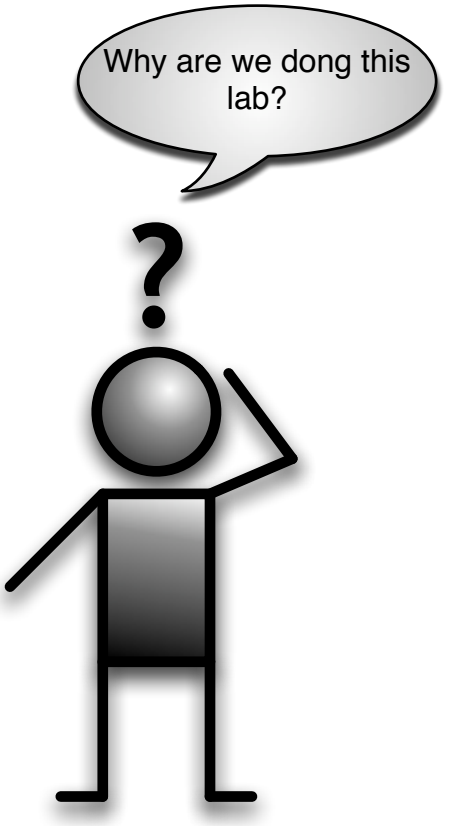
Diffusion Through a Membrane



This lab is designed to help us become familiar with the nature of the **cell membrane**, **diffusion**, and **osmosis**.

The Lab is divided into two major parts:

The **first** part involves making a model cell with **glucose** and **starch** inside and the placement of this cell into a beaker with **iodine**.

The **second** part involves the observance of osmosis using red onion cells.

To examine each part in more detai or scroll through the pages.

Part 1

Diffusion Through a Membrane

- A. Making The Cell
- B. Testing the Indicators
- C. Using Indicators to Make a Conclusion

Part 2

Diffusion of Water Across a Membrane (Osmosis)

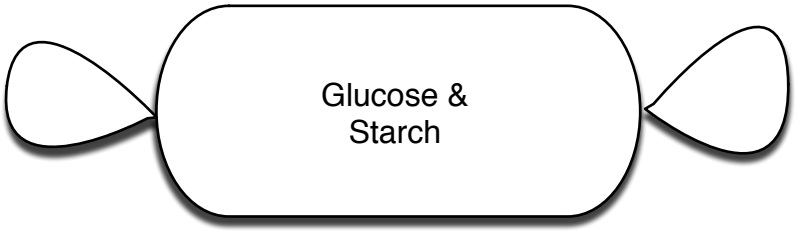
- A. Making the Solution
- B. Applying the Hypertonic Solution
- C. Applying the Hypotonic Solution

