

# CAIE Biology IGCSE

## 6 - Plant Nutrition

### Flashcards

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# What is photosynthesis?



# What is photosynthesis?

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?



What is the word equation for photosynthesis?

Carbon dioxide + Water  $\rightarrow$  Glucose + Oxygen

(in the presence of light and chlorophyll)



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



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



(in the presence of light and chlorophyll)



# What is chlorophyll used for in photosynthesis?





# What is chlorophyll used for in photosynthesis?

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 used for?



# What are the carbohydrates made in photosynthesis used for?

- starch as an energy store
- cellulose to build cell walls
- glucose used in respiration to provide energy
- sucrose for transport in the phloem
- nectar to attract insects for pollination



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



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

- Find a plant with leaves with green parts and non-green parts
- Keep the plant in the dark for 48 hours and then test both the green and non-green parts for starch
- Move the plant into sunlight and then wait another 48 hours 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  $\text{CO}_2$  in photosynthesis be shown experimentally?





# How can the importance of $\text{CO}_2$ in photosynthesis be shown experimentally?

- Place **transparent** plastic bags over 2 separate plants
- Place sodium hydrogencarbonate inside the bag of one (produces  $\text{CO}_2$ )
- Place soda lime in the other (absorbs  $\text{CO}_2$ )
- Test the plant leaves for starch a day later
- The leaves from the sodium hydrogencarbonate plant should only test positive for starch.



# What is a limiting factor? (Higher)



What is a limiting factor? (Higher)

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 hydrogencarbonate indicator be used to investigate what happens to plants in the dark?



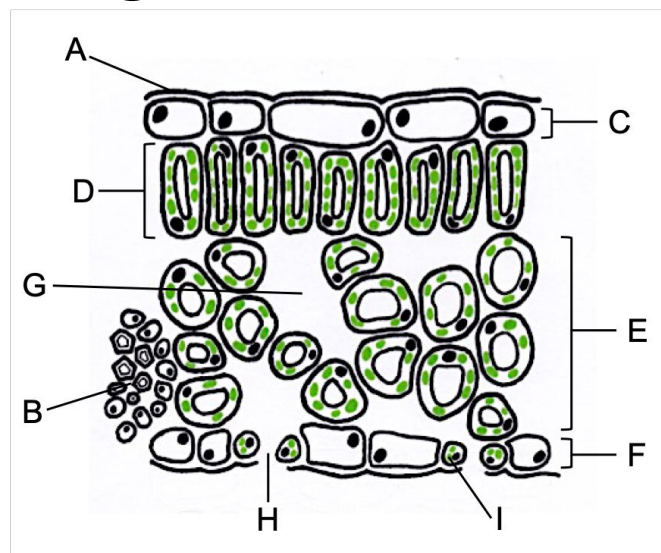


# How can hydrogencarbonate indicator be used to investigate what happens to plants in the dark?

- Cover one plant's leaves with tin foil, another with gauze and 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  $\text{CO}_2$  from respiration
- The test tube with the uncovered plant will have purple indicator as the carbon dioxide will have been removed by photosynthesis
- The test tube covered with gauze will remain orange as there is no net change in  $\text{CO}_2$ .
- The control will remain orange.

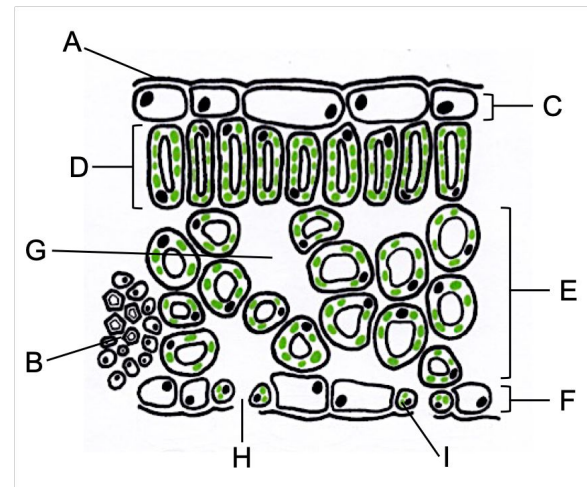


# Identify the structures labelled in this diagram of a leaf



# Identify the structures labelled in this diagram of a leaf

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



# How is the spongy mesophyll layer adapted for photosynthesis?



How is the spongy mesophyll layer adapted for photosynthesis?

It contains air spaces which allows gases to diffuse through the plant for photosynthesis ( $\text{CO}_2$  in,  $\text{O}_2$  out)



# How is the palisade mesophyll layer adapted for photosynthesis?



How is the palisade mesophyll layer adapted for photosynthesis?

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?





# What is the importance of the vascular bundles in photosynthesis?

- 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?



How are the guard cells adapted to aid the process of photosynthesis?

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?



What are nitrate ions used for in plants?

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

