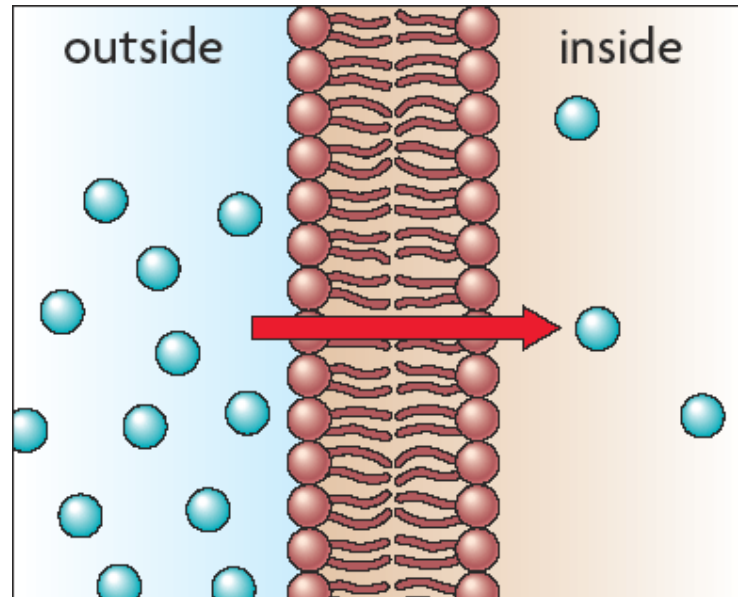


## 3.4 Diffusion and Osmosis

**KEY CONCEPT** Materials move across membranes because of concentration differences.



## 3.4 Diffusion and Osmosis

**Passive transport does not require energy input from a cell.**

- Molecules can move across the cell membrane through passive transport.
- **Passive transport** – movement of molecules across the cell membrane without energy input from the cell. Two types of passive transport are:
  - diffusion
  - osmosis

## 3.4 Diffusion and Osmosis

**Diffusion** is a type of **passive** transport.

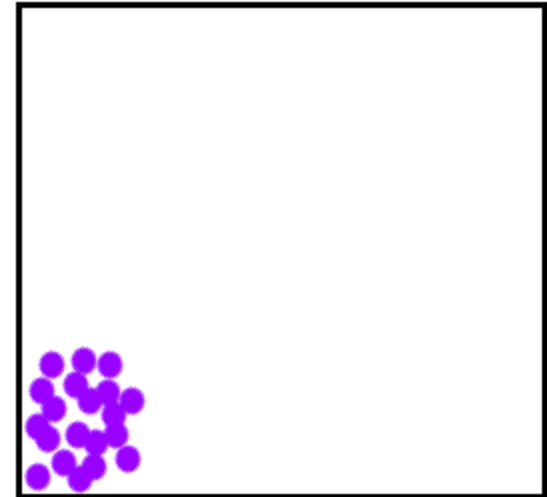
- Molecules diffuse down a concentration gradient.



## 3.4 Diffusion and Osmosis

**Diffusion** is a type of **passive** transport.

- Molecules move from a region of higher concentration to a region of lower concentration



## 3.4 Diffusion and Osmosis

**Diffusion** is a type of **passive** transport.

- Examples of diffusion in everyday life:
  - a) purple food coloring will diffuse across the entire beaker of water



## 3.4 Diffusion and Osmosis

**Diffusion** is a type of **passive** transport.

- Examples of diffusion in everyday life:
  - a) A drop of dye will diffuse through water until the entire glass of water is the same color.
  - b) Sugar will diffuse through tea until the entire cup of tea is sweet. (We stir the tea to speed up the diffusion.)





