

Speaker one

Osmosis is the diffusion of water molecules across a semi-permeable membrane, from a higher water concentration, to a lower water concentration.

Speaker two

Water uptake in plants involves the process of osmosis, where water moves from the soil into the roots of the plant.

But how?

We're going to do an experiment with potato cylinders, but you could use beetroot or carrot. This experiment investigates the effect of different concentrations of sucrose, a kind of sugar, on potato cylinders.

Solutions with high sucrose concentration contain more sucrose molecules and less water molecules, than a solution with low sucrose concentration.

The amount of water in the solution determines whether water will diffuse into or out of the potato cylinders by the process called osmosis. The experiment could be carried out using salt.

Speaker one

This is the equipment we'll need. Pause and take a look. Make sure the potatoes are the same size. Each cylinder will have a slightly different mass before and after the investigation, so keep them separate.

Set up and label the boiling tubes. The concentration of a solution is measured in moles per cubic decimetre.

Now, we are using five different sucrose concentrations, each of the same volume.

The 0 mol/dm³ sucrose solution is just distilled water, and that will be #1.

And then we've got four more, going up in regular intervals.

Speaker two

Blot each potato cylinder on the paper towel and then measure the mass. Record the mass and add the cylinders to the sucrose solution.

Start the stopwatch, and after 40 minutes, remove the cylinders. Blot on a paper towel and measure the sample again.

Speaker one

Repeat three times for each concentration to find out the mean and identify any anomalous results – these should not be included.

When you've collected your results, work out the percentage change in mass, using the formula: end mass minus starting mass, divide by starting mass, times 100. Once you've got those percentage changes, you can work out the mean result for each concentration by adding those numbers together and dividing by 3.

Then, use your results to plot a graph. The concentration of sucrose, the independent variable, goes on the X axis, and the change in mass, in %, goes on the Y axis.

Speaker two

Our results show that the 0.0 mol/dm³ cylinder has swelled and the mass has increased.

The water was at a higher concentration outside the potato, so the water molecules have moved into the potato, where the water concentration was lower.

The 1.0 mol/dm³ cylinder has shrivelled. Water has left the potato because the water concentration was higher inside the potato. The 0.25 mol/dm³ cylinder has not changed mass.

The concentration of water in the potato and its surroundings was the same.

Remember, osmosis is the diffusion of water molecules over a semi-permeable membrane from a higher concentration to a lower concentration.