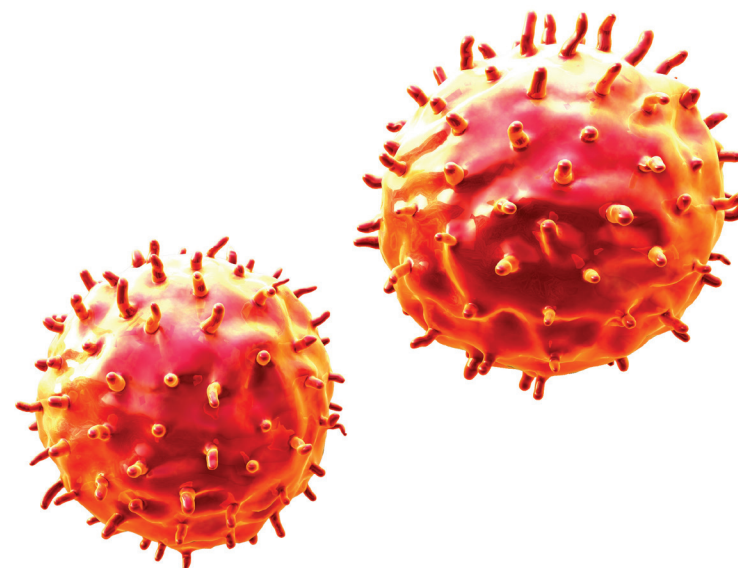


# Interactive Example Candidate Responses

Paper 4 (May / June 2016), Question 4

**Cambridge IGCSE™**  
**Biology 0610**



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4 *Rhabdostyla* is a single-celled organism that has no cell wall and no chlorophyll.

(a) Gases are exchanged across the cell membrane of *Rhabdostyla*.

Name:

the gas produced by *Rhabdostyla* .....  $\text{CO}_2$  .....

the process that produces the gas ..... respiration .....

the method of removal of the gas ..... ~~diffusion~~ .....

[3]

*Rhabdostyla* lives in freshwater habitats, such as ponds, lakes and rivers.

Freshwater has a very low concentration of solutes.

*Rhabdostyla* has a contractile vacuole that fills with water and empties at intervals as shown in Fig. 4.1. The contractile vacuole removes excess water.

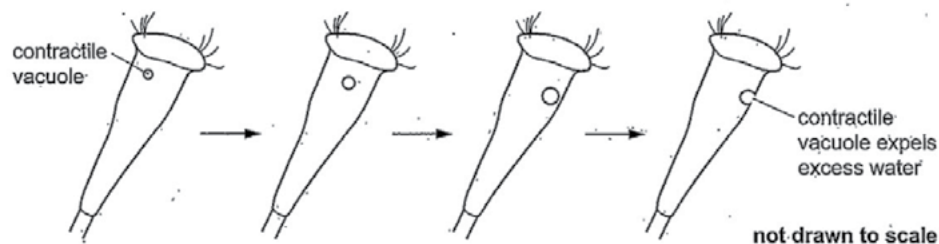


Fig. 4.1

(b) Explain, using the term **water potential**, why *Rhabdostyla* needs to remove excess water.

If *Rhabdostyla* did not remove excess it would get filled up with water until it burst as it has no cell wall to hold its shape. It would fill up as the <sup>freshwater</sup> ~~water~~ has a high water potential and *Rhabdostyla* has a low water potential so water moves down the ~~water~~ potential gradient through a partially permeable membrane into the cell by osmosis. [3]

