PEARSON EDEXCEL A-LEVEL BIOLOGY B · 9BI0

BIOLOGY



EXAM QUESTION PACK

TOPIC 1: BIOLOGICAL MOLECULES

WATER

SCORE	PERCENTAGE
/25	%

STEMUP

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Q1.

* Acute respiratory distress syndrome (ARDS) is a condition that can occur in babies.

In ARDS, cells in the alveoli do not produce enough of a substance called surfactant.

The alveoli cannot expand sufficiently when the baby inhales.

The diagram shows the alveoli of a baby with ARDS and the alveoli of an unaffected baby.



Alveoli of a baby with ARDS



Alveoli of an unaffected baby

Scientists investigated the effect of two synthetic surfactants, A and B, for treating ARDS.

Four groups of rabbits with ARDS were used.

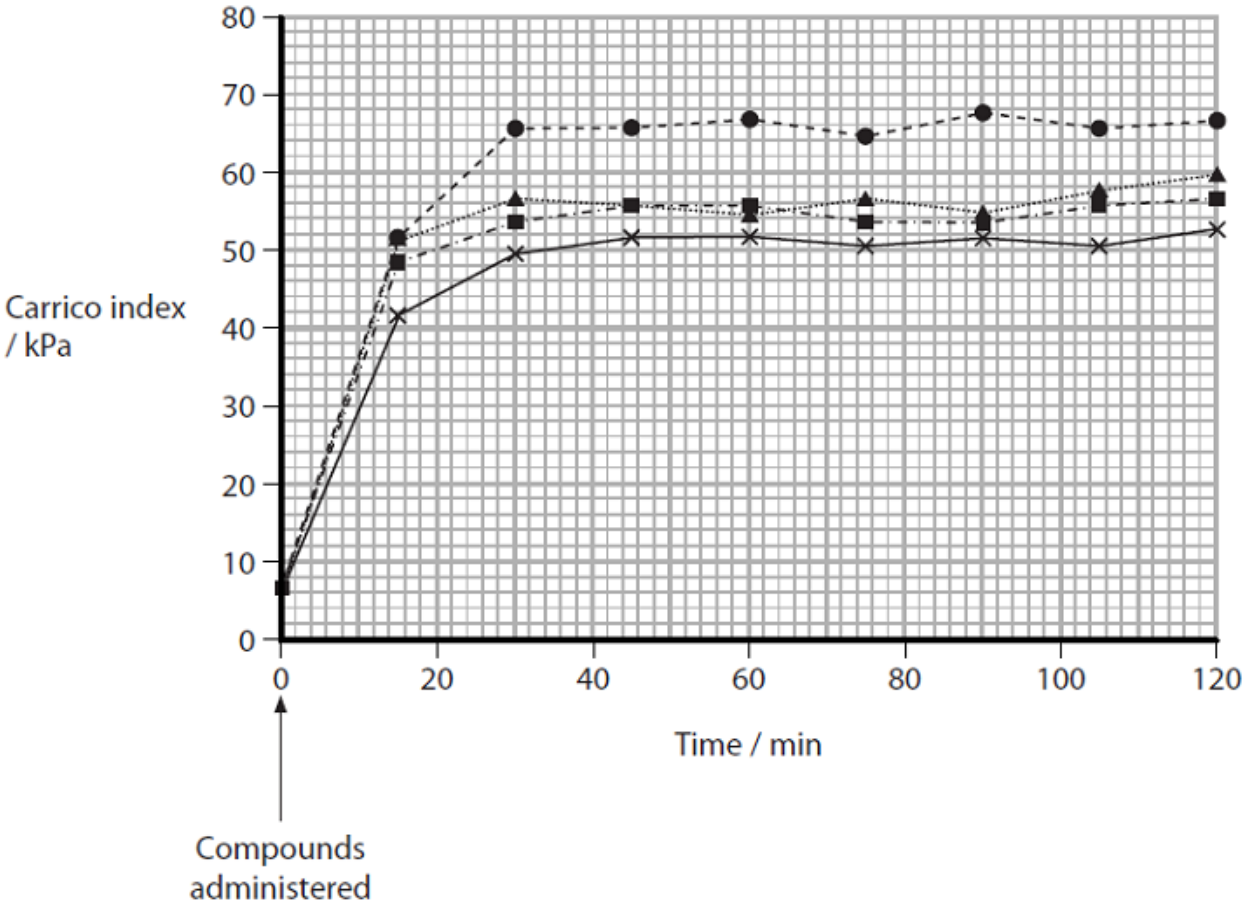
Each group of rabbits was given a different treatment.

