



Biology
Leaving Certificate
Ordinary Level

Past Exam Questions on
Cell Metabolism and Osmosis

Q8 Section B 2013

8. (a) (i) Which substance moves through cell membranes by osmosis?

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(ii) Name **one** other term used in biology to describe the movement of substances through cell membranes.

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(b) Answer the following in relation to an activity you carried out to demonstrate osmosis.

(i) In the space below, draw a labelled diagram of the apparatus you used in your demonstration.

(ii) Suggest a control that you might use in this activity.

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(iii) State the result(s) of your investigation.

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(iv) Briefly explain the result(s) referred to in part (iii).

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(v) What is the purpose of a control in scientific experiments?

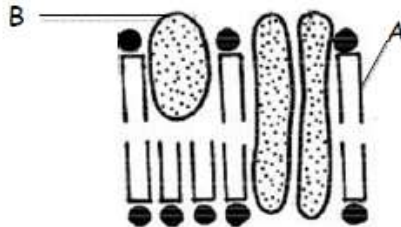
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Q13 Part (a) and (b) Section C 2013

13. (a) (i) Draw a labelled diagram of an animal cell as seen using a light microscope.
(ii) Name another type of microscope that gives greater detail than a light microscope. (9)

(b) The diagram below shows the ultrastructure of a section of cell membrane.



- (i) Give two functions of the cell membrane.
(ii) Name the parts labelled A and B.
(iii) Which organelle is known as “the powerhouse of the cell”?
(iv) Why does the nucleus of a cell have many pores?
(v) List two differences between a plant cell and an animal cell.
(vi) What is the primary source of energy for plant cells? (27)
- (b) Answer the following questions in relation to an investigation you carried out into fermentation by yeast cells.
- (i) Explain what is meant by *anaerobic respiration*.
(ii) Where in the cell does anaerobic respiration occur?
(iii) Describe, with the aid of a diagram, how you kept the yeast under anaerobic conditions during the investigation.
(iv) Name the two substances produced by the yeast in the process of fermentation.
(v) How did you know that fermentation had ceased? (24)

Q14 Section C 2012

- (a) (i) What is meant by *aerobic respiration*?
(ii) Aerobic respiration takes place in two stages.
1. Where in a cell does stage 1 occur?
2. Where in a cell does stage 2 occur?
(iii) Which type of respiration, aerobic or anaerobic, produces more energy?
(iv) In yeast cells, alcohol is produced by fermentation.
Draw a labelled diagram showing how alcohol may be produced in the laboratory.
Answer the following questions in relation to the activity:
1. Name another substance that is produced during the fermentation process.
2. How would you detect this other substance?
3. How would you know when fermentation had finished?

Q5 Section A 2011

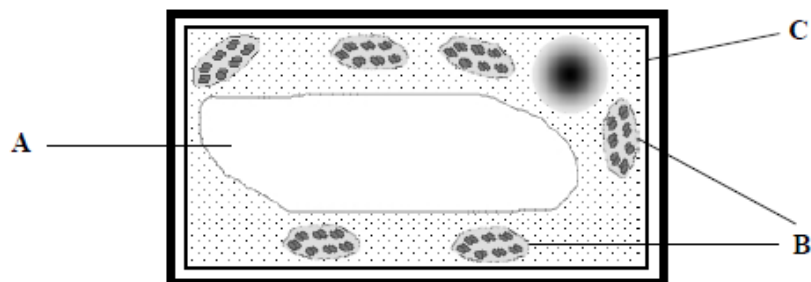
5. Choose each term from the following list and place it in **Column B** to match a description in **Column A**. The first one has been completed as an example.

Alcohol, Oxygen, Water, Mitochondria, Lactic acid, ~~Large~~

| Column A | Column B |
|--|----------|
| The amount of energy released in aerobic respiration. | Large |
| (i) A substance required for aerobic respiration. | |
| (ii) A product of anaerobic respiration in muscles. | |
| (iii) A product of aerobic respiration. | |
| (iv) A product of anaerobic respiration in yeast. | |
| (v) The cell structures in which Stage 2 of aerobic respiration takes place. | |

Q3 Section A 2010

3. The diagram shows a cell.



- (a) Is this a plant cell or an animal cell? _____

Give two reasons for the answer given above.

1. _____

2. _____

- (b) Name the structures labelled A, B and C in the diagram.

A. _____

B. _____

C. _____

- (c) Name a substance found in A. _____

Q2 Section A 2008

2. Choose a term from the following list and place it in **Column B** to match the description in **Column A**. The first one has been completed as an example:

amino acid, nitrogen, haemoglobin, keratin, enzyme

| Column A | Column B |
|--|-------------|
| A protein present in blood | haemoglobin |
| An element always present in proteins along with C, H, O | |
| A protein which changes reaction rates | |
| The end product of protein digestion | |
| A structural protein | |

Q3 Section A 2008

3. Indicate whether the following are true (T) or false (F) by drawing a circle around T or F.

Example: Carbon dioxide is produced during respiration.

