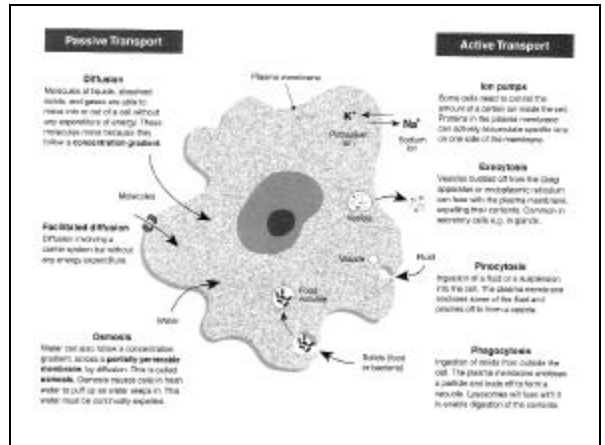


# Osmosis and Diffusion

## Transport



## Membranes:

- Permeable: allow chemicals to move in and out of them.
- Selectively permeable: allows only certain chemicals to move through them.
- Impermeable: Does not allow chemicals to move through them.

### Recap

1. Membrane permeability (see **Selective Permeability**) may influence the occurrence of diffusion or osmosis.
2. **Selective permeability** may allow the diffusion of certain materials and not others.
3. Other physical factors may influence the rate or occurrence of diffusion.

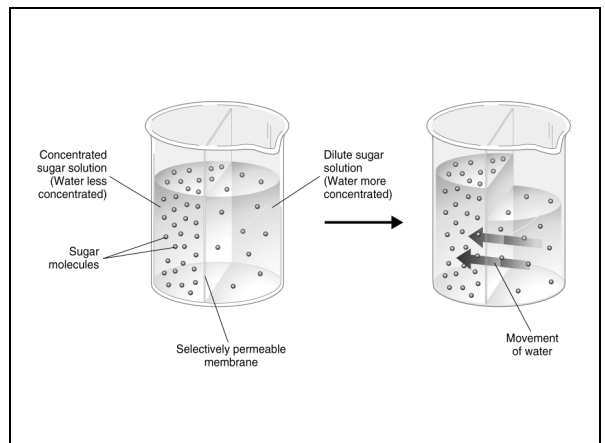
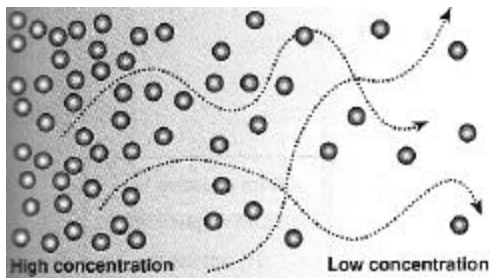
## Solutions:

- **Solvent:** material that dissolves other substances into it.
  - Most common on the Earth is water.
- **Solute:** material that is dissolved into a solvent.

## Concentrations:

- **Isotonic Solution:** two solutions of equal concentration on either side of a selectively permeable membrane.
- **Hypotonic Solution:** one of multiple solutions that has a lower concentration than the other.
- **Hypertonic Solution:** one of multiple solutions that has a greater concentration than the other.
- [ ] = concentration

## Materials move with the concentration gradient...



## Recap

1. If two solutions of differing concentration are separated by permeable membrane then

- (a) the solute diffuses through the membrane from the solution having the greater solute concentration into the solution having the lower solute concentration
- (b) water diffuses into the solution having the greater solute concentration.

2. Osmosis is the diffusion of water across a membrane into a solution having a greater solute concentration.

3. Diffusion stops when the concentration on either side of a membrane is equalised.

## Factors affecting rates of diffusion

**Concentration gradient:** Diffusion rates will be higher when there is a greater difference in concentration between two regions.

**The distance involved:** Diffusion over shorter distances occurs at a greater rate than diffusion over larger distances.

**The area involved:** The larger the area across which diffusion occurs, the greater the rate of diffusion.

**Barriers to diffusion:** Thicker barriers slow diffusion rate. Pores in a barrier enhance diffusion.

## Fick's Law

$$\text{Rate of Diffusion} = \frac{\text{Surface area of membrane} \times \text{Difference in concentration across the membrane}}{\text{Length of the diffusion path (thickness of the membrane)}}$$

## Final Recap

1. Diffusion causes homogeneous mixing.
2. Diffusion is the movement of molecules from an area of higher concentration to areas of lower concentration.
3. Solvent (water) and solutes diffuse independently (some times in opposite directions).
4. Diffusion of particles is down a concentration gradient.
5. Diffusion is important to the production of homogeneous solutions.

**6. If two solutions of differing concentration are separated by permeable membrane then:**

**(a) the solute diffuses through the membrane from the solution having the greater solute concentration into the solution having the lesser solute concentration**

**(b) water diffuses into the solution having the greater solute concentration.**

**7. Osmosis is the diffusion of water across a membrane into a solution having a greater solute concentration.**

**8. Diffusion usually stops when the concentration on either side of a membrane is equalized.**

**9. In osmosis water diffuses from a hypotonic solution to a hypertonic solution.**

**10. Membrane permeability may influence the occurrence of diffusion and/or osmosis.**

**11. Selective permeability may allow the diffusion of certain materials and not others.**

**12. Other physical factors may influence the rate or occurrence of diffusion.**