Select page

Your Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme	
(a)	carbon dioxide/ $\text{CO}_2$ ; (aerobic) respiration ; (simple) diffusion ; <b>A</b> excretion <b>I</b> gas exchange	<b>3 marks</b>
(b)	water enters by <u>osmosis</u> ; down a <u>water potential</u> gradient/high(er) to low(er) <u>water potential</u> ; <b>R</b> water concentration <b>A</b> semi-/selectively/differentially through partially permeable membrane ; needs to remove water to prevent bursting ;	<b>3 marks</b>
(c)	as concentration of sea water increases the removal of water decreases ; as concentration of sea water increases the water potential gradient decreases ; <b>A</b> 0% to 12% therefore less water enters at higher concentrations of sea water ; less excess water ;	<b>3 marks</b>
(d)	cell walls, inelastic/do not stretch/rigid/inflexible/keep shape of cell ; <b>I</b> strong/tough/don't break cells, are turgid/have high turgor pressure ; resist any increase in, volume/pressure ; these cells do not absorb excess water ; <b>A</b> (very) little water enters the cells will not burst ;	<b>3 marks</b>

In an investigation, individual *Rhabdostyla* were placed into different concentrations of sea water. The rate of water excreted by the contractile vacuole of each organism was determined. The results are shown in Fig. 4.2.

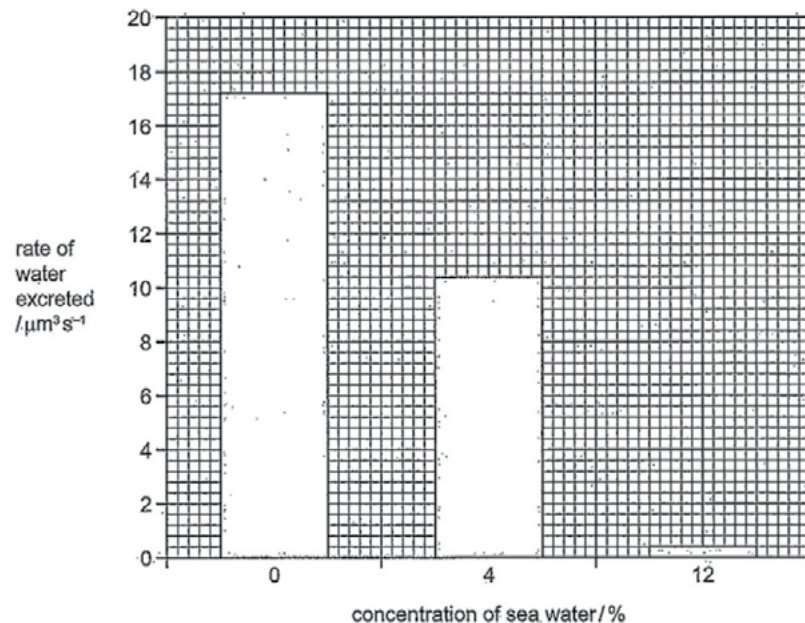


Fig. 4.2

(c) Explain the results shown in Fig. 4.2.

When there is just water a high amount of water is excreted due to the large differences in water potential between the cell and the water. When there is a higher concentration of sea water at 4% there are more salts in the water so the difference in water potential is less so less moves into the cell. At 12% concentration the water potentials are similar so there is little movement of water and so little water needs to be excreted by the cells as there are many salt ions in the water as well as sea water has a high salt content.

Select page

Your Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme	
(a)	carbon dioxide/CO <sub>2</sub> ; (aerobic) respiration ; (simple) diffusion ; <b>A</b> excretion <b>I</b> gas exchange	<b>3 marks</b>
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(d) Single-celled organisms with cell walls do not have contractile vacuoles. Suggest why.

As a cell wall holds the shape of the organism even when filled with water so it will not burst like those without cell walls. Instead they become turgid when they are filled with water as the cell wall retains the cell's shape unlike the cell membrane so they do not need to be emptied of water by a contractile vacuole so it would be a waste of energy to have a contractile vacuole. [3]

[Total: 12]

Your  
Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme	
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4 *Rhabdostyla* is a single-celled organism that has no cell wall and no chlorophyll.

(a) Gases are exchanged across the cell membrane of *Rhabdostyla*.

Name:

the gas produced by *Rhabdostyla* O<sub>2</sub>

the process that produces the gas respiration

the method of removal of the gas excretion

[3]

*Rhabdostyla* lives in freshwater habitats, such as ponds, lakes and rivers.

Freshwater has a very low concentration of solutes.

