

AQA, OCR, Edexcel

A Level

A Level Biology

**Gas Exchange in Organisms
Questions**

Name:

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Total Marks:

Gas Exchange in Organisms

Gas exchange is essential in organisms in order to get the necessary amount of oxygen to the cells to allow metabolic reactions to be carried out.

1. Organisms have adaptations that increase the rate of diffusion across the exchange surface. One of these adaptations is to maintain a steep concentration gradient across the exchange surface.
 - i) Identify two other adaptations that increase the rate of diffusion. (2 marks)
 - ii) How are the lungs adapted to maintain a steep concentration gradient? (2 marks)
 - iii) How do single celled organisms exchange gases? (1 mark)
 - iv) Why have multi-cellular organisms evolved and developed different exchange mechanisms to that of the single celled organism? (2 marks)
2. Insects have developed a gas exchange mechanism which is facilitated by the tracheae.
 - a) i) What are tracheae? (1 mark)
 - ii) How do tracheae facilitate gas exchange? (4 marks)
- b) Plants also need to facilitate gas exchange in order to obtain enough CO₂ for photosynthesis and O₂ for respiration.
 - i) Where does gas exchange occur in plants and why? (2 marks)
- c) Both insects and plants have adaptation to control gas exchange.
 - i) What mechanisms do plants and insects use to control gas exchange in order to limit water loss? (4 marks)
- d) The image below shows a *Cereus peruvians*, which is an example of a xerophytic plant. Xerophytic plants have many adaptations for conserving water loss.



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- i) Why do xerophytic plants need adaptations to conserve water loss? (1 mark)
- ii) One of the adaptations in some xerophytic plants is a layer of hairs on the epidermis around the stomata. How does this help survival in a desert environment? (2 marks)
- iii) Identify two other adaptations found in some xerophytic plants that help them conserve water. (2 marks)

3. Fish have developed a sophisticated system for gas exchange because water has a much lower concentrations of oxygen than air.

- a) The structure of the gill is very well adapted to its function.
 - i) How are the gill filaments adapted for gas exchange? (2 marks)
 - ii) The filaments have a high density of capillaries. These are involved in the counter current flow system. What is the counter current flow system? (2 marks)
 - iii) How does the counter current flow system mean that gas exchange is more efficient? (2 marks)