T F

(a) Stage 1 of respiration requires oxygen

T F

(b) Stage 1 of respiration takes place in the cytoplasm

T F

(c) Stage 2 of respiration also takes place in the cytoplasm

T F

(d) Some of the energy released in respiration is lost as heat

T F

(e) Lactic acid is a product of anaerobic respiration

T F

Q3 Section A 2007

3. Indicate whether the following are true (T) or false (F) by drawing a circle around T or F.

Example: The pulmonary artery carries blood to the lungs

T F

(a) If the eyepiece lens of a microscope is marked X10 and the objective lens is marked X4, the total magnification is X14

T F

(b) Plant cells have chloroplasts, animal cells do not have chloroplasts

T F

(c) Humans receive oxygen from the air they inhale

T F

(d) Cell membranes let only some molecules pass through

T F

(e) Human chromosomes are found in the nucleus

T F

Q11 Section C 2007

11. (a) (i) What is a tissue?
 (ii) Name **two** tissues found in animals. (9)
- (b) Tissue culture is used to make a skin graft for patients who have been severely burned.
 (i) What is meant by tissue culture?
 (ii) Name the gas needed to release energy to make a skin graft.
 (iii) Suggest the most suitable temperature to make skin cells grow.
 (iv) Suggest a reason why sterile conditions are needed in tissue culture.
 (v) What type of cell division, mitosis or meiosis, is involved in tissue culture?
 (vi) Give **one** other application of tissue culture apart from skin grafting. (24)
- (c) (i) Explain briefly what is meant by a gene.
 (ii) Where in the nucleus would you find genes?
 (iii) The allele for brown eye (**B**) is dominant to the allele for blue eye (**b**). Explain each of the underlined terms.
 (iv) Use a Punnett square to find the possible genotypes of children of parents who are both heterozygous for brown eye. State the eye colour resulting from each of these genotypes. (27)

Q12 Section C 2007

12. (a) (i) Explain briefly what is meant by respiration.
 (ii) Distinguish between aerobic and anaerobic respiration. (9)
- (b) (i) Copy the table below into your answer book and complete the final column.

| Type of respiration | Energy Source | End products |
|---------------------------------|---------------|--------------|
| Aerobic respiration | Glucose | |
| Anaerobic respiration in muscle | Glucose | |
| Anaerobic respiration in yeast | Glucose | |

- (ii) In stage 1 of respiration, glucose is partly broken down. Where in the cell does this happen?
 (iii) Name the cell component shown in the diagram in which stage 2 of respiration takes place.



- (iv) Which stage of respiration releases more energy? (24)
- (c) (i) Draw a labelled diagram of the apparatus in which you used yeast to produce alcohol.
 (ii) The water that you used in the apparatus was previously boiled and cooled. Why was this?
 (iii) In your investigation it was necessary to exclude air. How was this done?
 (iv) Describe briefly a test to show that alcohol had been produced. (27)

Q13 Section C 2006

13. (a) (i) Identify X and Y in the following equation which is a summary of aerobic respiration.
 $C_6H_{12}O_6 + 6X \longrightarrow 6Y + 6H_2O$
- (ii) What is anaerobic respiration? (9)
- (b) Answer the following questions in relation to aerobic respiration as a two stage process.
- (i) Where in the cell does the first stage take place?
- (ii) Does the first stage require oxygen?
- (iii) Comment on the amount of energy released in the first stage.
- (iv) Where in the cell does the second stage take place?
- (v) Does the second stage require oxygen?
- (vi) Comment on the amount of energy released in the second stage.
- (vii) State **two** ways in which the energy that is released is used in the human body. (24)
- (c) (i) Describe how you used yeast to produce alcohol (ethanol). Include a labelled diagram of the apparatus that you used.
- (ii) How did you show that alcohol had been produced? (27)

Q2 Section A 2005

2. Use ticks (✓) to show if the named structure is present in an animal cell, in a plant cell or in both.
The first has been completed as an example.

| Structure | Cytoplasm | Cell Wall | Chloroplast | Nucleus | Vacuole |
|-------------|-----------|-----------|-------------|---------|---------|
| Animal Cell | ✓ | | | | |
| Plant Cell | ✓ | | | | |

Q7 Section B 2005

- 7. (a) (i) What is osmosis?
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- (ii) What is a selectively permeable (semi-permeable) membrane?
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- (b) (i) Draw a labelled diagram of the apparatus that you used to demonstrate osmosis.

- (ii) Describe how you carried out the experiment to demonstrate osmosis.

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- (iii) How were you able to tell that osmosis had taken place?

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Q11 Section C 2005

11. (a) (i) Complete the following equation, which is a summary of photosynthesis.
 $6\text{CO}_2 + 6\text{H}_2\text{O} + \text{light} + \text{chlorophyll} \longrightarrow$
- (ii) Where in the cells of a leaf is chlorophyll found? (9)
- (b) (i) Light energy trapped by chlorophyll is used to split water. List **three** products that result when water is split.
- (ii) Describe what happens to each of the **three** products that you have listed in (i).
- (iii) Carbon dioxide is essential for photosynthesis. Where does it enter the leaf?
- (iv) From your knowledge of photosynthesis suggest a way to increase the yield of plants such as lettuces in a greenhouse. (24)
- (c) (i) Some of the carbohydrates produced in photosynthesis are used in respiration. What is respiration?
- (ii) Suggest **one** reason why living organisms need to respire.
- (iii) What is aerobic respiration?
- (iv) Respiration can also be anaerobic. Which of the two types of respiration releases more energy?
- (v) Anaerobic respiration by micro-organisms is called fermentation. Give **one** example of industrial fermentation, including the type of micro-organism and the substance produced. (27)