## 3.4 Diffusion and Osmosis

**Diffusion** is a type of **passive** transport.

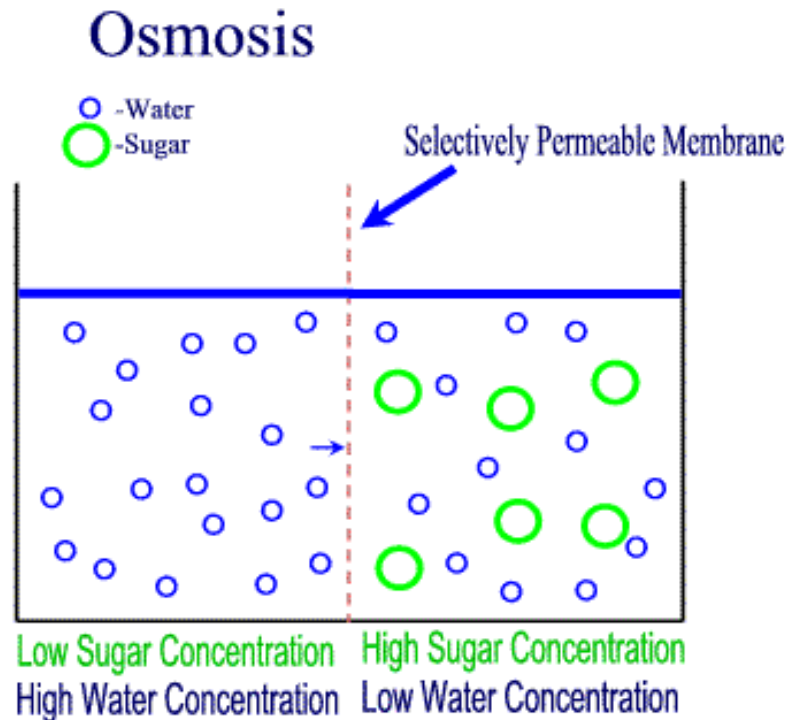
- Examples of diffusion in everyday life:
  - a) The smell of perfume spreads throughout a room.
  - b) The smell of a flower spreads throughout a garden.
  - c) The odour of food cooking diffuses throughout the kitchen. If you open the kitchen door it will spread into the next room.



## 3.4 Diffusion and Osmosis

**Diffusion and osmosis are types of passive transport.**

- **Osmosis** is the diffusion of water molecules across a semipermeable membrane from an area of high to low water concentration





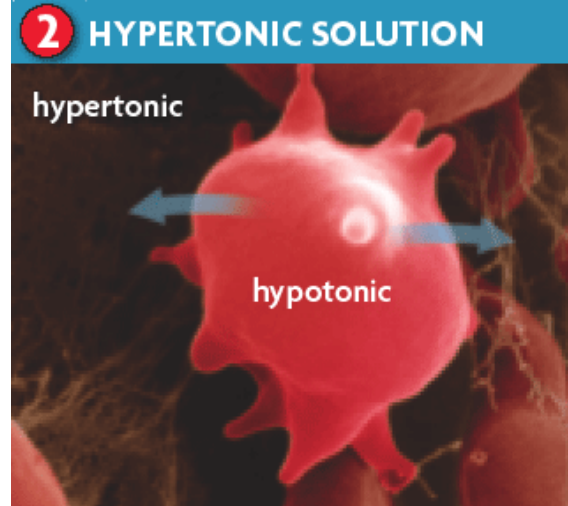
## 3.4 Diffusion and Osmosis

**Diffusion and osmosis are types of passive transport.**

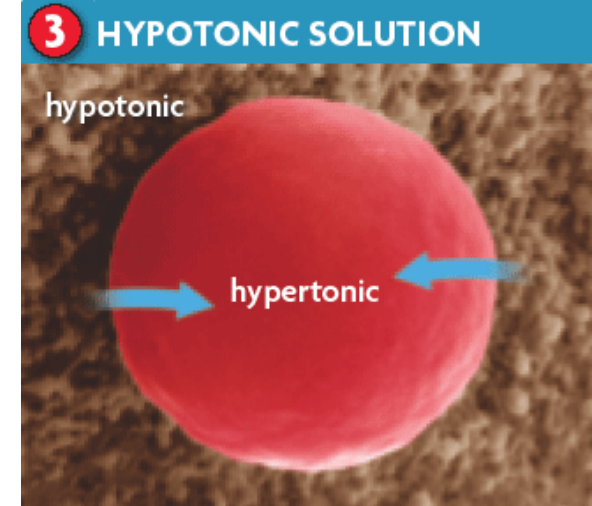
- There are **three** types of solutions.
  - isotonic
  - hypertonic
  - hypotonic



A solution is isotonic to a cell if it has the same concentration of solutes as the cell. Equal amounts of water enter and exit the cell, so its size stays constant.



