

MODULE: *Cells*

Post Test

Marking Scheme

1. (10 minutes)

Cancer Research

Cell division is the process that takes place when one cell makes another cell. It takes many, many divisions to form a fully-grown human made up of over a million, million cells. Scientists were trying to find out how cell division is controlled, because sometimes this process goes wrong in the human body. This causes a disease called cancer. Scientists from the USA and UK working together have shown how living things control cell division with the hope of working out ways to treat and prevent cancer.

The scientists were studying one of the smallest of all living things - yeast. Yeast is a very useful microorganism. It is used in making bread. More importantly it can be grown easily and quickly in a laboratory. The researchers carried out their experiments using a special type of yeast called fission yeast. Fission means to split. So, to make a new cell, a yeast cell just splits into two!

The scientists knew that inside every cell there is a nucleus. The nucleus controls all the activities of the cell. The nucleus contains structures called genes. Genes are sections of DNA. This is a chemical that contains the instructions needed for a healthy cell to grow. These instructions tell the cell to divide, stop dividing and eventually die. The scientists added a substance to the yeast cells to damage the DNA inside the nucleus. By doing this they discovered a particular gene. This gene controls how the yeast cell divides. This gave them an idea. They thought that the same gene might be found in all living cells.

Meanwhile, in Canada and the USA, scientists were carrying out similar experiments on other living things. They compared their results and agreed - all living things, including humans, control cell division in the same way.

Healthy human cells behave in a very controlled way. They grow, divide, stop dividing and eventually die. In cancer, this process goes wrong. The scientists can now use the yeast cells to study how a cancer cell divides and grows into a tumour. A tumour is a swelling or growth that can occur almost anywhere in the body. The yeast cells may help the scientists find new ways to treat and prevent cancer.

a) How does a cancer tumour develop?

Healthy human cells behave in a very controlled way. They grow, divide, stop dividing and eventually die. In cancer, this process goes wrong. A cancer cell divides and grows into a tumour. A tumour is a swelling or growth that can occur almost anywhere in the body.

b) Which chemical in nucleus were the scientists interested in?

DNA

c) What did the scientists do to the chemical?

The scientists added a substance to the yeast cells to damage the DNA inside the nucleus.

d) What controls cell division in cells?

A gene controls how a cell divides.

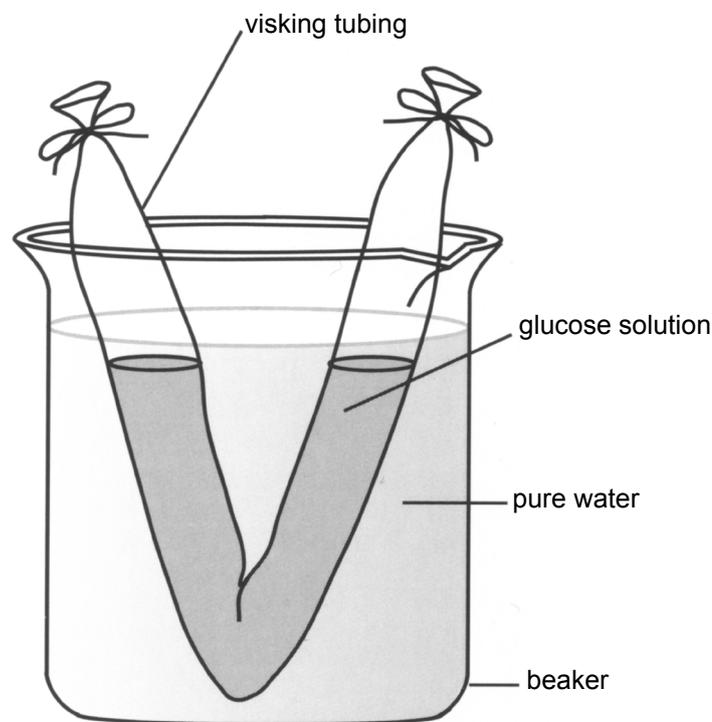
2. (20 minutes)

Read the information below and then answer the questions.

