Oxford Cambridge and RSA

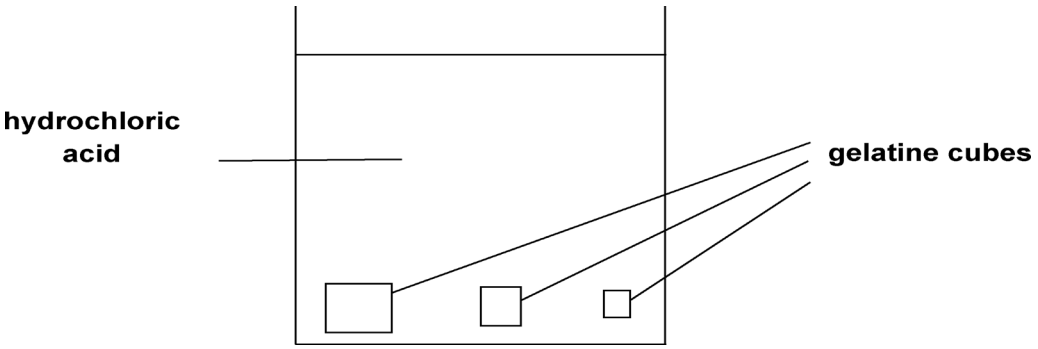
GCSE Biology A (Gateway)

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 area : 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