

Photosynthesis as an energy transfer process

Question Paper 6

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Photosynthesis
Sub Topic	Photosynthesis as an energy transfer process
Booklet	Theory
Paper Type	Question Paper 6

Time Allowed : 47 minutes

Score : / 39

Percentage : /100

Grade Boundaries:

A*	A	B	C	D	E	U
>85%	'77.5%	70%	62.5%	57.5%	45%	<45%

1 Fig. 1.1 is a diagram of a palisade cell from a dicotyledonous leaf.

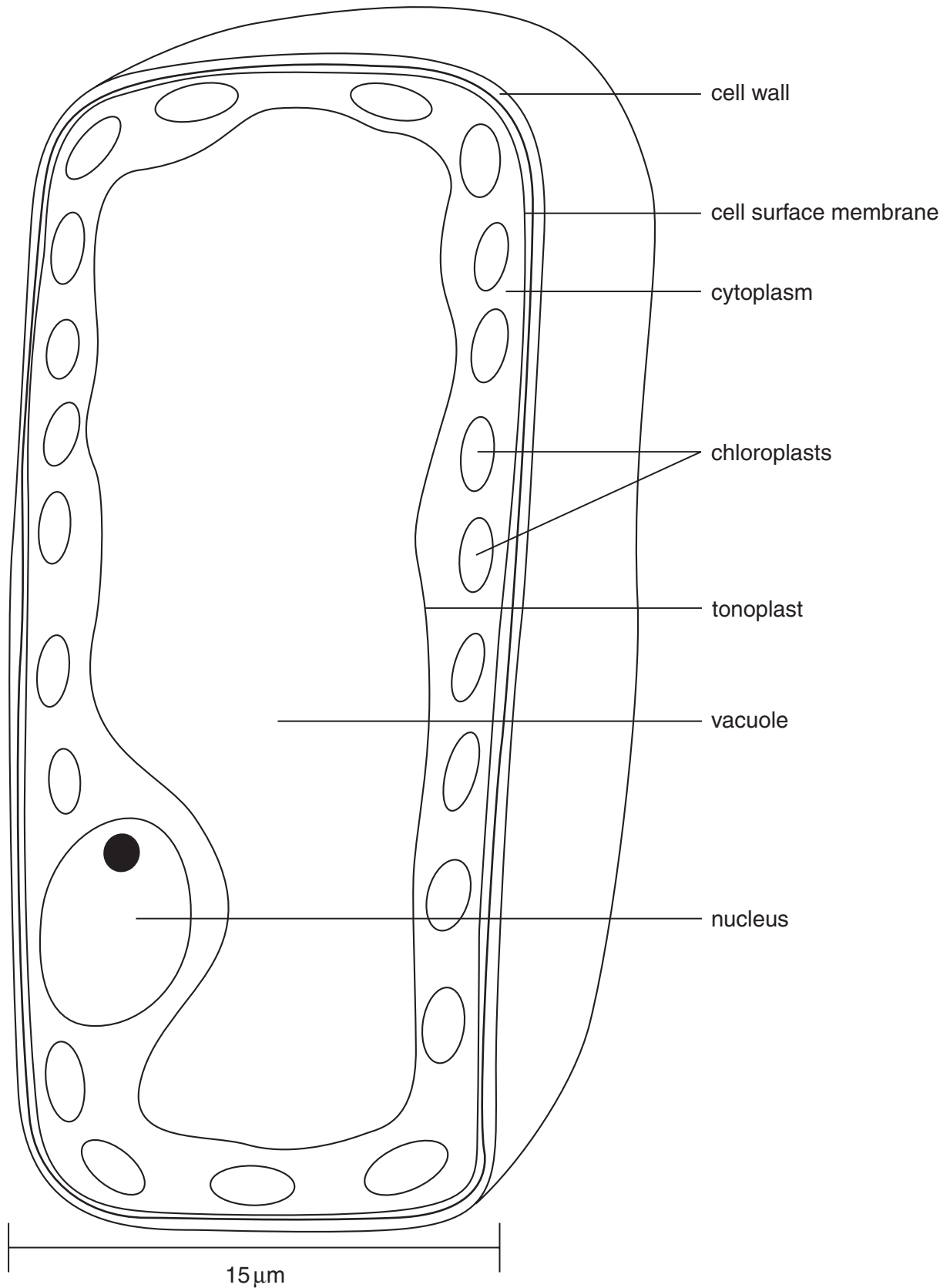


Fig. 1.1

(a) Describe how these cells are arranged in the leaf.

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.....[2]

