CIE Biology IGCSE

6 - Plant Nutrition

Flashcards

What is photosynthesis?

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Photosynthesis is the process where some organisms are able to make complex carbohydrates using the energy from light

What is the word equation for photosynthesis?

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Carbon dioxide + Water → Glucose + Oxygen

(in the presence of light and chlorophyll)

What is the symbol equation for photosynthesis?
(Higher/Supplement)

What is the symbol equation for photosynthesis? (Higher/Supplement)

$$6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$$

(in the presence of light and chlorophyll)

What is chlorophyll used for in photosynthesis? (Higher/Supplement)

What is chlorophyll used for in photosynthesis? (Higher/Supplement)

Chlorophyll is used to trap light energy and transfer it into chemical energy so that it can be used to build complex organic molecules (e.g. glucose).

What are the carbohydrates made in photosynthesis stored as? (Higher/Supplement)

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The carbohydrates are stored as starch in granules (starch is insoluble)

Give 2 uses of the carbohydrates made in photosynthesis (Higher/Supplement)

Give 2 uses of the carbohydrates made in photosynthesis (Higher/Supplement)

- Used in respiration to produce energy
- Used as structural components like cellulose for cell walls

How can the importance of chlorophyll in photosynthesis be shown experimentally?

How can the importance of chlorophyll in photosynthesis be shown experimentally?

- Find a leaf that has green parts and non-green parts
- Keep the plant in the dark for 2 days and then test both the green and non-green parts for starch
- Move the plant into sunlight and then wait another 2 days and test both parts of the plant again
- The green parts contain chlorophyll and these should be the only ones testing positive for starch in the second test

How can the importance of light in photosynthesis be shown experimentally?

How can the importance of light in photosynthesis be shown experimentally?

- Put a plant in the dark for 48 hours
- Remove the plant and place a strip of opaque tape over part of a leaf
- Leave the plant in the sun for 48 hours
- Remove the tape and test the part of the plant that did not have the tape on and also the part that did have the tape on for starch and compare the results
- The uncovered section should be the only one that tests positive for starch

How can the importance of CO_2 in photosynthesis be shown experimentally?

How can the importance of CO_2 in photosynthesis be shown experimentally?

- Place **transparent** plastic bags over 2 separate plants
- Place sodium hydrogencarbonate inside the bag of one (produces CO_2)
- Place soda lime in the other (absorbs CO_2)
- Test the plant leaves for starch a day later

What is a limiting factor? (Higher)

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A factor that limits the rate of a reaction when there is not enough of it

When may light be a limiting factor for photosynthesis? (Higher/Supplement)

When may light be a limiting factor for photosynthesis? (Higher/Supplement)

In a dense forest or at night

When may temperature be a limiting factor for photosynthesis? (Higher/Supplement)

When may temperature be a limiting factor for photosynthesis? (Higher/Supplement)

In winter

How can greenhouses provide the optimum conditions for photosynthesis? (Higher/Supplement)

How can greenhouses provide the optimum conditions for photosynthesis? (Higher/Supplement)

- Gas heaters provide a suitable temperature and release CO_2
- Optimum lighting conditions can be achieved with artificial light

How can hydrogencarbonate indicator be used to investigate what happens to plants in the dark? (Higher/Supplement)