- One group received compound A.
- One group received compound B.
- One group received both compound A and compound B.
- One group received a natural surfactant control.

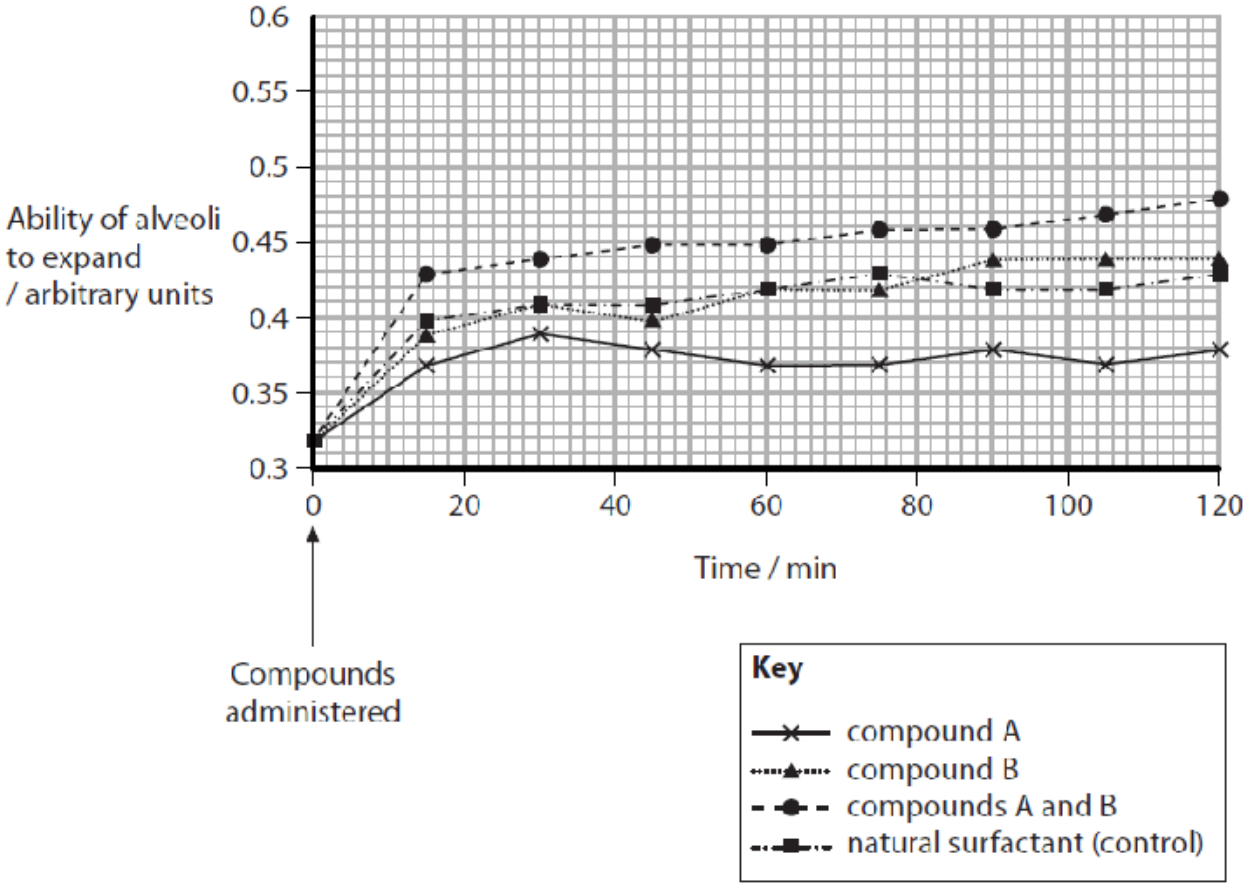
The mean Carrico index of each group of rabbits and the ability of the alveoli to expand were determined every 15 minutes.

