is estimated by counting the number of bubbles released in a given time.

The results are summarized in the table below.



Light intensity (arbitrary unit)	5	6	7	8	9
Numbers of bubbles released per min. (min^{-1})	23	24	24	24	22

1. Plot the results on the graph paper provided.
2. What happens to the rate of photosynthesis when light intensity increases? (At high light intensity)

As light intensity increases above _____, the rate of photosynthesis _____.

3. You have learnt that the four factors affecting the rate of photosynthesis are carbon dioxide concentration, the presence of chlorophyll, the amount of water and light intensity. What is a possible factor limiting the rate of photosynthesis when light intensity is high?

_____ is the factor limiting the rate of photosynthesis.

What evidence from the graph can support your answer?

4. Now put the information in the two curves together and complete the following paragraph to describe the overall effects of light intensity on the rate of photosynthesis.

At the start, as the light intensity _____, the rate of photosynthesis _____.

This is because _____ is a limiting factor.

As light intensity increases above _____, the rate of photosynthesis _____.