A hypertonic solution has more solutes than a cell. Overall, more water exits a cell in hypertonic solution, causing the cell to shrivel or even die.



A hypotonic solution has fewer solutes than a cell. Overall, more water enters a cell in hypotonic solution, causing the cell to expand or even burst.

## 3.4 Diffusion and Osmosis

**Diffusion and osmosis are types of passive transport.**

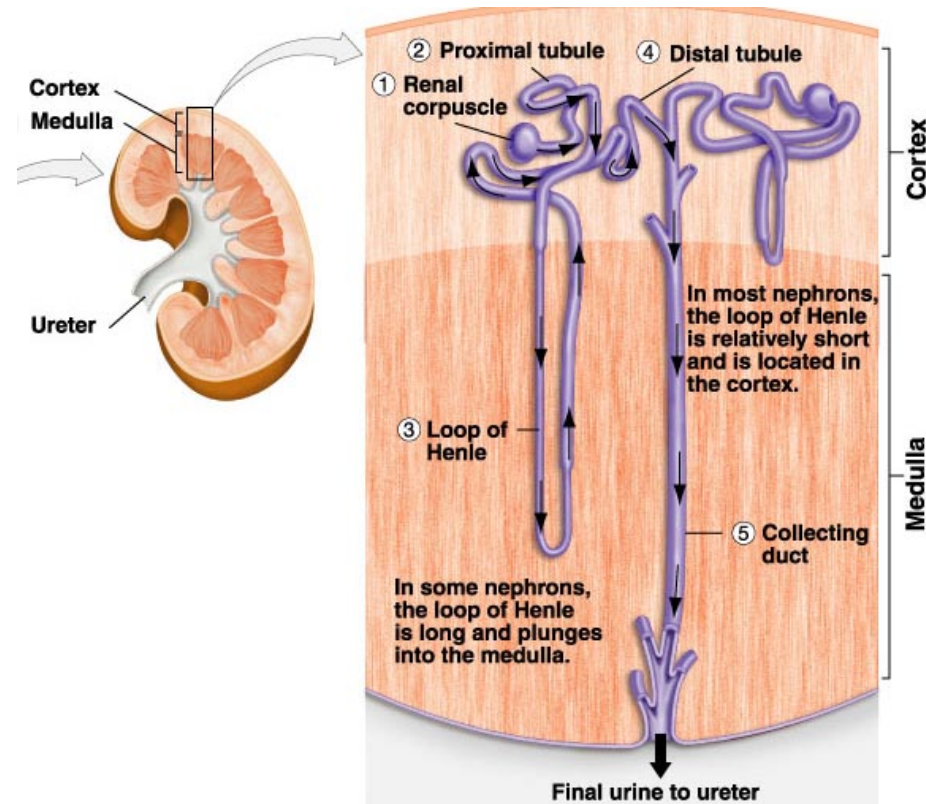
- Other examples of osmosis in nature:
  - 1) absorption of water by plant roots



