



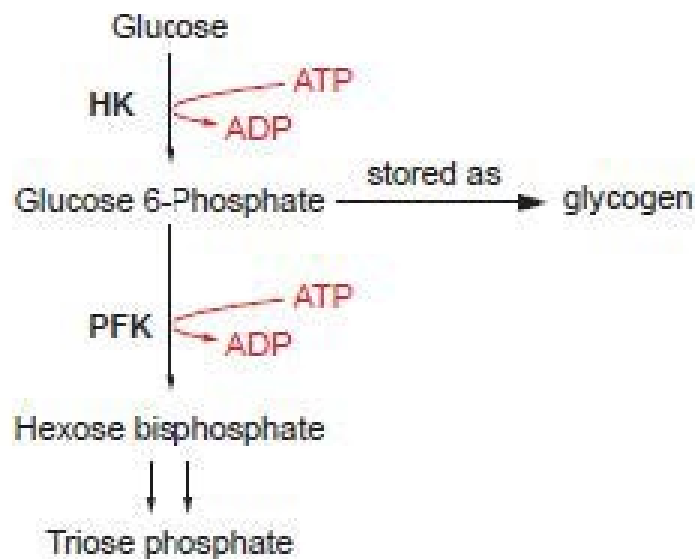
## **GCE Biology**

S21-A400U10-1

### **Assessment Resource 5**

Energy for Life Resource E

1. Glycolysis is the initial stage of respiration and involves hydrolysis of glucose and the production of ATP. The diagram below shows part of glycolysis.



Control of glycolysis is largely by end-product inhibition:

- High levels of ATP allosterically inhibit the enzyme PFK in the liver thus lowering its affinity for its substrate.
- PFK is the main regulatory enzyme in glycolysis, but it is not the only one.
- HK, the enzyme catalysing the first step of glycolysis, is inhibited by its product, glucose 6-phosphate.

(a) Explain the term *allosteric inhibition*.

[2]

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- (c) NAD is a hydrogen acceptor used in many stages of respiration. Methylene blue can be used as an artificial hydrogen acceptor. It decolourises when reduced and can be used to give an indication of the rate of respiration.

An experiment was set up using isolated liver mitochondria extracted in ice-cold, isotonic buffer. The same volume and concentration of pyruvate, mitochondrial suspension and methylene blue was added to each experiment. The temperature was changed for each experiment and the experiment repeated three times. Thermostatic water baths were used throughout.

- (i) Explain why the mitochondria were initially suspended in ice cold, isotonic buffer. [3]

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- (ii) Explain why pyruvate was used as the respiratory substrate and not glucose. [2]

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The results of the experiment are shown in the table below.

Time taken for methylene blue to decolourise / seconds					
Temperature /°C	Trial 1	Trial 2	Trial 3	Mean	Standard deviation
10	320	290	385	332	±48.6
20	280	275	282	279	±3.6
30	165	172	159	165	±6.5
40	102	105	98	102	±3.5
50	156	162	148	155	±7.0
60	330	355	342	342	±12.5

(iii) State one conclusion you can draw from this experiment and comment on the reliability of the results in the table shown. [3]

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2. The sea rises and falls twice a day; this is called tidal movement. In river estuaries there is still tidal movement but little wave action. As the seawater on a rising tide moves across bare rock it brings sand, muc particles and detritus. The lack of wave action in estuaries results in this material settling out when the tide stops moving. These materials build-up and in time raise the level of mud and eventually form soil. This habitat is called a saltmarsh where rooted plants grow. Higher land, frequently used for agriculture, drains through the saltmarsh into the river.



river

low marsh

high marsh

edge of marsh

(a) State the term used to describe the

I. process by which the saltmarsh community is formed.

[1]

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II. first organisms to colonise the mud.

[1]

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III. the final group of organisms which inhabit the area which was once mud.

[1]

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(b) A saltmarsh is an extreme environment for organisms trying to survive.

Using the information given, identify three abiotic factors which cause this to be an extreme environment for plant survival. Explain each of your answers. [6]

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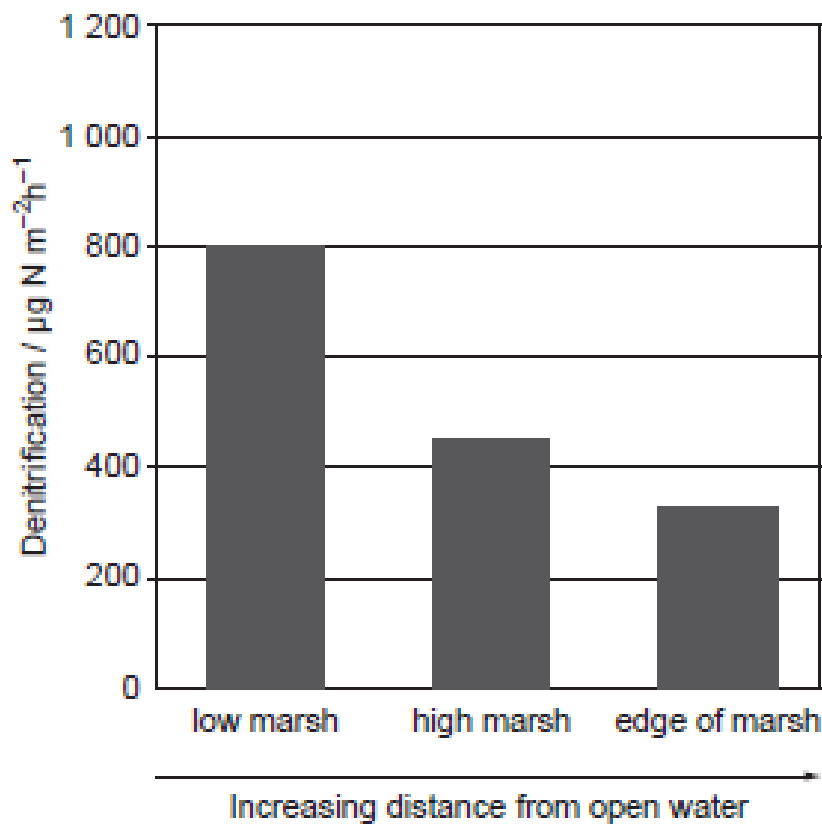
II. \_\_\_\_\_

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III. \_\_\_\_\_

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Denitrification is a biotic factor which affects saltmarsh ecology. The results of an investigation into rates of denitrification are shown in the chart below. Further investigations also showed that denitrification varied through the year. It was higher in the summer than the winter months.



(c) (i) State why denitrification is classed as a biotic factor. [1]

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(ii) Using the information given and your own knowledge, identify two factors affecting denitrification. Explain each of your answers. [3]

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(d) Describe a practical method which you could carry out on the saltmarsh to investigate the change in vegetation over time. [5]

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