Cell Structure – 2021/20 GCE Biology A Component 02

1. Nov/2021/Paper_H420/02/No.18

Cells are surrounded by a plasma membrane that contains phospholipids.

(a) Explain how the structure of phospholipid molecules allows for the formation of plasma membranes.

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..... **[3]**

(b) The permeability of plasma membranes can be investigated using beetroot.

Beetroot cells contain a red pigment. The red pigment leaks out of the cells only when the plasma membrane has become damaged.

Some students investigated the effect of pH on the permeability of plasma membranes in beetroot cells.

The students used a valid method for the investigation, which is outlined below:

- Equal-sized disks of beetroot were cut.
- The disks were each immersed in an equal volume of buffer solution.
- After a set time, the solution was stirred and the absorbance measured using a colorimeter.
- The procedure was replicated three times in each of six different pH buffers.

The students recorded their results in the format shown below.

pH2 - 80%, 78%, 78%: average = 78.67%
pH3 - 61%, 60%, 60%: average = 60.33%
pH4 - 19%, 23%, 22%: average = 21.33%
pH5 - 9%, 10%, 11%: average = 10 %
pH6 - 0%, 0%, 0%: average = 0
pH7 - 0%, 0%, 0%: average = 0

(i) Present the students' results in an appropriate table in the space below.

[4]

(ii) The students concluded that the red pigment began to leak out of the beetroot cells at any pH below pH6.

Suggest and explain why a low pH might cause the red pigment to leak out of the beetroot cells.

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(iii) Outline how the students could modify their investigation to get a more accurate value for the pH at which the red pigment begins to leak out of the beetroot cells.

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