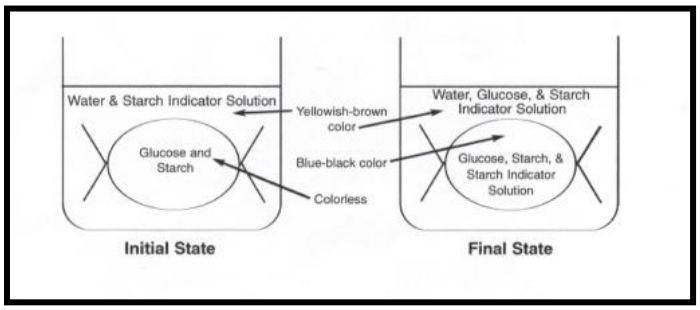
Review Sheet/NYS Regents Lab Activity #5
Diffusion Through a Membrane (Union-Endicott CS review sheet revision)

Key Points I

1. Molecules tend to move from high to low concentration without the use of energy (***diffusion***).
2. Membranes may allow some molecules to pass through while not allowing others (***selectively permeable*).**
3. ***Indicators*** are used to show the presence of certain kinds of molecules.

Procedure I

1. A model cell is made using a plastic membrane (usually *dialysis tubing*) containing ***starch* and *glucose***. The bag is sealed with often with string.
2. ***Starch indicator*** (iodine) is placed in solution outside the 'cell'.
3. Because of the differences in concentration, starch indicator diffuses in and glucose diffuses out. Starch 'wants' to diffuse out, but **cannot** because the molecule is **too large** to pass through the membrane.



4. Starch (milky white) + starch indicator (brown) = **blue-black** color
5. The inside of the bag turns **blue-black** while the outside stays brown, proving that indicator went in, but starch did not leave.
6. *Glucose indicator which is* ***_Benedict's solution***___ (blue) + glucose (clear) + HEAT = eventually turns **orange**
7. Testing the fluid outside the 'cell' shows glucose has left. This is tested by placing fluid from outside into a test tube, adding indicator solution, and heating the mixture.
8. You may prove that #6 is true by testing (heating) indicator alone and also testing indicator + starch. Both of these *controls* result in a **blue** color (no change).

Analysis I

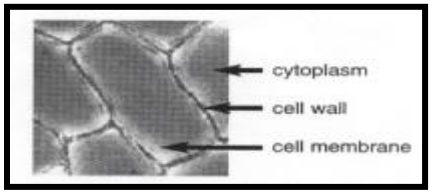
1. **Glucose** and starch indicator may pass through the membrane. **Starch** may not. This is because starch is a much **larger** molecule than glucose or starch indicator.
2. This shows the importance of **breaking down** large molecules inside the digestive system in order for nutrients to enter the bloodstream.

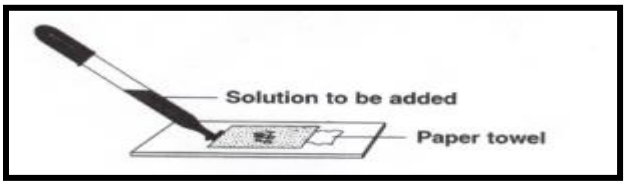
Key Points II

1. Basic parts of the cell that are easily seen under the microscope are the *cytoplasm*, *cell membrane*, and *cell wall* (in plants).
2. Molecules tend to move from **high to low** concentration without the use of energy (*diffusion*).
3. Diffusion of water molecules is particularly important and has the special name of ***osmosis***.
4. The balance of water molecules inside and outside the cell is extremely important for the survival of all organisms, including humans.

Procedure II

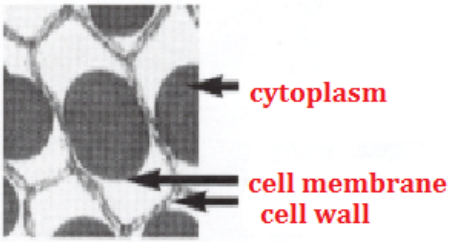
1. Make a *wet mount* slide of a thin section of red onion cells. The cells are taken from the outer 'skin' of the onion bulb and a small piece is placed in a drop of water on a microscope slide. A ***cover slip*** is placed on top by touching it to the water at an angle, and then carefully placing it on the specimen, trying not to get air bubbles underneath.
2. The cells are examined under the light (compound) microscope. You should be able to identify the cytoplasm, cell membrane, and cell wall.
3. It is important to see that the cell membrane and cytoplasm completely fill the space within the cell wall.





4. Place a 10% salt solution under the cover slip. This is done by putting a drop of salt solution next to one edge of the **cover slip**, then absorbing water from the **opposite** side of the slip using a **paper towel.**
5. Observe the cells in the salt solution. It is important to see that the cytoplasm and cell membrane have **shriveled up** inside the cell wall. This is due to **water molecules** leaving the cell and entering the salty (low water) solution.

Label the structures in the onion cells in salt water solution below.



6. Place distilled water under the cover slip using the technique described in #4 above.
7. Observe the cells in distilled water. It is important to see that the cytoplasm and cell membrane have **swollen back** to fill the entire space available within the cell wall.

Analysis II

1. Cells placed in very salty solutions will **lose water**, causing them to collapse and possibly lose the ability to complete life functions.
2. Cells placed in very watery solutions will tend to gain water, which causes them to **swell** and might cause them to burst/break open, destroying the cell. Note that this did not happen in the plant cells because the cell wall prevents the cell membrane from easily expanding.
3. Freshwater creatures, particularly single-celled organisms, must cope with too much water entering the cells. They use their __**contractile vacuoles**___ if single celled to pump out this water. **Saltwater** organisms tend to have the opposite problem and must try to reclaim lost water.