Graph 1 and Graph 2 show the results of this investigation.

Graph 1 Effect of compounds A and B on the Carrico index



Graph 2 Effect of compounds on the ability of alveoli to expand



Analyse the data to explain the potential use of these two compounds to treat ARDS in human babies.

(6)

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(Total for question = 6 marks)

Q2.

A student planned to keep two species of fish in an aquarium.

One species of fish should be kept at a minimum temperature of 25 °C. The other species

requires a minimum concentration of oxygen of 7.5 mg dm^{-3} water.

Explain why the student chose to keep these two species of fish in an aquarium at 30 °C.

(4)

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(Total for question = 4 marks)

Q3.

Answer the questions with a cross in the boxes you think are correct ☒. If you change your mind about an answer, put a line through the box ☒ and then mark your new answer with a cross ☒.

Acute respiratory distress syndrome (ARDS) is a condition that can occur in babies.

In ARDS, cells in the alveoli do not produce enough of a substance called surfactant.

The alveoli cannot expand sufficiently when the baby inhales.

The diagram shows the alveoli of a baby with ARDS and the alveoli of an unaffected baby.



Alveoli of a baby with ARDS



Alveoli of an unaffected baby

The surfactant in the alveoli reduces the surface tension of water.

(i) Which bond is responsible for the cohesive forces between water molecules that contribute to the surface tension of water?

(1)

☒ **A** covalent

☒ **B** ionic

☒ **C** hydrogen

☒ **D** hydrophobic

(ii) Surfactant contains phospholipid molecules.

How many of the following components are found in phospholipids?

(1)

1 amino acids

2 fatty acids

3 glycerol

4 phosphate

☒ **A** one

☒ **B** two

☒ **C** three

☒ **D** four

(Total for question = 2 marks)

Q4.

The photograph shows a wombat, an animal that lives in dry parts of Australia.



Source: © Blue Gum Pictures/Alamy Stock Photo

Wombats are herbivores, feeding on grasses, leaves and bark. Wombats also dig in the soil for roots.

They have behavioural and physiological adaptations to survive periods of severe drought.

The effect of drought on the health of wild wombats was investigated.

Changes in body mass, body condition and the chemical constituents of stomach contents and faeces were recorded.

These changes were related to the changes in the quality and quantity of the food of wombats.

Explain why drought affects the quality and quantity of the food of wombats.

(5)

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(Total for question = 5 marks)

Q5.

Which statements describe some properties of water that are useful to plants?

1 Hydrogen bonding makes water a polar solvent.

2 Cohesive forces between water molecules allow the water to move in an unbroken stream.

3 Weak hydrogen bonds between water molecules attract the molecules to each other and allow water molecules to move easily in relation to one another.

(1)

☒ **A** 1 and 2 only

☒ **B** 2 and 3 only

☒ **C** 1 and 3 only

☒ **D** 1, 2 and 3

(Total for question = 1 mark)

Q6.

Transpiration moves water and mineral ions from the roots to the leaves of plants.

Explain how transpiration depends on the dipole nature of water.

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(Total for question = 3 marks)

Q7.

Macroalgae and microalgae are photosynthetic organisms.

Seaweeds are macroalgae that live attached to rock in coastal areas.

Some seaweeds are green, some are brown and some are red.

