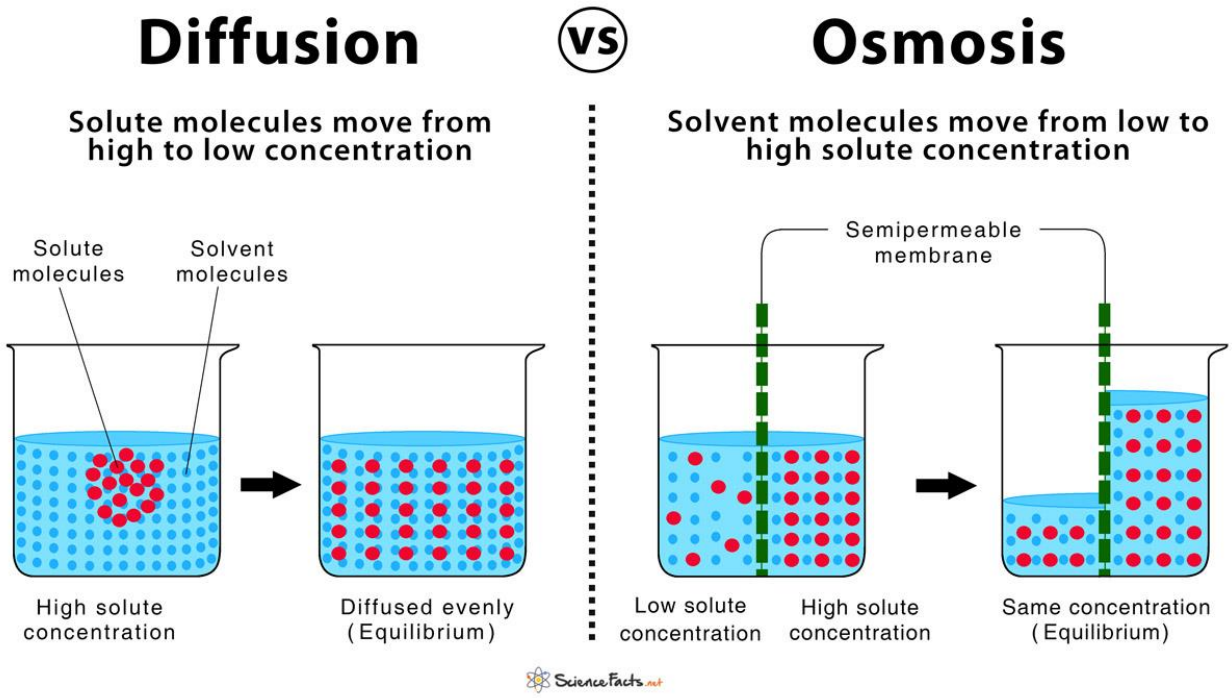
Diffusion and Osmosis

Background:

Diffusion is the passive movement of particles of a solute from an area of high concentration to an area of low concentration.

Osmosis is the passive movement of a solvent, such as water, through a semipermeable membrane from a region of high solvent concentration to an area of low solvent concentration.



Solute: a substance that has been dissolved in a given solution.

Solvent: a substance, usually a liquid, that is capable of dissolving or dispersing one or more other substances.

Ex: To create saltwater, salt is dissolved into water.

Solute: salt

Solvent: water

Semipermeable membrane: A membrane or barrier that allows only certain molecules or substances to pass through it and does not allow others.

Ex: Dialysis tubing acts as a semipermeable membrane.

Lugol's iodine: a solution of potassium iodide that turns blue in the presence of starch.

Laboratory Exercise:

Materials:

- 10 cm piece of dialysis tubing
- 250 mL beaker
- Dental floss
- Lugol's iodine
- 1% starch solution

Procedure:

1. Soak a piece of dialysis tubing in 250 mL of deionized water for at least 5 minutes.
2. Seal off one end of the dialysis tubing by gently twisting the end and tying dental floss tightly around it.
3. Gentle rub your fingers on the other end of the tube to open it. Make sure to open it as far down as you can towards your knot.
4. Pipette a small volume of 1% starch solution into the dialysis tube. Make sure you leave enough room to tie the end closed.
5. Twist the open end of the dialysis tubing closed and tie off with another piece of dental floss.
6. Trim excess dental floss and dialysis tubing from the ends of your sealed dialysis bag.
7. Add a few drops of Lugol's iodine to your beaker of 250 mL of water until it appears a pale yellow.
8. Place your dialysis bag into the beaker and wait 30-40 minutes. Review the background information and fill in the *Start of Experiment* section of Table 1.
9. After 30 min have elapsed, fill out the remainder of Table 1 and answer questions 1-4.

Results:

Table 1:

		Dialysis Tubing Contents	Beaker Contents
Start of Experiment	Color	Cloudy white	Pale yellow
	Contents	1% starch	Water & Lugol's
End of Experiment	Color	Blue	Pale yellow
	Contents	1% starch + Lugol's	Water & Lugol's

Questions:

1. What happens when starch interacts with Lugol's iodine?
   It turns a dark blue/purple color.

2. Based on your results, was the starch able to pass through the semipermeable membrane that was the dialysis tubing? Explain how you reached your conclusion.
   No, the starch was not able to pass through the membrane. We know this because if it had been able to, the beaker contents would have turned blue.

3. Based on your results, was the Lugol's iodine able to pass through the semipermeable membrane? Explain how you reached your conclusion.
   Yes, the Lugol's was able to pass through the semipermeable membrane. We know this because the dialysis bag which contained clear 1% starch turned blue. This indicates that it came into contact with Lugol's.

4. What would happen if the contents of the dialysis bag and beaker were reversed? What would the final colors of the dialysis tubing contents and beaker contents be? (The beaker would be filled with 1% starch solution and the dialysis tubing would contain water and Lugol's iodine.)
   If the contents of the beaker were starch and the dialysis bag contained Lugol's, then the beaker contents would turn blue in color and the dialysis bag would be pale yellow.