Diffusion, Osmosis and Plasmolysis lab-4

Diffusion

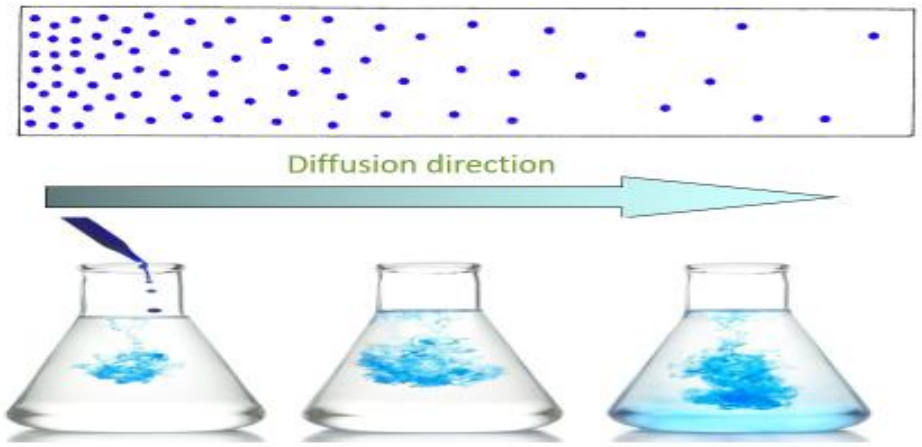
Diffusion: is the movement of molecules from a region of higher concentration to a region of lower concentration, (down a concentration gradient).

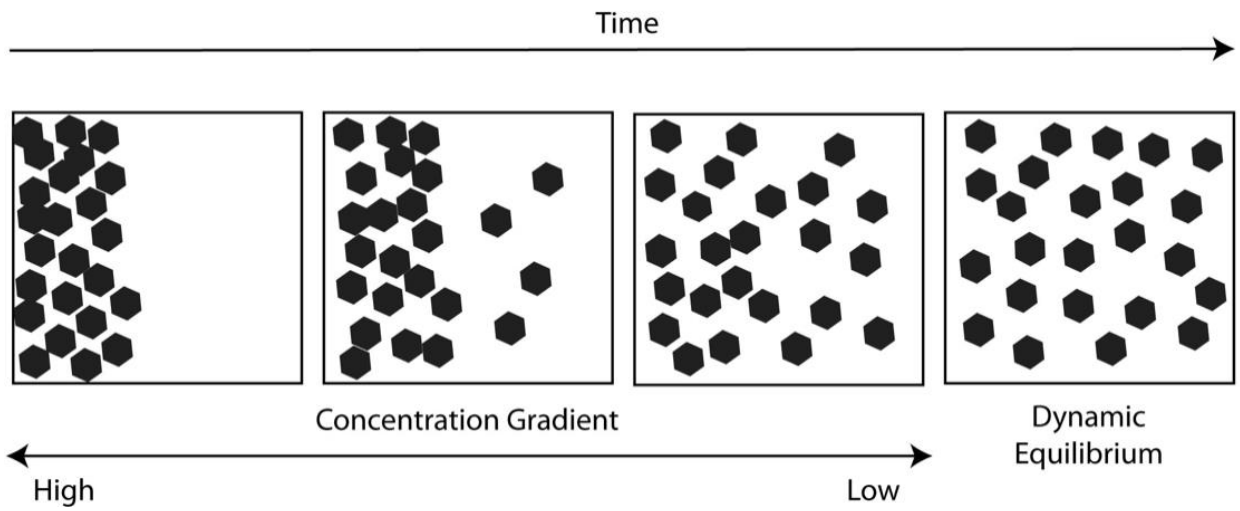
The rate of diffusion of gases is faster than liquid or solids.

The solute diffused and the medium where diffusion occur could be liquid, solid or gas.

Energy in not involved (not required)

Diffusion





Concentration Gradient Molecules move randomly from high concentration to low concentration.