(b) With reference to Fig. 1.1, explain how the structure of this cell is related to its function in photosynthesis.

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.....
.....[3]

Fig. 1.2 is a diagram of an electron micrograph of part of a chloroplast showing thylakoid membranes.

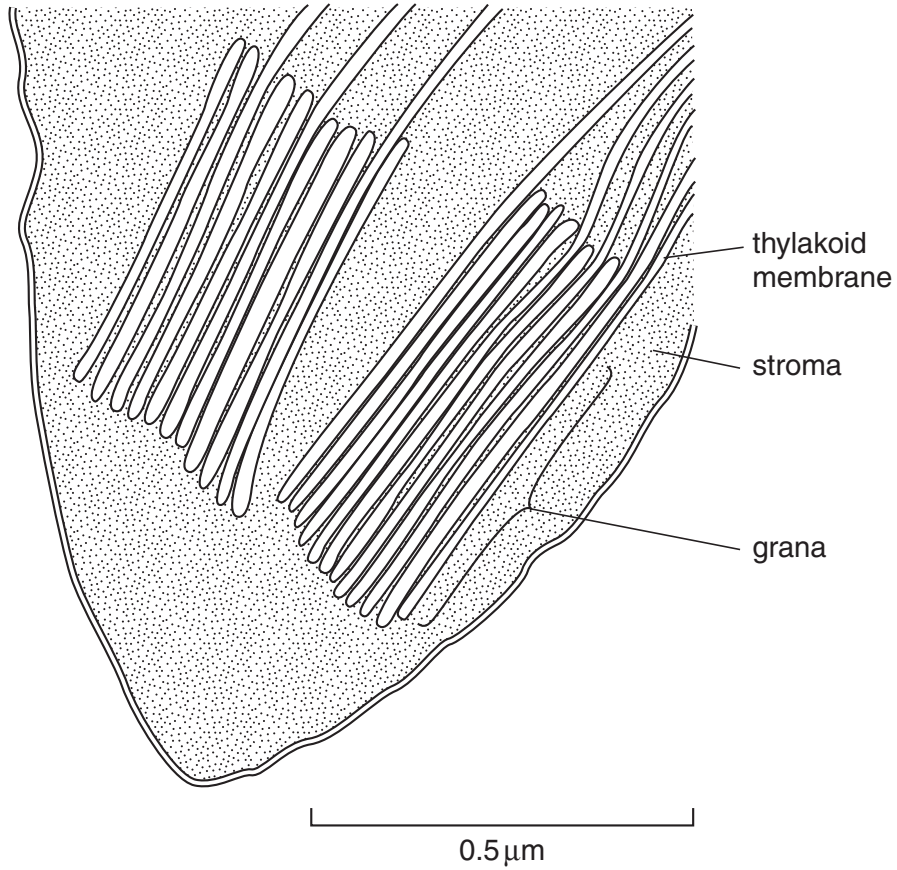


Fig. 1.2

(c) Describe the role of the thylakoid membrane in photosynthesis.

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.....[4]

(d) Describe how carbon dioxide is fixed in the stroma.

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.....[2]

[Total : 11]

2 (a) Fig. 8.1 shows some of the reactions that take place inside a palisade mesophyll cell.