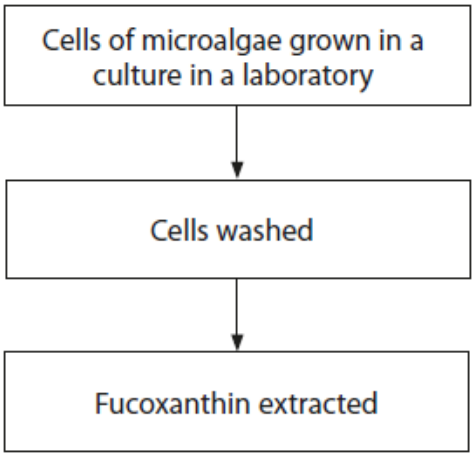
The colour of seaweeds depends on the photosynthetic pigments contained in their cells.

Green seaweeds contain chlorophyll, brown seaweeds contain chlorophyll and fucoxanthin and red seaweeds contain chlorophyll and phycoerythrin.

Fucoxanthin is found in both macroalgae and microalgae.

Fucoxanthin has anti-inflammatory, anti-tumour, anti-diabetes, anti-malarial and anti-obesity activity in humans.

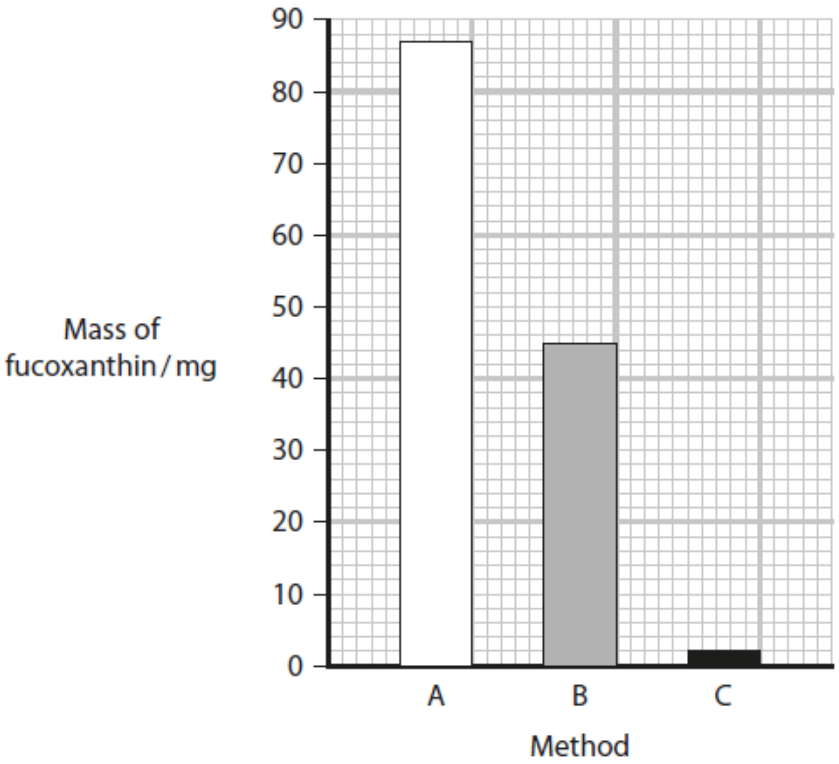
The diagram outlines the steps taken to extract fucoxanthin from microalgae.



The table shows three methods used for washing the cells and extracting the fucoxanthin.

Method	Liquid used for washing cells	Chemical used to extract fucoxanthin
A	water	ethanol
B	culture media	ethanol
C	culture media	water

The graph shows the mass of fucoxanthin extracted from 1 dm^3 of cell culture.



(i) Calculate how many times more fucoxanthin was extracted using method A compared with method B.

(1)

Answer .....

(ii) Explain why different masses of fucoxanthin were extracted using these three methods.

(3)

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(Total for question = 4 marks)