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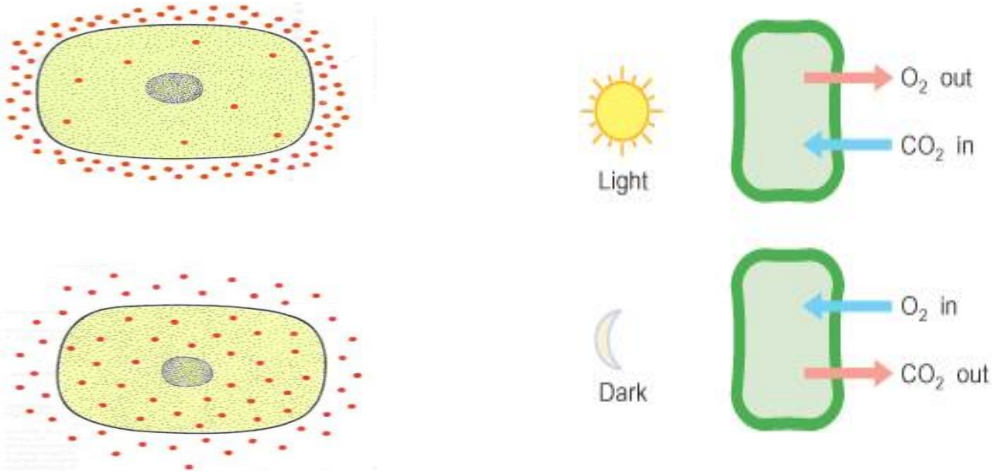
Diffusion of O2 and CO2 in plant.

- Plant has no specific organ for respiration (lung)
- Diffusion occurs through stomata.
- Gas exchange occur during photosynthesis and respiration



Simple diffusion plays a very important role in the life of the plants:

1- It is an essential step in the exchange of gases during respiration and photosynthesis.

2- During passive salt uptake, the ions are absorbed by simple process of diffusion.

3- Last step in stomatal transpiration is the diffusion of water vapors from the intercellular spaces into the outer atmosphere through open stomata.

Factors Affecting Diffusion

1. Temperature:

Increases kinetic energy of solute and solvent particles.

Leads to increase in their movement and the faster rate of diffution

2. Surface area:

Increasing surface area facilitates diffusion.

3. Size of the molecules or ions:

Generally the larger molecule or ion, the slower the rate of diffusion.

4. Pressure :

The higher the pressure, the faster the rate of diffution

5. Concentration gradient.

6. Time

Experiment

1-Trim the stems of your flowers so they aren't excessively long.

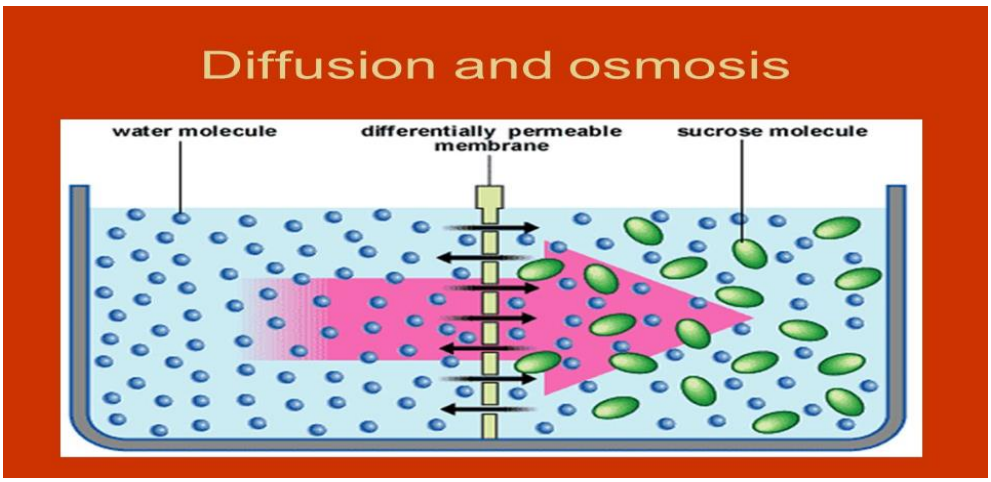
2-Make a slanted cut at the base of the stem underwater. The cut is slanted so that the stem won't sit flat on the bottom of the container. A flat cut can prevent the flower from taking in water. Add food coloring to a glass.

3-Use about 20 to 30 drops of food coloring per half-cup of warm water. Warm water will be taken up more readily than cold water.

4-Set the damp stem of the flower in the colored water. The petals should become colored after a few hours. It may take as long as 24 hours, however, depending on the flower.

Osmosis

- Osmosis is a specific type of diffusion, it is the passage of water from a region of high water concentration through a semi-permeable membrane to a region of low water concentration.
- The movement of water to plant cell occur through osmosis.
- Living cells in plants form osmotic systems due to the presence of semi-permeable plasma membrane and the cell sap having a certain osmotic pressure.