Diffusion Through a Membrane

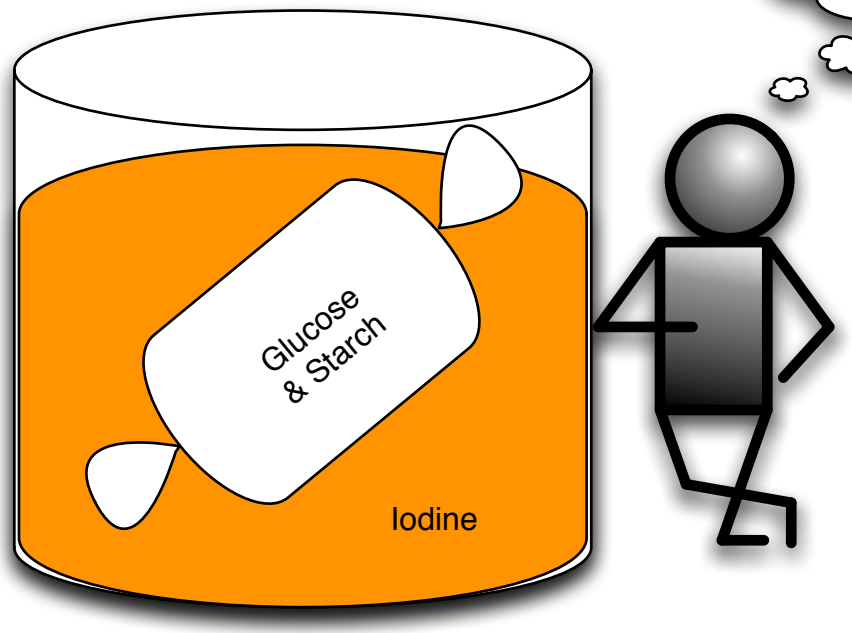
Part 1

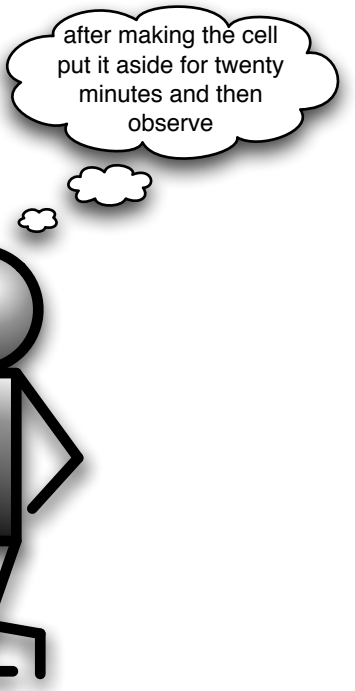
A. Making The Cell

After opening the artificial membrane, tie off one end and add the **glucose** and **starch** solutions. Tie the other end then mix by gently turning the cell upside down repeatedly.



Place the cell in a beaker then add some **iodine**





Observe any changes after 20 minutes

Part 1

Diffusion Through a Membrane

B. Testing the Indicators

In order determine which substances diffused across the cell membrane we'll need to use some chemical **indicators**.

Of course we will need an **indicator** for **glucose** and an **indicator** for **starch**.

Let's figure out how each indicator works.

Glucose Indicator

When the **glucose** indicator is heated in the presence of glucose it will turn a **brick red color**

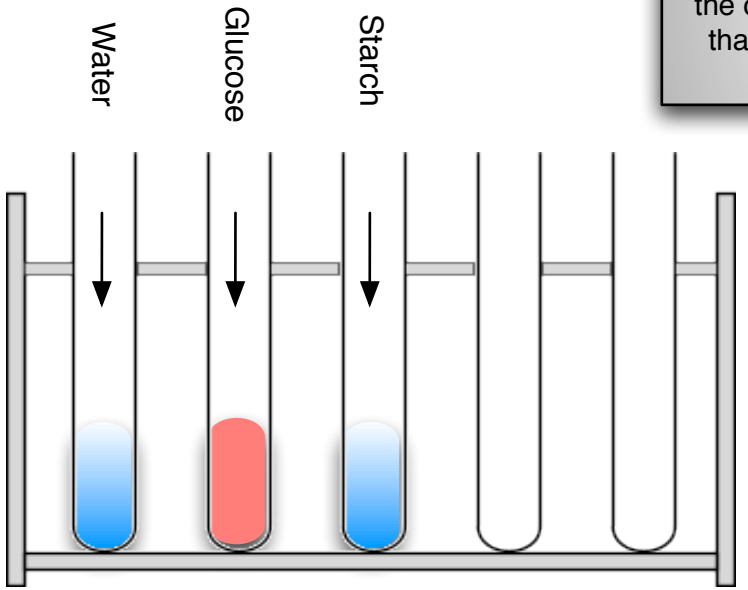
Positive →

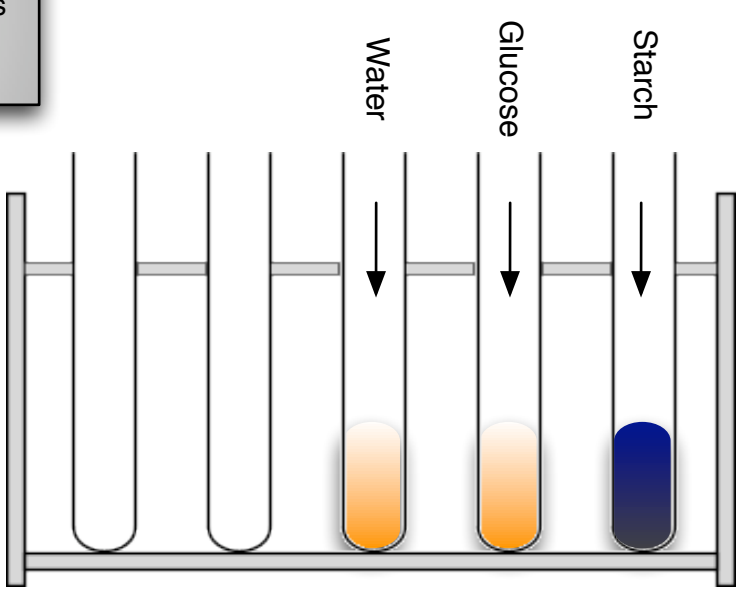
Starch Indicator

When the **starch** indicator is in the presence of starch it will turn a dark **blue/ black color**

Positive →

Since we have not used these indicators before it is necessary to verify that it is the combination of the two substances that will cause the change by testing them individually.





