

Respiration

Question Paper 5

Level	International A Level
Subject	Biology
Exam Board	CIE
Topic	Energy and respiration
Sub Topic	Respiration
Booklet	Theory
Paper Type	Question Paper 5

Time Allowed : 70 minutes

Score : / 58

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 shows the molecular structure of ATP.

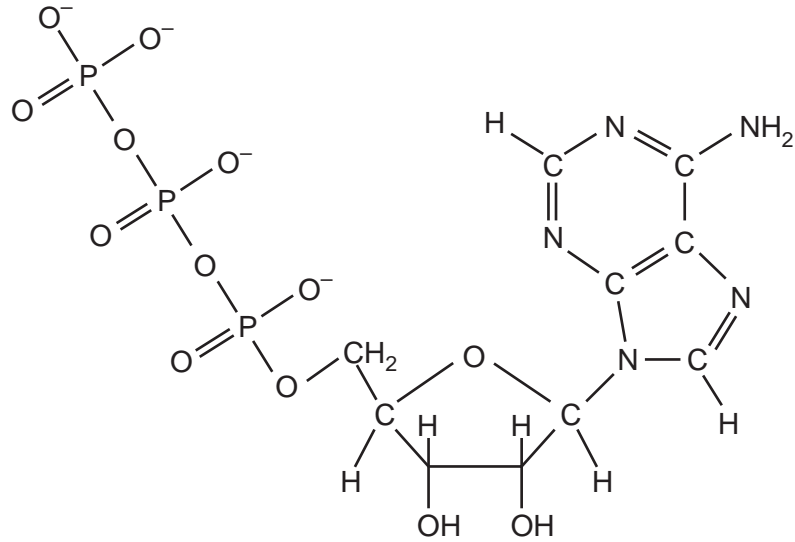


Fig. 1.1

(a) Describe the main structural features of the molecule.

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.....[3]

(b) Explain how ATP is able to transfer energy in cells.

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.....[3]

(c) State how ATP is synthesized in mitochondria.

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.....[4]

[Total: 10]

- 2 Fig. 3.1 is a diagram of a section through the proximal convoluted tubule of a kidney nephron showing details of cell structure, as seen with the electron microscope.