Type of solution according to water concentration

Isotonic solution:

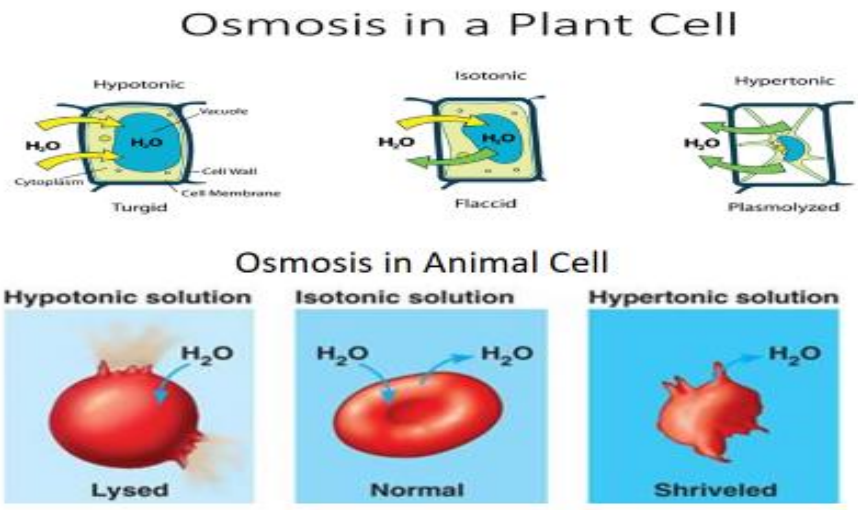
- The concentration of water inside and outside the cell is equal.
- Example: normal saline.

Hypotonic solution:

- The concentration of water outside the cell> inside the cell.

Hypertonic Solution:

- The concentration of water outside the cell< inside the cell.



Turgidity

When water moves into a plant cell, the vacuole gets bigger, pushing the cell membrane against the cell wall.

The force of this increases the turgor pressure within the cell making it firm or turgid.

The pressure created by the cell wall stops too much water entering and prevents cell lysis.

Turgidity helps in maintaining the plant rigid and upright. It also saves the plants from wilting.

Osmosis Experiment

1. Label each beaker with it's appropriate solution concentration
2. Pour 100 ml of distilled water into the beaker marked "0.0."
3. Repeat this for the remaining saline solutions in the 5 beakers with their respective concentrations.
4. Cut 6 potato cubes to a length of 2x2x2cm.
5. Find and record the mass for each potato cube and record in Table 1 under "Initial Mass."
6. Place 0.0 Molar potato cube in its' respected beaker.
7. Repeat Steps 5 and 6 for each of the remaining saline solution beakers.

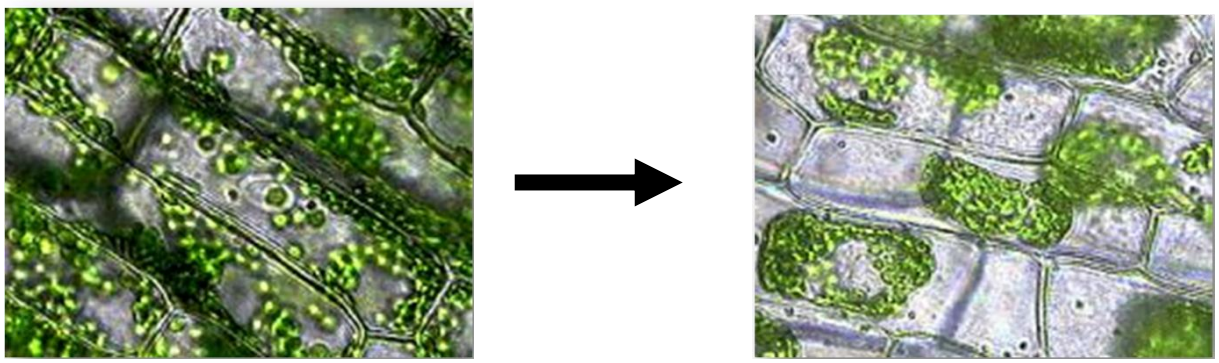
8. **Ensure that all potato cubes are completely submerged; add an equal amount of solution to all beakers if one cube is not submerged.**
9. Remove the potato cube out of the 0.0 Molar Solution cup and carefully blot dry with a paper-towel.
10. Find and record the 0.0 Molar potato cube mass under Final Mass in Table 1.
11. Repeat Steps 11 for each of the remaining saline solutions.

