



# Objectives

- ✿ Define diffusion and explain why it is biologically important.
- ✿ Define osmosis and explain why it is biologically important.
- ✿ Explain the difference between isotonic, hypotonic, and hypertonic conditions.
- ✿ Predict what would happen to a cell in hypo, hyper, and isotonic conditions.
- ✿ Compare and contrast facilitated diffusion with active transport.



# Cell Transport

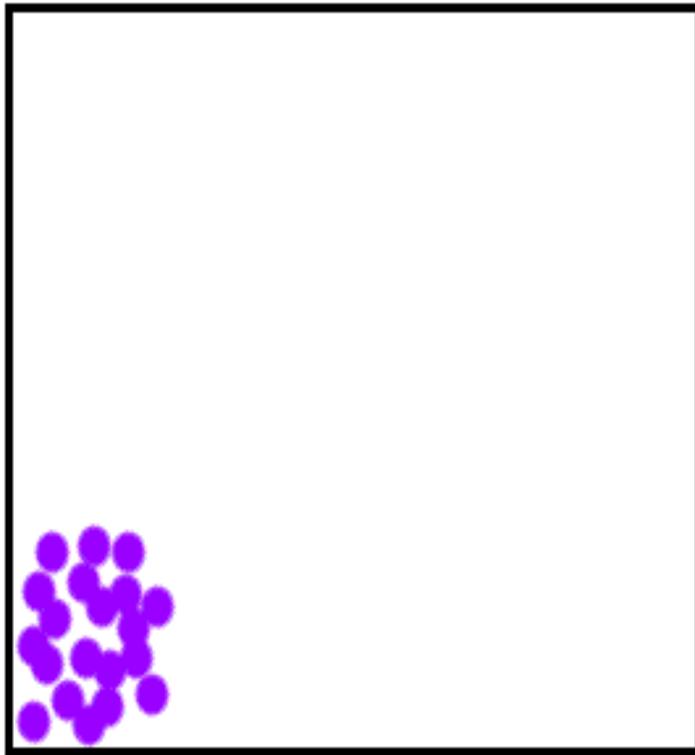
- ✿ Materials within a cell need to be able to move through the cell in order to complete the functions of life.
- ✿ There are several mechanisms that cells use to transport materials.
- ✿ There are 2 categories of cell transport to consider:
  - ✿ Passive Transport (Today)
  - ✿ Active Transport



# Diffusion

- ✿ **Diffusion** is a form of passive transport in which molecules move from an area of higher concentration to an area of lower concentration.
- ✿ The difference in concentrations across the distance the material moves is called the **concentration gradient**.
- ✿ Diffusion will continue to occur until the solution reaches **equilibrium**, which means that the concentration is the same throughout.

