A level Biology A

H420/03 Unified biology

Question Set 9

1 ATP can be produced in various ways. Each stage of respiration contributes to the production of ATP.

- 4 ATP made but 2 used up so yield of 2 ATP

(a) Describe the production of ATP by **substrate-level phosphorylation** in different stages of respiration with reference to the number of ATP molecules produced.

→ 2 ATP molecules per glucose from glycolysis - when TP converted to pyruvate
- 1 ATP produced in each Krebs cycle - when 5C compound converted to oxaloacetate

[4]

(b) Glucose and other carbohydrates are present in respiring cells. The concentrations of carbohydrate molecules vary between tissues.

A student conducted tests on three tissues, **A**, **B** and **C**. Table 2 shows the results of these tests.

Tissue	Colour after Benedict's test	Colour after treatment with HCl and Benedict's test	Colour after iodine test
A	red	red	yellow
B	yellow	red	black
C	orange	orange	black

Table 2

Two of the tissues were known to be phloem tissue and liver tissue.

Use the evidence in Table 2 to identify which tissue, **A**, **B** or **C**, is phloem and which tissue is liver. Explain your answer.

Tissue ..B.. must be phloem because ...contains non-reducing sugar which is hydrolysed to monosaccharides.....

Tissue ..A.. must be liver because ...doesn't contain starch.....

[3]

(c) Cells can use fatty acids instead of carbohydrates as respiratory substrates. A process called beta oxidation is used to break down fatty acids to acetyl CoA for use in respiration.

Fig. 2 shows a simplified example of beta oxidation.

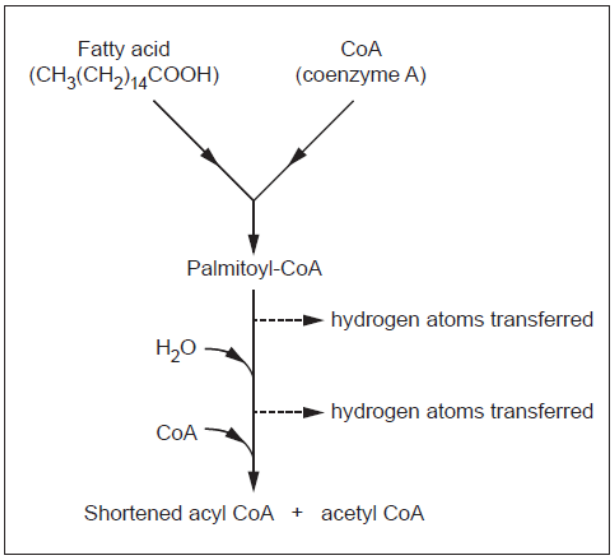

Fig. 2

(i) Using the information in Fig. 2, calculate the percentage of carbon atoms in the fatty acid that are able to enter the Krebs cycle.

fatty acid : 16 C
acetyl CoA : 2C

$\frac{2}{16} \times 100 = 12.5\%$

Answer = 12.5 % **[1]**

(ii) The percentage of carbon atoms that a reaction makes available for use in the Krebs cycle can be described as the efficiency of the reaction.

Calculate the efficiency of the **link reaction**. Using your answer to part **(i)**, state whether the link reaction is **more**, **less** or **equally** efficient when compared to the reactions described in Fig. 2.

Show your working.

acetyl CoA : 2C
pyruvate : 3C

$\frac{2}{3} \times 100 = 66.7\%$

Answer = 66.7 %

Link reaction is more efficient **[1]**

(iii) Fig. 2 shows the role of coenzyme A in beta oxidation.

Suggest a role for coenzymes **other than coenzyme A** in beta oxidation. **[1]**

FAD/NAD accepts hydrogen atoms

Total Mark for Questions Set 9: 10