

In this experiment we are going to investigate diffusion in a model cell.

We will need the following equipment:

Starch solution.

Glucose solution.

Boiling tubes.

Visking tubing.

A dropper.

A dimple tile.

Iodine.

Benedict's solution.

A water bath, filled with hot water and safety glasses, which should always be worn when using iodine or Benedict's solution.

To make the model cell, cut a 20 centimetre piece of visking tubing. Soak the visking tubing in water, and never let it dry out during the experiment.

Once it is soaked through, tie a knot in one end.

Fill the visking tubing with 5 cubic centimetres of starch solution and 5 cubic centimetres of glucose solution and then seal the tubing with another knot.

Rinse the outside of the model cell with water to remove any starch or glucose solution that may be on the outside.

Place the model cell in a boiling tube and add fresh water, making sure it is completely submerged.

Then leave for a minimum of 15 minutes.

After which we can take a sample to see if diffusion has taken place.

First, we'll test for starch.

Use a dropper to remove some water from around the model cell.

Put a few drops into a dimple tile, and then add in a couple of drops of iodine.

The iodine stays red-brown with no colour change.

As our control, test a few drops of starch solution.

The iodine changes colour from red-brown to blue-black in the presence of starch.

There was no colour change in our sample, showing that no starch was present.

Now test for glucose.

Again, use a dropper to remove a little water from around the model cell.

Put it in a boiling tube and add a little Benedict's Solution.

For a control, add a few drops of fresh water and Benedict's solution to another boiling tube.

Then heat both boiling tubes for up to 5 minutes in the water bath, with the water at around 90 degrees Celsius.

After 5 minutes, remove the boiling tubes from the water.

We can see that in the boiling tube containing water from the model cell that the Benedict's Solution has changed colour from blue to an orangey-red.

This is a positive test for glucose.

A change of colour to green would indicate a low concentration of glucose, but is still a positive test result.

In the control boiling tube, containing fresh water and Benedict's Solution, there has been no colour change.

No glucose is present.

In conclusion, glucose can diffuse through the model cell membrane, starch cannot.

Glucose is soluble and small enough to pass through a cell membrane.

Starch is insoluble in cells and too large to pass through a cell membrane.

Only some molecules can pass through cell membranes.

This is called selective permeability.