Part 1

Diffusion Through a Membrane

C. Using Indicators to make a conclusion

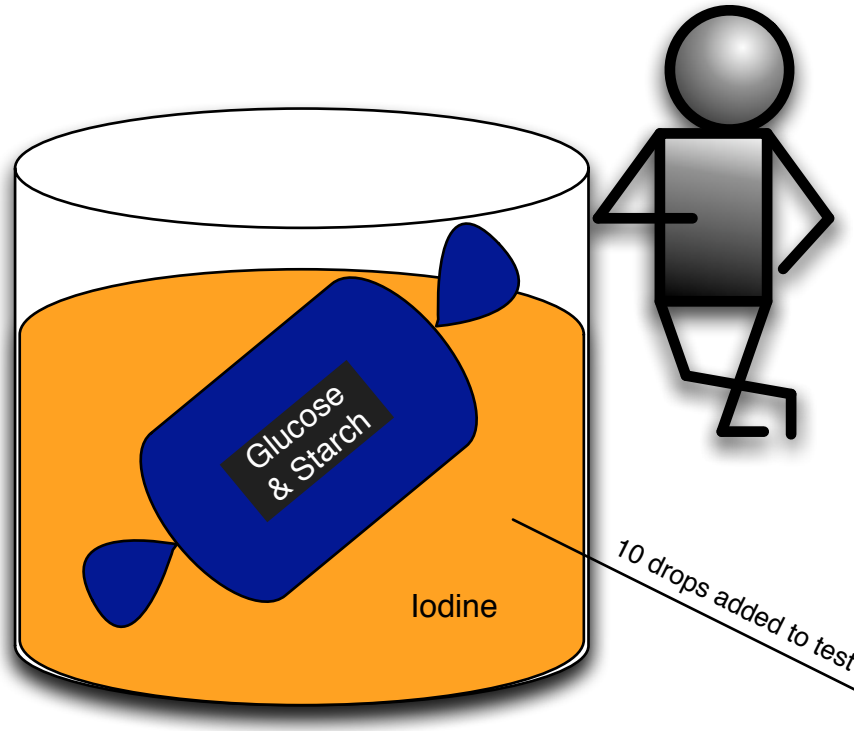
At this point we need to use our knowledge of the indicators used earlier to figure out which molecules moved across the membrane.

The blue/black color change indicates that there **is starch inside** the cell and **no starch outside** the cell.

What about the glucose? Did it move across the cell? In order to figure this out we need to test the liquid outside the cell for glucose using the indicator

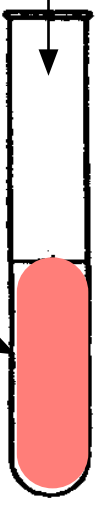
After 20 minutes we observe that the inside of the cell has changed color and the outside has not.

WOW! The color changed inside the cell. What happened?



Glucose indicator

10 drops added to test tube



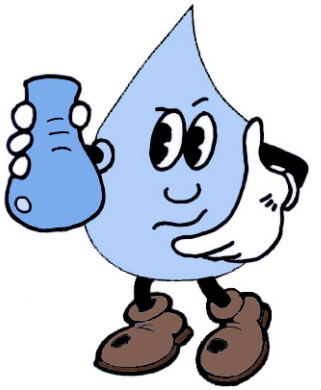
Ten drops are removed and added to a test tube with glucose indicator and then heated. The Blue solution should turn brick red if the glucose is outside the cell.