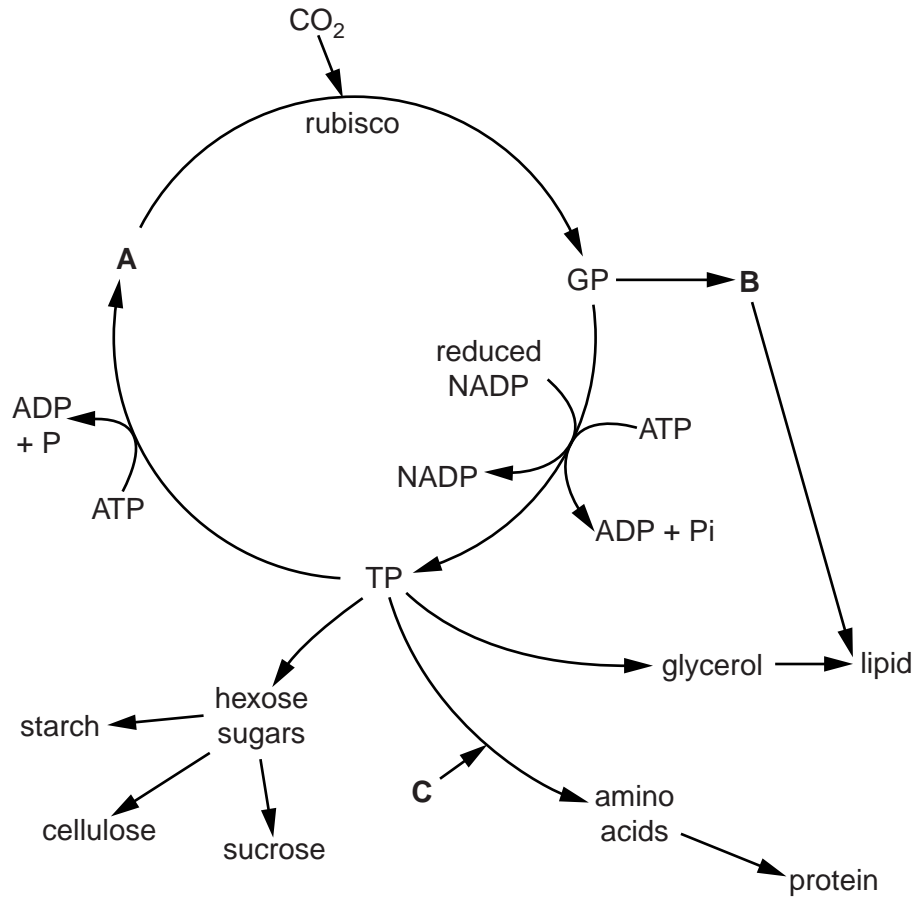


Fig. 8.1

(i) Identify substances **A**, **B** and **C**.

A

B

C

[3]

(ii) Name precisely the process that produces reduced NADP.

.....[1]

(iii) Name the type of reaction that takes place to produce starch from hexose sugars **and** name the type of bonds formed.

reaction

bond[2]

(iv) Describe how carbon dioxide reaches the inside of a palisade mesophyll cell from the external atmosphere.

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[3]

(b) The optimum pH for the activity of rubisco is pH8.

Explain why the illumination of chloroplasts leads to optimum pH conditions for rubisco.

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[3]

[Total: 12]

3 (a) An experiment was carried out into the effect of light of different colours on photosynthesis.

- 15 leaf discs from the same plant were obtained.
- Five sealed test-tubes were set up, each containing three leaf discs in hydrogencarbonate indicator solution.
- Hydrogencarbonate indicator solution changes colour at different pH values.
- At the start of the experiment the indicator solution in all five test-tubes was orange-red.
- Four of the test-tubes were illuminated by light of a specific colour.
- The test-tubes were illuminated for the same length of time.
- The fifth test-tube was covered in black paper and was a control.

The results are recorded in Table 7.1.