## 3.4 Diffusion and Osmosis

**Diffusion and osmosis are types of passive transport.**

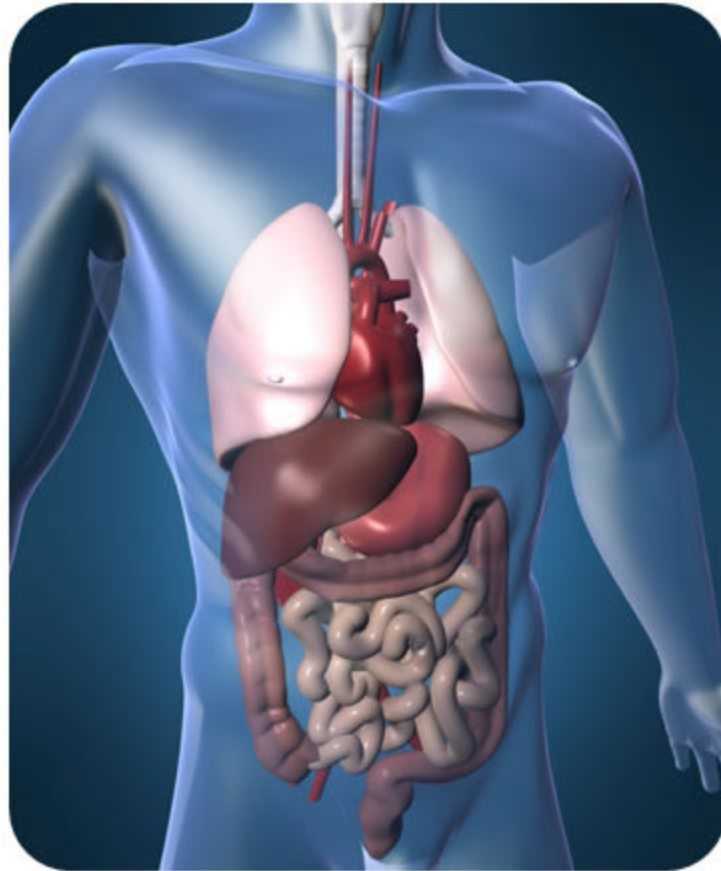
- Other examples of osmosis in nature:
  - 1) reabsorption of water by the proximal and distal convoluted tubules of the nephron
  - 2) reabsorption of water by the proximal and distal convoluted tubules of the nephron



## 3.4 Diffusion and Osmosis

**Diffusion and osmosis are types of passive transport.**

- Other examples of osmosis in nature:
  - 3) absorption of water by the alimentary canal – stomach, small intestine, and colon

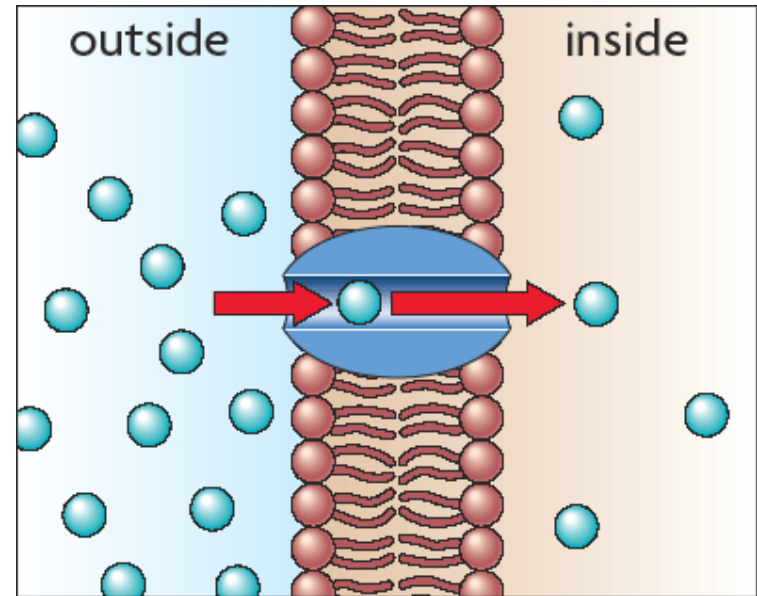




## 3.4 Diffusion and Osmosis

**Some molecules can only diffuse through transport proteins.**

- Some molecules cannot easily diffuse across the cell membrane.
- **Facilitated diffusion** is diffusion through transport proteins.





## 3.4 Diffusion and Osmosis

**Diffusion and osmosis are types of passive transport.**

- Here is an example of particle moving through a plasma membrane