Part 2

Diffusion of Water Across a Membrane (Osmosis)

A. Making the Solution

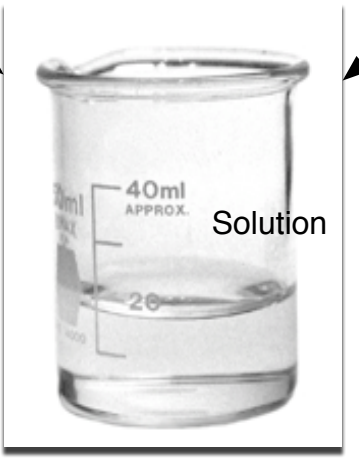
A **solution** has two parts: the **solvent** and **solute**



solute
10g

solvent
10 ml

We measured out 10g of **salt** and added it to 10ml of **water**. This is a **hypertonic** solution compared to the solution of the cytoplasm



More solute = hypertonic

Solutions can be:
Hyper-tonic
Hypo-tonic
Iso-tonic

If we say a solution is **hyper**, **hypo**, or **iso**tonic we must compare it to another solution.

Hyper = Above

Hypo = Below

Iso = Equal

The **prefixes** refer to the **amount** of **solute** in the solution

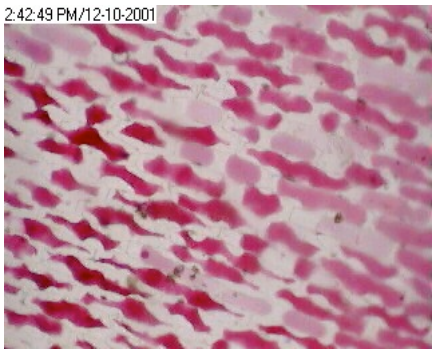
Part 2

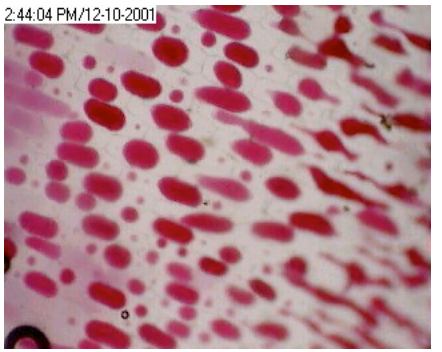
Diffusion of Water Across a Membrane (Osmosis)

B. Applying the Hypotonic Solution

More solute
= hypertonic

The **hypertonic (salt water)** solution is added to the slide



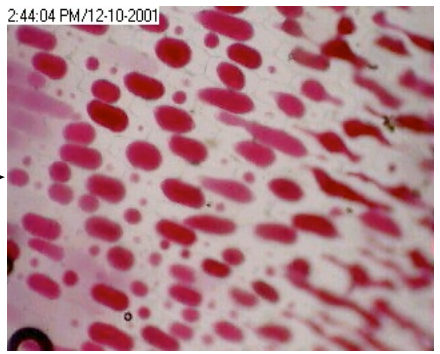


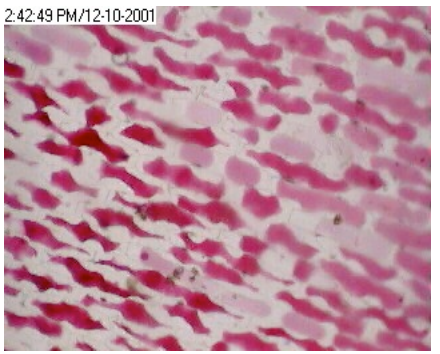
Water **leaves** the cells

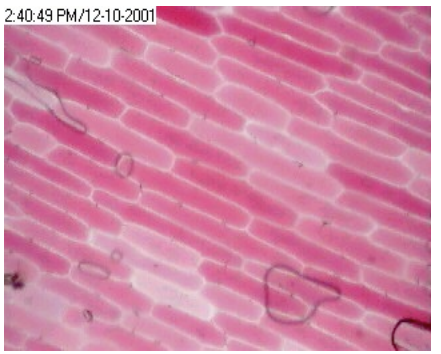
C. Applying the Hypotonic Solution

Less solute
= hypotonic

The **hypotonic (distilled water)** solution is added to the slide







Water **enters** the cells

Part 2

Diffusion of Water Across a Membrane (Osmosis)

Summary

The key to understanding which way water will move is to figure out where the highest concentration of water is. It will flow from **high** to **low** concentration.
Simply locate the area where the percentage of water is greatest - this is where the percentage of solute is lowest.
Pure (distilled) water is 100% water and 0% solute

You can see why the more salt you add to a solution the faster the water will leave the cell. As we add salt (solute) to a solution we decrease the percentage of water.