Table 7.1

colour of light	final colour of hydrogencarbonate solution
white	purple
blue	purple
green	orange-yellow
red	purple
control – no light	yellow

When the pH increases, the indicator becomes purple and when the pH decreases, the indicator turns yellow.

(i) Explain the results for the leaf discs illuminated by blue light.

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..... [2]

(ii) Explain why the indicator in the control went yellow.

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..... [2]

(b) Cyclic and non-cyclic photophosphorylation take place in the light-dependent stage of photosynthesis.

(i) Describe the role of accessory pigments in photophosphorylation.

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..... [2]

(ii) Write a balanced equation that summarises photolysis.

..... [1]

(iii) State **precisely** the location of photosynthetic pigments within a chloroplast.

..... [1]

[Total: 8]

- 4 The light-dependent stage of photosynthesis takes place on the thylakoids of the chloroplast.

Fig. 7.1 shows some of the components involved in the light-dependent stage.

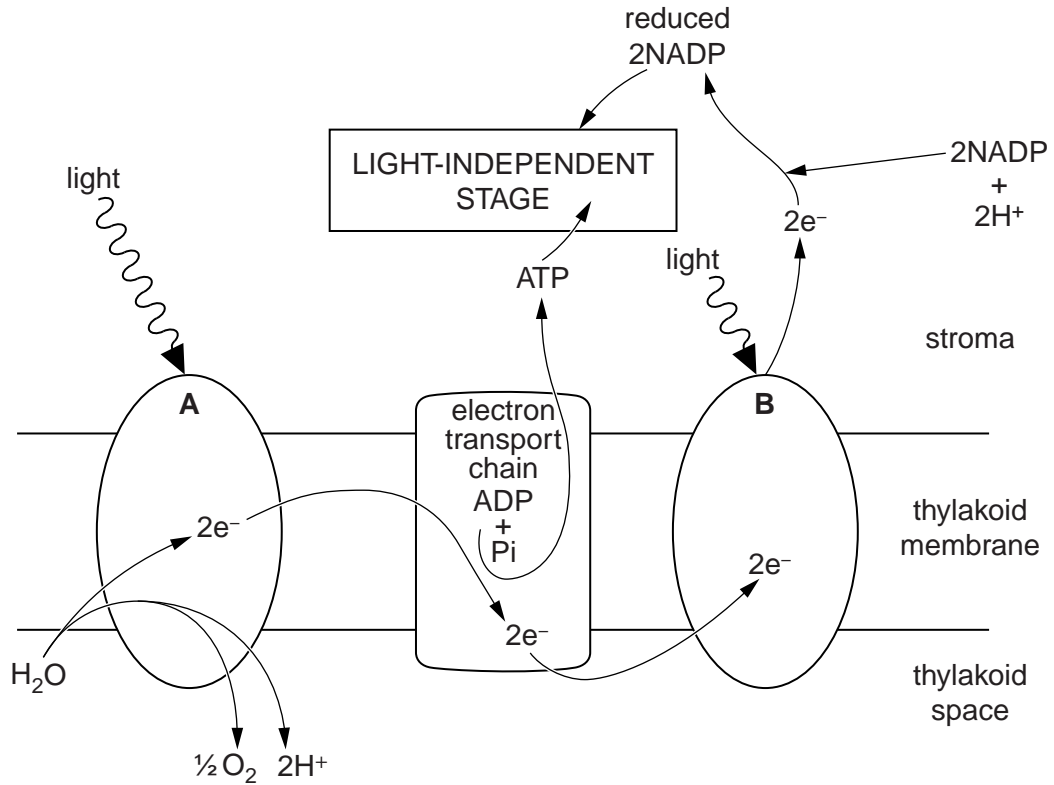


Fig. 7.1

- (a) With reference to Fig. 7.1, identify structures A and B.

A

B [2]

(b) Describe the roles of the following substances in the light-independent stage of photosynthesis:

(i) RuBP

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.....
..... [2]

(ii) reduced NADP

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..... [2]

(iii) ATP.

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..... [2]

[Total: 8]