

SUBJECT AREAS:

Natural science

ACTIVITY DESCRIPTION:

Knowledge and identification of the mode of action of environmental factors on the intensity of the photosynthesis process.

OBJECTIVES:

- Using investigation and experiment to establish the correlation between: variation of light intensity and the photosynthesis process; variation of light wavelength and the photosynthesis process; establishing the correlation between variation of temperature and the photosynthesis process; correlation between variation of carbon dioxide concentration and the photosynthesis process.
- Identifying environmental factors that act on photosynthesis.

MATERIALS:

Video projector, laptop, pencils, Plant material; equipment, substances necessary for the method.

GRADE/LEVEL:

Secondary school (15-18)

DURATION:

Preparation time: 30 min.

Activity time: 50 min.

PLACE:

Classroom

AUTOR:

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The influence of environmental factors on the intensity of photosynthesis

INTRODUCTION:

In this lesson we aim to find out what happens to the intensity of photosynthesis in different living conditions. Formulation of some hypotheses: 1. Light intensity does not produce changes in the intensity of photosynthesis. 2. Red light ensures the highest production. 3. At temperatures higher than 0°C photosynthesis does not occur. 4. If we introduce a source of carbon dioxide into distilled water, the intensity of photosynthesis changes.

BACKGROUND:

Describe the topic you will cover during the lesson in order to attract attention and motivate your students to pay attention and learn about what you plan to teach. This is the part where you'll let your students know what they'll be learning and doing in class, helping them stay more engaged and on track.

Procedure:

Outline: The connection between lessons is achieved by updating knowledge related to the photosynthesis process.

-Communicating the subject of new learning and formulating the purpose of the lesson and the main specific competencies.

Instruction:

-Organize students into groups to perform the tasks on the worksheet. The practical work will be performed by all groups in the order indicated on the worksheet and at a sustained pace, imposed and controlled by the teacher.

-Supervise the sequential performance of the work tasks and formulates the necessary recommendations, intervening to correct errors reported in the work technique and to dynamize the performance of practical operations.

-After each stage of work, the events from the experience are analyzed and described face-to-face and the conclusions are noted.

Guided Practice:

Support them to carry out the experiment according to the worksheet, in order to: establishing the correlation between the variation of light intensity and the photosynthesis process; establishing the correlation between the variation in the wavelength of light and the photosynthesis process; establishing the correlation between the variation in temperature and the photosynthesis process; establishing the correlation between the variation of carbon dioxide concentration and the photosynthesis process.

Formative Assessment: Support students in writing down their conclusions after each experiment.

Collaborative Process: In their work teams everyone will share their conclusions resulting from the experiment. Write down the conclusions established based on face-to-face discussions regarding environmental factors and their mode of action.

Independent Practice: Give them the task of describing how they perceive today's entire experience, positive aspects and areas that need improvement from their point of view.

FUN FACTS:

Watch the following video which contains information about photosynthesis.

https://www.youtube.com/watch?v=xEF8shaU_34

ASSESSMENT:

Uses methods such as checking conversation (through questions and answers), retelling (retelling) and completing incomplete dialogues.

Assessment through student grades by direct observation.

General assessment of the experiment, its implementation and the conclusions reached.

EVALUATION:

- General assessment of the work method and the level of knowledge acquired by the students;
- Formulation of recommendations addressed to the students for individual study.

WORKSHEET

The goal:

We aim to find out what happens to the intensity of photosynthesis under different living conditions.

Formulation of hypotheses:

1. Light intensity does not produce changes in the intensity of photosynthesis.
2. Red light ensures the highest production.
3. At temperatures higher than 0°C photosynthesis does not occur.
4. If we introduce a source of carbon dioxide into distilled water, the intensity of photosynthesis changes.

Set up a plan: We use *Elodea Canadensis* L. plants of equal size, 15-20 cm, we cut the end of the stems with a razor blade in such a way as not to crush it. Each plant is placed with its tip down in a test tube filled with water, so that the cut part is one centimeter below the water level and will be placed in certain situations to verify the hypotheses. We use the “bubble method”; by recording in tables the number of bubbles that are released in one minute.

The experiment itself:

1. Establishing the correlation between the variation of light intensity and the photosynthesis process:

- place a light bulb (200-250 W) in front of the test tube at a certain distance, to prevent the water in the test tube from overheating, place a glass or plastic container between the light source and the test tube;
- count the bubbles eliminated per minute and note;
- repeat the experiment choosing a different distance each time, 20 cm, 40 cm, 60 cm, but light in the same direction, note the number of bubbles characteristic of each distance;
- process the data and note the conclusions.

2. Establishing the correlation between the variation in the wavelength of light and the photosynthesis process:

- place a light bulb in front of the test tube at a certain distance, and in front of it a red cellophane/glass and record the number of bubbles released per minute;
- remove the red cellophane and place a green cellophane in its place and record the number of bubbles released per minute;
- remove the green cellophane and place a blue cellophane in its place and record the number of bubbles released per minute;
- process the data and write down the conclusions.

3. Establishing the correlation between the variation in temperature and the photosynthesis process:

- place your plant from the experiment in a test tube in which the water has a temperature of 0°C and record the number of bubbles released per minute;

- replace the water in the test tube with water heated to 30-35°C and record the number of bubbles released per minute;
- repeat the experiment with water heated to 40°C and record the number of bubbles released per minute;
- process the data and write down the conclusions.

4. Establishing the correlation between the variation of carbon dioxide concentration and the photosynthesis process:

- transfer the Elodea branch to a test tube with distilled water at the same temperature and light intensity. Are oxygen bubbles still released?

- introduce a small amount of sodium hydrogen carbonate (NaHCO_3) into the test tube with distilled water.

What do you find?

What does this phenomenon demonstrate?

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5. Conclusions