

Cells – AS Biology P1

1. No.3

03.1

Describe how viruses are replicated.

[4 marks]

Viruses attach to the host cell using its attachment proteins which bind to specific receptor proteins on the host cell surface.

The viral nucleic acid is then injected to host cells. Inside the host cell the viral nucleic acid is replicated. In RNA viruses like HIV, reverse transcriptase converts RNA into DNA.

The host cell uses its machinery to synthesize viral proteins from the viral genetic material.

The viral components are assembled into new virus particles which are released from the host cell.

0 3 . 2

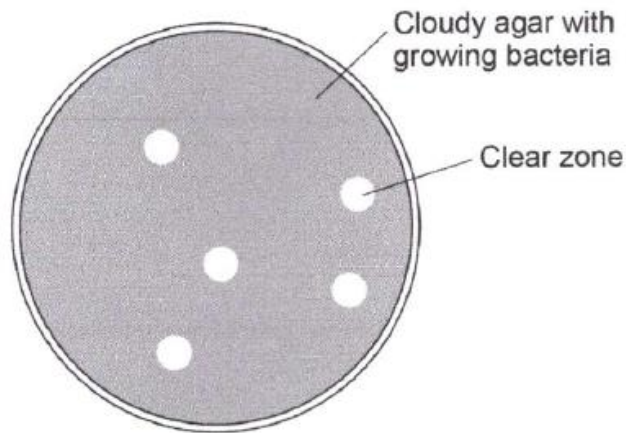
A scientist investigated the effect of a virus species on a bacterial culture.

The scientist:

- mixed a diluted sample of the virus with a bacterial culture in liquid agar
- poured the liquid agar into a Petri dish and let the agar set
- incubated the virus-bacterial culture at 30 °C for 24 hours.

Figure 3 shows the appearance of the Petri dish after 24 hours.

Figure 3



Explain why clear zones are present in Figure 3.

[1 mark]

Virus replication has killed cells in the clear zones.

0 3 . 3

Predict the appearance of the Petri dish if the incubation was extended by a few more hours.

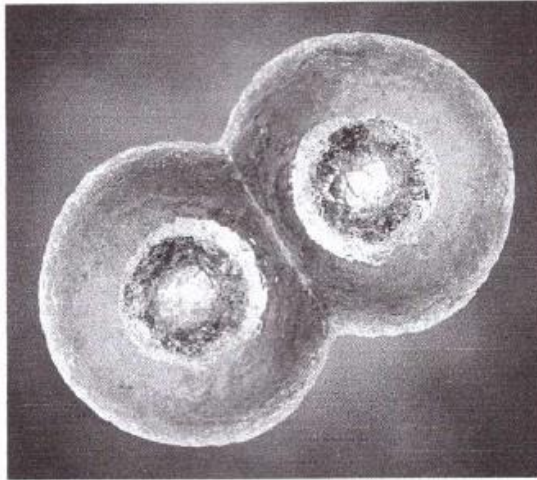
[1 mark]

More clear zones will form.

0 3 . 4 Animal cells replicate during the cell cycle.

Figure 4 shows one animal cell at a stage of the cell cycle.

Figure 4



Identify the stage of the cell cycle shown in Figure 4.

Explain the appearance of the cell shown in Figure 4.

Do **not** refer to organelles in your answer.

[2 marks]

Identity of stage Telophase.

Explanation A new cell surface membrane is forming

2. No.6

0 6 . 1

Give **two** roles of phosphate ions in cells.

[2 marks]

- 1 Phosphate ions are a component of DNA and RNA forming part of the sugar phosphate backbone.
- 2 Phosphate ions are used to produce ATP, which is the main energy carrying molecule in cells.

0 6 . 2

Diseased lungs can cause carbon dioxide to build up in the blood plasma. This leads to an increase in hydrogen ion concentration in the plasma.

Describe the effect this increase in hydrogen ion concentration has on the plasma **and** on the proteins in the plasma.

Do **not** refer to the Bohr effect.