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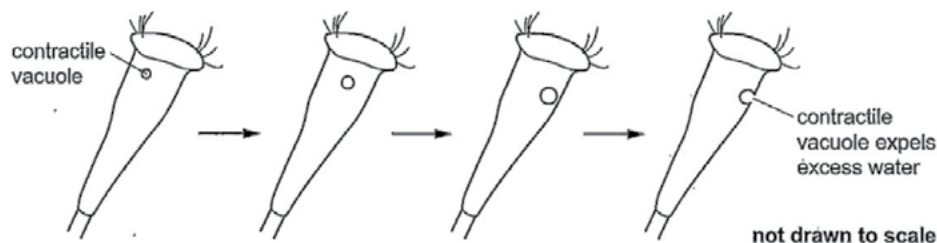


Fig. 4.1

(b) Explain, using the term **water potential**, why *Rhabdostyla* needs to remove excess water.

*Rhabdostyla* needs to remove excess water to avoid having too high water potential. If it would have too high water potential the cell would swell up and burst as there is no cell wall that would stop it from bursting.

[3]

Select page

Your Mark

4(a)

4(b)

4(c)

4(d)

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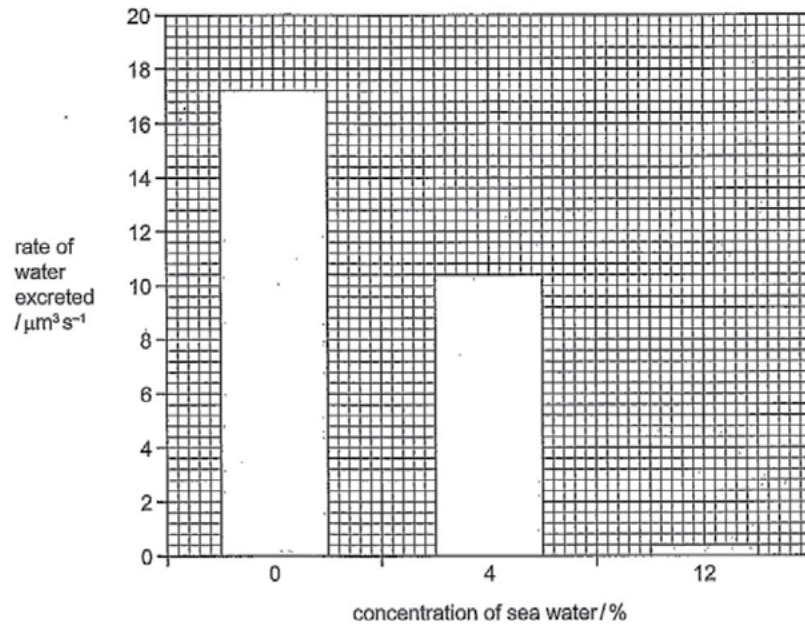


Fig. 4.2

(c) Explain the results shown in Fig. 4.2.

The lower the concentration of sea water, the higher the rate of water excreted. As you can see, at 0 concentration (%) the rate of water excreted was the highest ( $17.2 \mu\text{m}^3 \text{s}^{-1}$ ). This might be because *Rhabdostylas* are used to fresh waters and not to salty water. Too much salty water could have made the vacuole ~~too~~ flaccid and dried out from the salt.

[3]

Your  
Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme
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(d) Single-celled organisms with cell walls do not have contractile vacuoles. Suggest why.

Single-celled organisms with cell walls do not need contractile vacuole to empty it's content because these cells cannot burst. The cell wall prevents them from bursting and so there is no need for contractile vacuole and to even out the water potential.

[3]

[Total: 12]

Select  
page

Your  
Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme
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4 *Rhabdostyla* is a single-celled organism that has no cell wall and no chlorophyll.

(a) Gases are exchanged across the cell membrane of *Rhabdostyla*.

Name: *Rhabdostyla*

the gas produced by *Rhabdostyla* ... *water vapor*

the process that produces the gas ... *contractile vacuole fills and empties with water*

the method of removal of the gas ... *contractile vacuole*

[3]

*Rhabdostyla* lives in freshwater habitats, such as ponds, lakes and rivers.