Pocket water purifier

Nanotechnologists are developing a membrane that behaves like a cell membrane. They hope the membrane will be used to purify dirty water in areas where there is a water shortage, and people do not have easy access to clean water.

The idea came from observations made while using the equipment below.



They firstly filled the Visking tubing with glucose and found that after 15 minutes there was glucose in the pure water. Next they tried sucrose instead of glucose. This time there was no sucrose in the water. However what they did notice was that the volume of liquid inside the Visking tubing had increased. This was their eureka moment!

- a. What conclusion could they make from their first experiment?

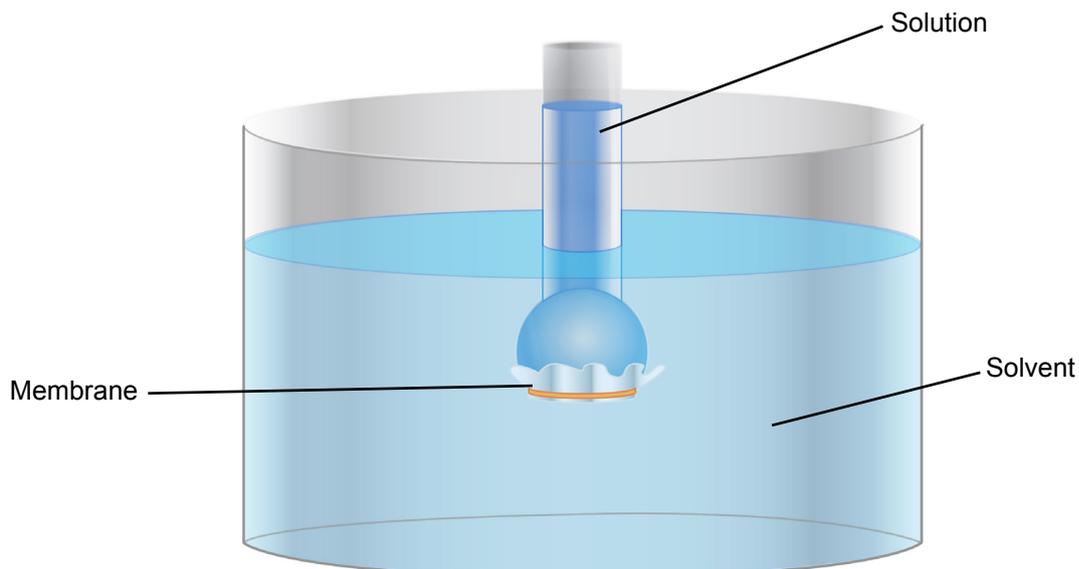
Glucose had past out of the Visking tubing and into the water.

- b. Explain what had happened?

The glucose molecules are small enough to pass through the tiny holes in the Visking tubing.

- c. Explain what had happened in the second experiment?

The sucrose molecules are too large to pass through the pores. However the water molecules are sufficiently small, and as there is a lower concentration of water molecules in the sucrose solution the water passes through the pores in the membrane by a special form of diffusion called osmosis.



d. They thought they would carry out an enquiry to find out what would happen if they changed the concentration of sugar. They changed their apparatus. This is a drawing from the research log of one of the researchers.

i. What would be the independent variable?

Concentration of sucrose solution

ii. How would they change it to see a pattern in their results?

Produce a range of concentrations at regular intervals such as 10%, 20% and 30%.

iii. What would they measure?

The increase in the height of the water in the tube

iv. How would they ensure their measurements are precise?

They could use callipers or certainly measure using a rule with millimetres.

v. What variables would they control?

The size of the Visking tubing

The volume of solution in the Visking tubing

The volume of water in the beaker

The type of water

The time they ran the test or frequency of measurements

vi. What would you predict will happen?

The greater the concentration of sucrose the higher the solution would move up the tube (the greater the volume of water entering the Visking tubing).

vii. Explain your prediction.

The higher concentration of sucrose would contain fewer molecules of water and so more water molecules would move from the beaker into the Visking by osmosis.