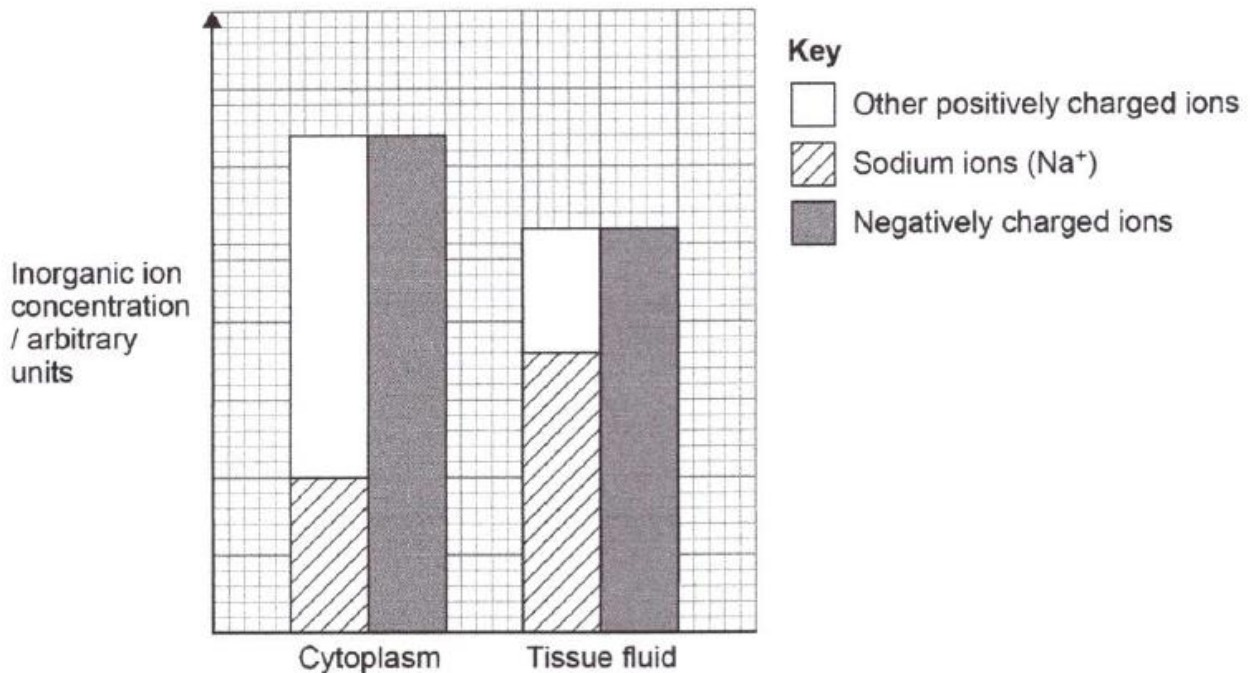
[2 marks]

Increase in hydrogen ion concentration causes decreased plasma pH. This can denature proteins in the plasma or alter their tertiary structure including changing the shape of active site which affects their function.

Scientists measured the concentration of inorganic ions in the cytoplasm of mammalian cells and in the tissue fluid surrounding those cells.

Figure 7 shows their results.

Figure 7



0 6 . 3

Use **Figure 7** to describe **two** patterns shown in the **total** concentrations of positively and negatively charged ions in the cytoplasm and in tissue fluid.

[2 marks]

- 1 There is equal positive and negative in both cytoplasm and tissue fluid.
- 2 There is a higher ion concentration in cytoplasm compared to tissue fluid.

06.4

In these mammalian cells, the:

- cell-surface membrane is permeable to sodium ions
- sodium ion concentration does not increase in the cytoplasm over time.

Use this information and **Figure 7** to suggest and explain the ion transport mechanisms involved in the transport of sodium ions.

[2 marks]

- Sodium ions move into the cells by facilitated diffusion down a concentration gradient.
- Sodium ions move out of cells by active transport against a concentration gradient.