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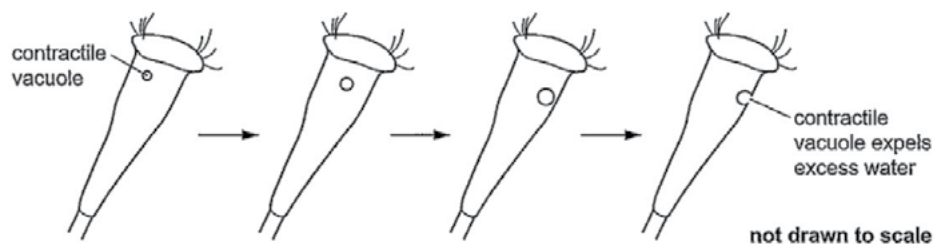


Fig. 4.1

(b) Explain, using the term **water potential**, why *Rhabdostyla* needs to remove excess water.

*To make sure your water potential is correct, you need to get rid of all excess water. If you don't remove excess water then you won't be able to produce the gas you want.*

[3]

Select page

Your Mark

4(a)

4(b)

4(c)

4(d)

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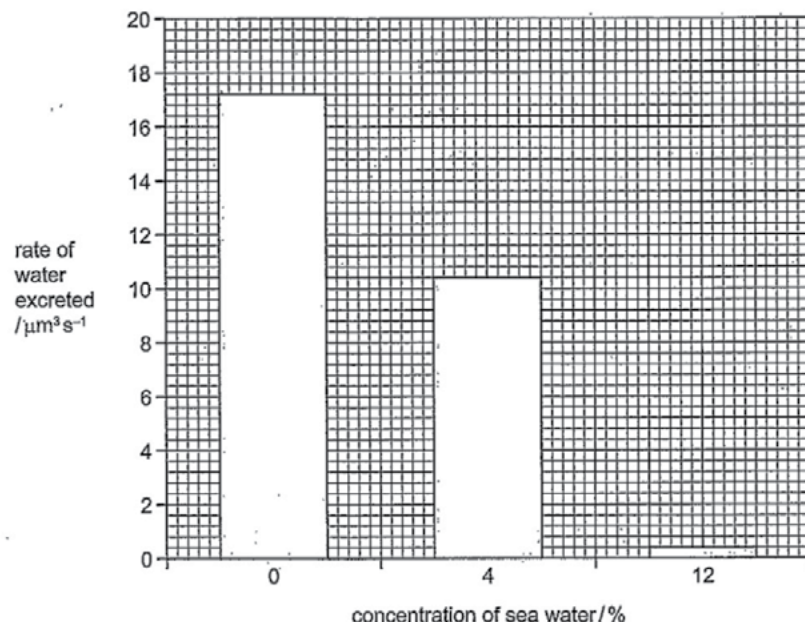


Fig. 4.2

(c) Explain the results shown in Fig. 4.2.

When there is 0% concentration of sea water, the rate of water excretion is about  $17 \mu\text{m}^3 \text{s}^{-1}$ . When there is 4% concentration of sea water, the rate of water excretion is lower at about  $10.5 \mu\text{m}^3 \text{s}^{-1}$ . Lastly, when there is 12% concentration of sea water, there is only about  $1 \mu\text{m}^3 \text{s}^{-1}$  (rate of water excreted).

[3]

Select page

Your Mark

4(a)

4(b)

4(c)

4(d)

Q4	Mark scheme
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(d) Single-celled organisms with cell walls do not have contractile vacuoles. Suggest why.

Single-celled organisms ~~ent~~ with cell walls  
don't have contractile vacuoles because  
they only have 1 cell to ~~to~~ live off of.  
Organisms with multiple cells ~~to~~ need ~~a~~ contractile  
vacuoles to help the organisms cells work  
together to keep the organism alive.

[3]

[Total: 12]

Select  
page

Your  
Mark

4(a)

4(b)

4(c)

4(d)

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