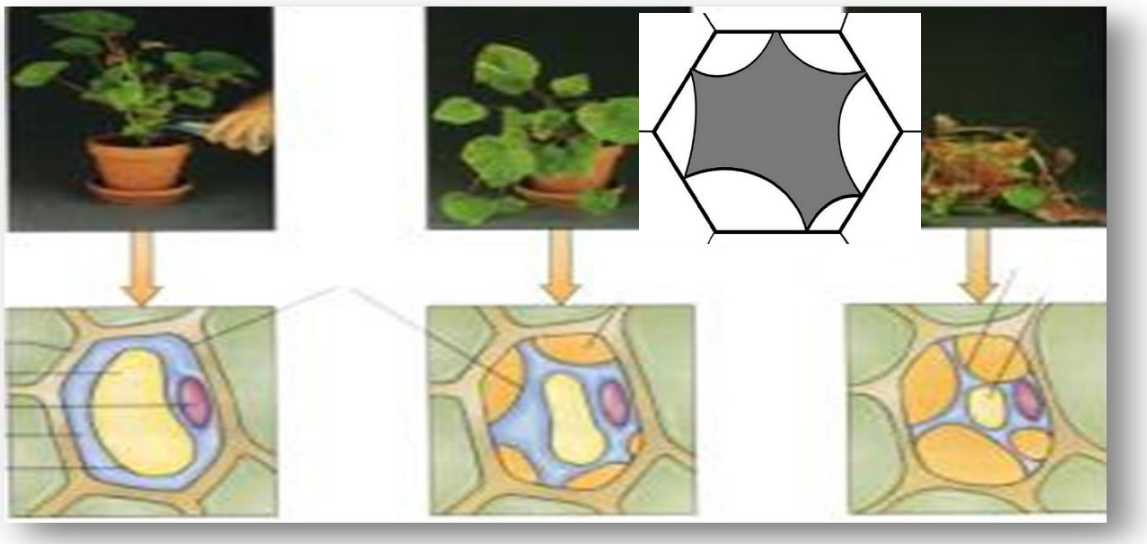
((*Final weigh-Initial weigh)/Initial weigh) x 100%*

Concentration	Initial weigh	Final weigh	weigh Difference	% Change in weigh
Distilled Water				
0.2 M				
0.4 M				
0.6 M				
0.8 M				
1.0 M				

Plasmolysis

Plasmolysis is the shrinkage of plasma membrane and cellular content through moving away from the cell wall due to extensive loss of water when the cell placed in hypertonic solution.





Types of Plasmolysis

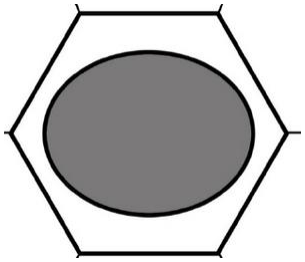
Concave plasmolysis

- Plasma membrane and protoplast shrink away from the cell wall forming half-moon shaped pockets.
- Reversible

Convex plasmolysis

- The plasma membrane detaches completely from the cell wall due to severe water loss. This leads to cell wall collapsing in a process called cytorrhysis.

- Irreversible.



Deplasmolysis

When the plasmolysed cell is placed in a hypotonic solution, (the solution in which solute concentration is less than the cell sap), the water travels into the cell, due to the higher concentration of water outside the cell. Then the cell swells and becomes turgid. This is known as deplasmolysis.

Plasmolysis Experiment

For this experiment, the student requires a microscope, clean slides and cover slips, dropper, salt, spatula, and Onion epidermis. Prepare a wet mount using a single leaf.

Determination of osmotic pressure of cell sap by plasmolysis.

1- Take (10) test tubes and full each one from one of the following solution concentration: 0.1 , 0.2 , 0.3 , 0.4 , 0.5 , 0.6 , 0.7 , 0.8 , 0.9 , and 1.0 of molar salt solution in 50 ml , than remark the tube.

2- Put a part of the inner onion epidermis on the slide, and put a drop of a molar solution on it.

3-Remark the slide side of the molar concentration.

4- Examine the epidermis cells under the microscope to observing the plasmolysis phenomena.