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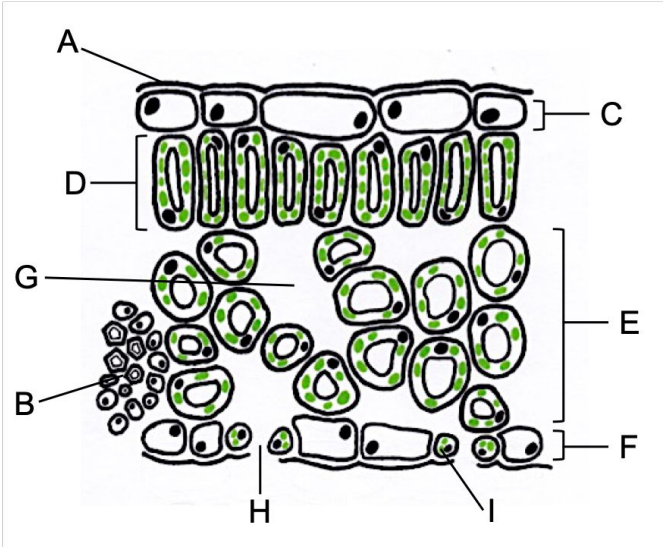
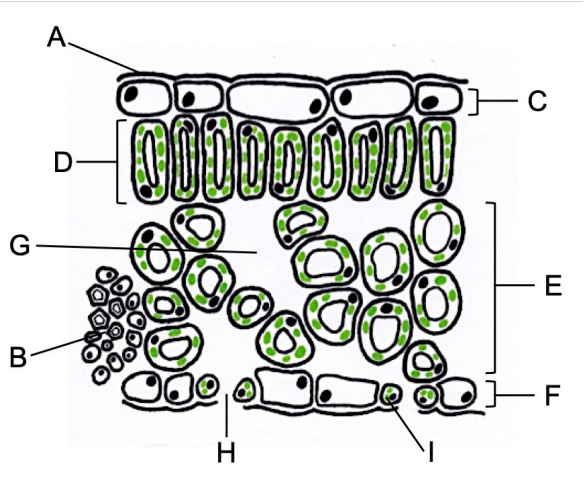
- Cover one plant's leaves with tin foil, keep another exposed to the light
- Place each plant in a boiling tube containing hydrogencarbonate indicator and set up another tube containing hydrogencarbonate indicator only as a control
- The test tube with the tin foil covered plant will have yellow coloured indicator due to CO_2 from respiration
- The test tube with the uncovered plant will have purple indicator as the carbon dioxide will have been removed by photosynthesis
- The control will remain red

Identify the structures labelled in this diagram of a leaf



Identify the structures labelled in this diagram of a leaf

A	waxy cuticle	**F**	lower epidermis
B	vascular bundle	**G**	air-filled space
C	upper epidermis	**H**	stoma
D	palisade mesophyll tissue	**I**	guard cell
E	spongy mesophyll tissue		



Describe the position of the xylem and phloem in the leaf

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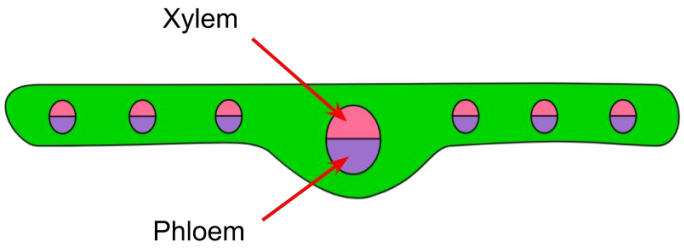
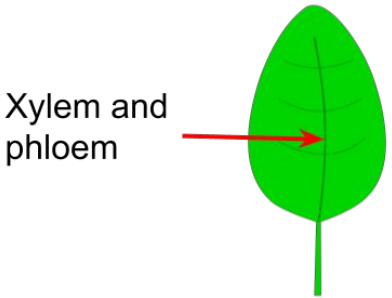
The xylem is on the top of the phloem

They exist inside the spongy mesophyll layer





How is the spongy mesophyll layer adapted for photosynthesis? (Higher/Supplement)

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It is packed loosely which allows gases to diffuse through the plant for photosynthesis (CO_2 in, O_2 out)

How is the palisade mesophyll layer adapted for photosynthesis? (Higher/Supplement)

How is the palisade mesophyll layer adapted for photosynthesis? (Higher/Supplement)

It contains long and thin cells with many chloroplasts and lots of chlorophyll to carry out photosynthesis

What is the importance of the vascular bundles in photosynthesis? (Higher/Supplement)

What is the importance of the vascular bundles in photosynthesis? (Higher/Supplement)

- The xylem is adapted to transport water which is useful to provide the cells with a constant supply of water for photosynthesis
- The phloem is adapted to transport sugars to where they are needed from the photosynthesising tissues that produce them

How are the guard cells adapted to aid the process of photosynthesis? (Higher/Supplement)

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Guard cells can change shape to open or close pores in the leaf which controls the exchange of gases needed for photosynthesis

What are nitrate ions used for in plants?

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They are used in the synthesis of amino acids

What are magnesium ions used for in plants?

What are magnesium ions used for in plants?

They are used to make chlorophyll

What does nitrate ion deficiency in plants cause?

(Higher/Supplement)

What does nitrate ion deficiency in plants cause? (Higher/Supplement)

- Stunted growth
- Chlorosis (yellowing of the leaves)

What does magnesium ion deficiency in plants cause?

(Higher/Supplement)

What does magnesium ion deficiency in plants cause? (Higher/Supplement)

- Chlorosis (yellowing of the leaves)