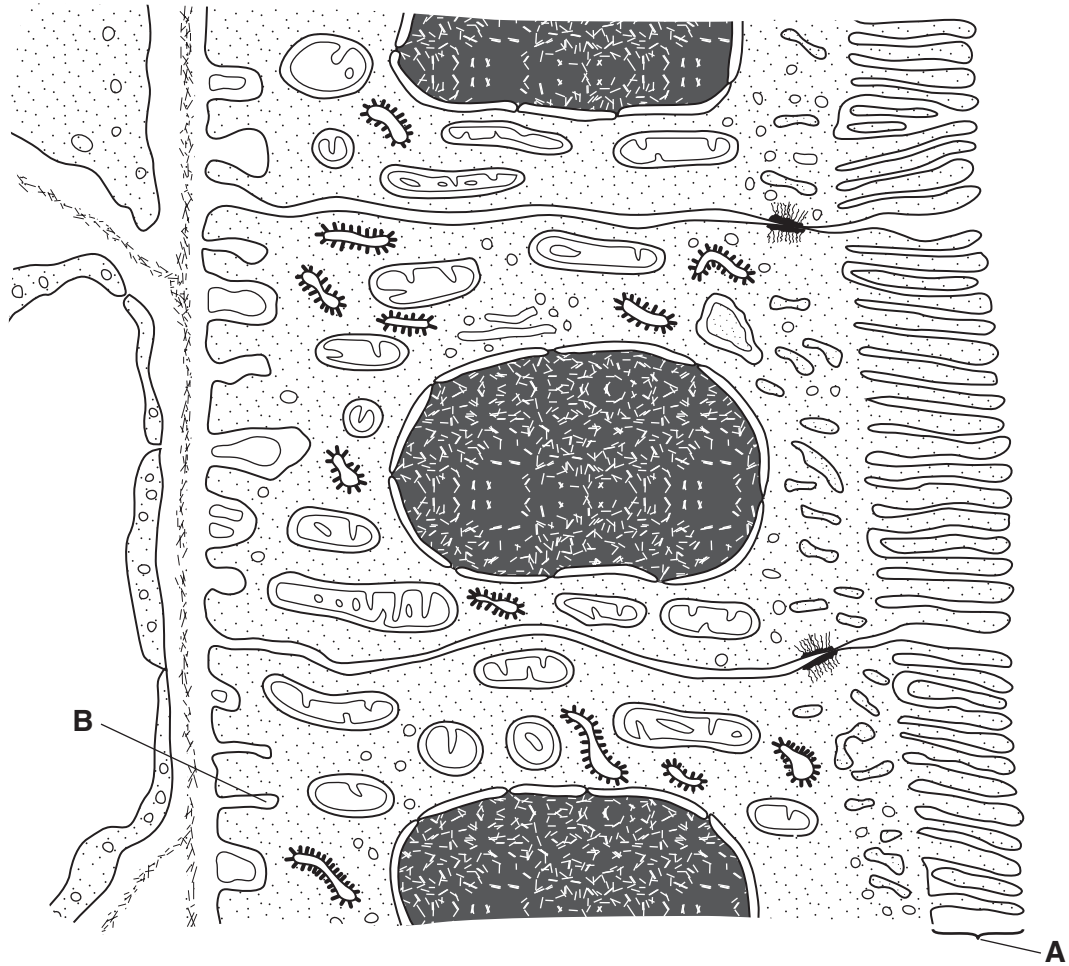


Fig. 3.1

- (a) Name the structures **A** and **B**.

A

B [2]

(b) Explain three ways in which the cells of the proximal convoluted tubule are adapted for selective reabsorption.

1.
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 2.
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 3.
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-[3]

(c) Describe the mechanism of glucose reabsorption into the blood from the lumen of the proximal convoluted tubule of the kidney.

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.....[3]

(d) Outline, in terms of water potential, how water is reabsorbed by the cells of the **proximal convoluted tubule**.

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.....[2]

[Total: 10]

4 (a) The components of a molecule of ATP (adenosine triphosphate) are shown in Fig. 3.1.

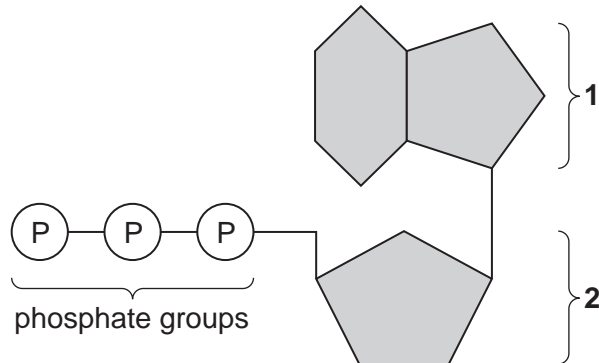


Fig. 3.1

With reference to Fig. 3.1, name components 1 and 2.

- 1
- 2 [2]

(b) Describe the consequences for the cell of the following statements.

- Each cell has only a very small quantity of ATP in it at any one time.
- The molecules, ATP, ADP (adenosine diphosphate) or AMP (adenosine monophosphate) **rarely** pass through the cell surface membrane.

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..... [2]

- (c) Glucose is a respiratory substrate. Table 3.1 shows the yield of ATP from some other substrates.

Table 3.1

respiratory substrate	number of ATP molecules produced per mole of substrate
alanine (an amino acid)	15
glycogen	39
lactate	18
palmitic acid (a fatty acid)	129

- (i) Explain the different yields of ATP from glycogen and palmitic acid.

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..... [2]

- (ii) Describe the circumstances in which alanine and lactate are used as respiratory substrates.

alanine
.....
lactate
..... [2]

[Total: 8]

- 5 (a) Outline the role of oxygen in aerobic respiration.

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..... [3]

- (b) Table 3.1 shows the results of some measurements of the energy released by different respiratory substrates and the water produced in the process.

