

**GCSE Biology A (Gateway)**

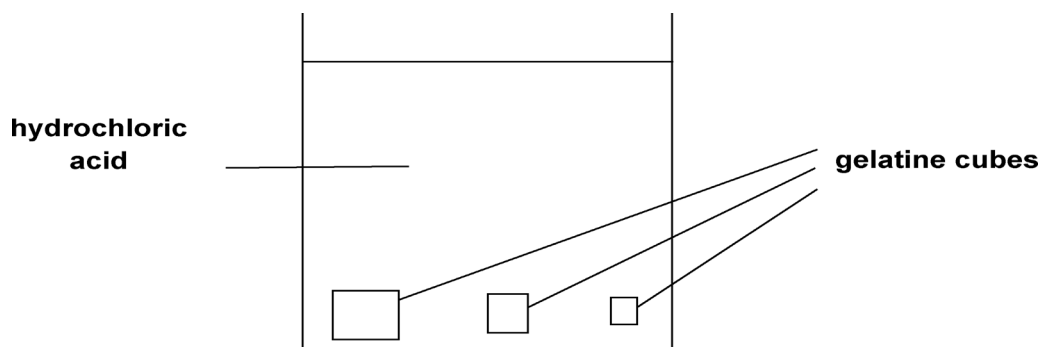
**J247/01 B1-B3 and B7 Foundation (Foundation Tier)**

**Question Set 9**

1

Some students investigate the effect of the ratio of surface area : volume on the rate of diffusion in animal cells.

1. They use three different sized gelatine cubes stained blue with pH indicator.
2. They put the cubes into a beaker of hydrochloric acid.
3. They measure the time for each cube to completely change colour.



The table shows their results.

| length of 1 side of cube (cm) | surface <u>area</u> : volume ratio | time to completely change colour in seconds |
|-------------------------------|------------------------------------|---|
| 1                             | .....                              | 132   |
| 2                             | 3:1                                | 328   |
| 3                             | 2:1                                | 673   |

- (a) (i) Calculate the surface area : volume ratio for the cube with sides of 1 cm.

Answer = ..... [1]

- (ii) Calculate the rate of colour change for each of the three cubes.

Write your answers in the table below.

Show your answers in standard form.

| Length of 1 side of cube (cm) | Rate of colour change ( $s^{-1}$ ) |
|-------------------------------|------------------------------------|
| 1                             | .....                              |
| 2                             | .....                              |
| 3                             | .....                              |

[2]

(iii) Use the results and your calculations in parts (i) and (ii).

Explain why most single celled organisms do **not** need a transport system (e.g. the circulatory system of multi-cellular organisms).

[2]

(b) Oxygen enters red blood cells by diffusion.

Describe and explain how red blood cells are adapted for the efficient uptake and transport of oxygen.

[5]

**Total Marks for Question Set 9: 10**

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