Table 3.1

respiratory substrate	energy released / kJ		mass of water produced / g
	per g of substrate	per dm ³ of oxygen consumed	per g of substrate
carbohydrate	17.4	20.9	0.56
lipid	39.3	19.6	1.07
protein	17.8	18.6	0.45

- (i) Describe **and** explain the differences in energy released by the three respiratory substrates.

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..... [3]

- (ii) Suggest why more water is produced from the metabolism of lipid than from the other two substrates.

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..... [1]

6 (a) Fig. 8.1 is an electronmicrograph of a section through a mitochondrion.

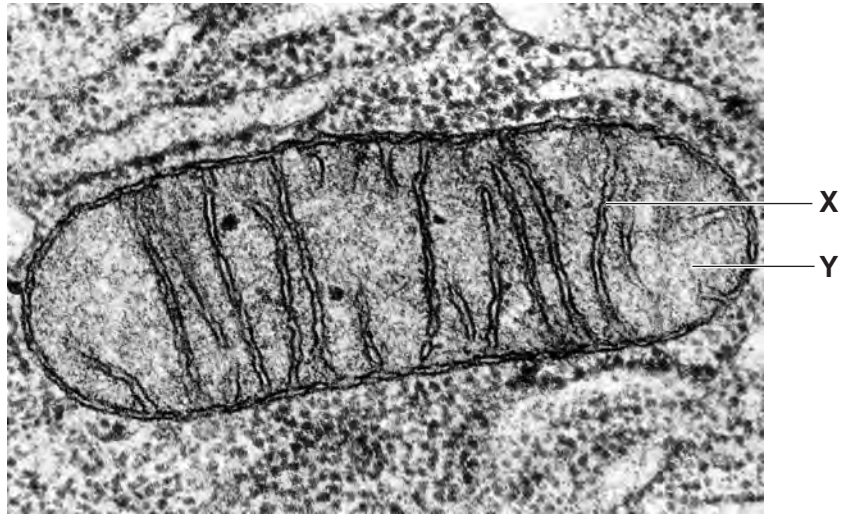


Fig. 8.1

Name X and Y.

X

Y

[2]

(b) Fig. 8.2 outlines the early stages of respiration.

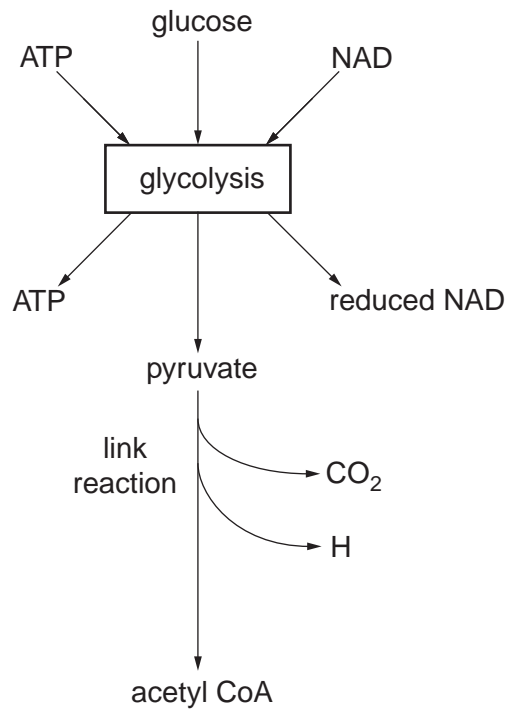


Fig. 8.2

With reference to Fig. 8.2:

(i) explain why ATP is needed at the start of glycolysis

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..... [1]

(ii) state the role of NAD in glycolysis

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..... [1]

(iii) state how many molecules of ATP are produced from one molecule of glucose during glycolysis

..... [1]

(iv) name the two types of reaction that occur during the conversion of pyruvate to acetyl CoA in the link reaction

1.
2. [2]

(v) name the location, in the mitochondrion, of the link reaction

..... [1]

(vi) describe what happens to the hydrogen released during the link reaction.

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..... [2]