# Take A Look: Diffusion



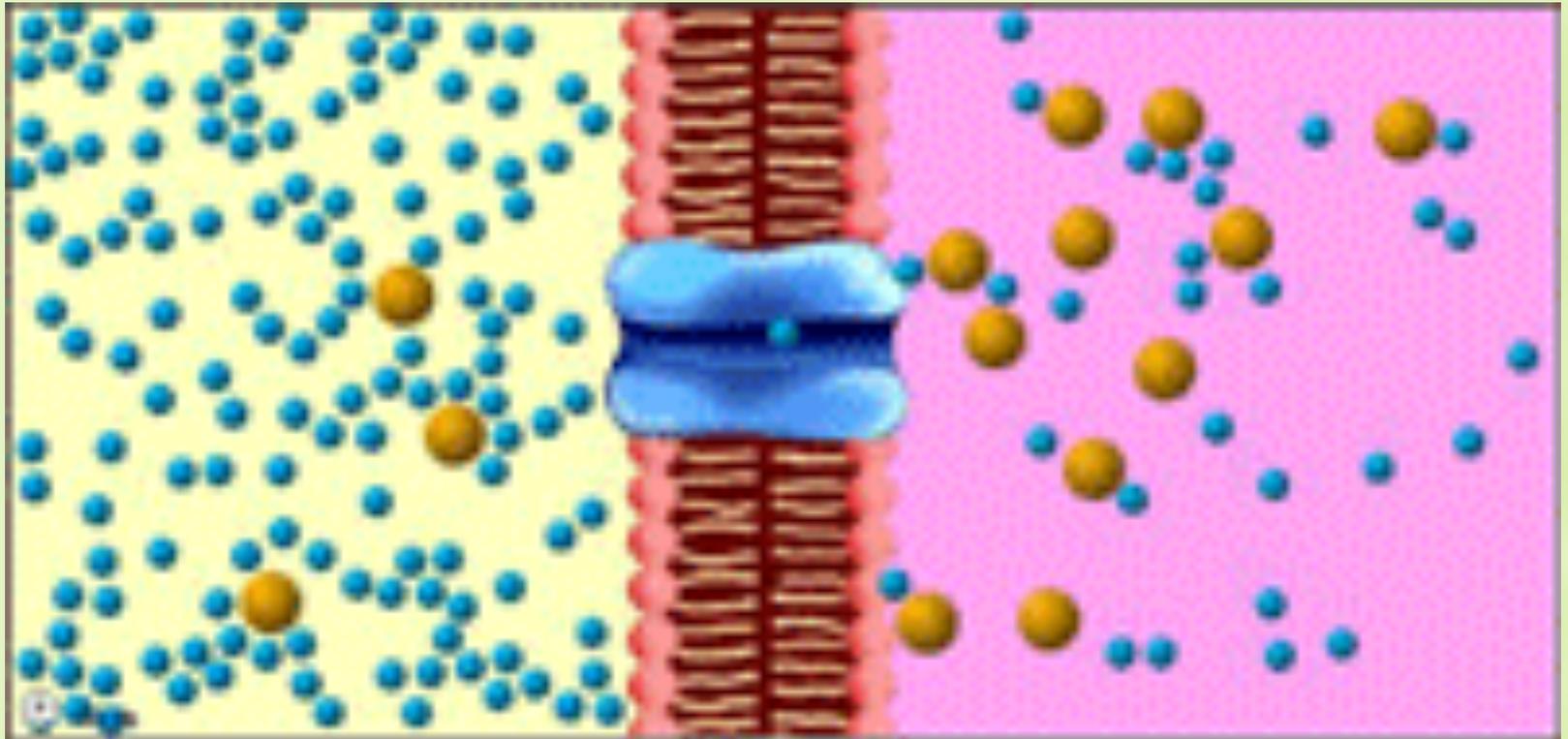
- ✿ Diffusion can occur across a membrane if the molecules can pass through it.
- ✿ Plasma membranes are **semi-permeable**, which means that certain materials can pass into and out of the cells and organelles.



# Osmosis

- ✿ Osmosis is how water diffuses across a membrane from an area of high concentration to an area of low concentration.
- ✿ This is particularly important because water is the most common solvent in organisms.
- ✿ The external environment becomes very important because if the concentration of water inside the organism is different from its environment, water will move until it reaches equilibrium.

# Take A Look: Osmosis





# A Quick Review

- ✿ **Solvent** is the substance that dissolves another.
- ✿ **Solute** is the substance that is being dissolved in the solvent.
- ✿ **Concentration** is the amount of solute compared to the amount of solvent.
- ✿ **EXAMPLE:** In 5% salt water, salt is the solute and water is the solvent. The concentration is 5g of salt and 95 g of water.

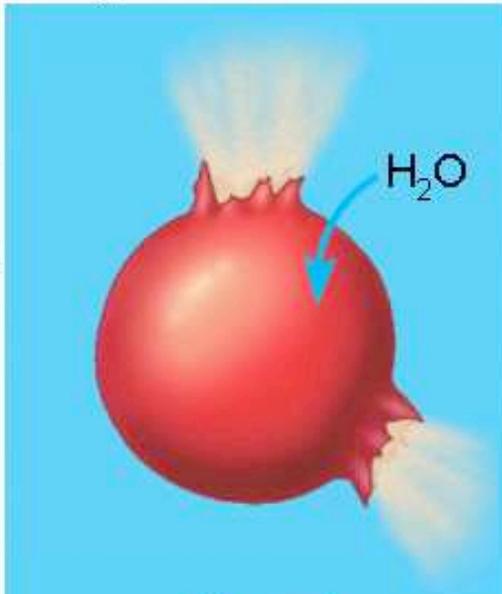


# Hypo..., Hyper..., & Isotonic

- ✿ A **Hypotonic** solution is one in which the concentration of solute is **lower** than that of the cytosol in the cells.
- ✿ A **Hypertonic** solution is one in which the concentration of solute is **higher** than that of the cytosol in the cells.
- ✿ An **Isotonic** solution is one in which the concentration of solute is the **same** as that of the cytosol in the cells.

# Take A Look: Hypo, Hyper, Iso

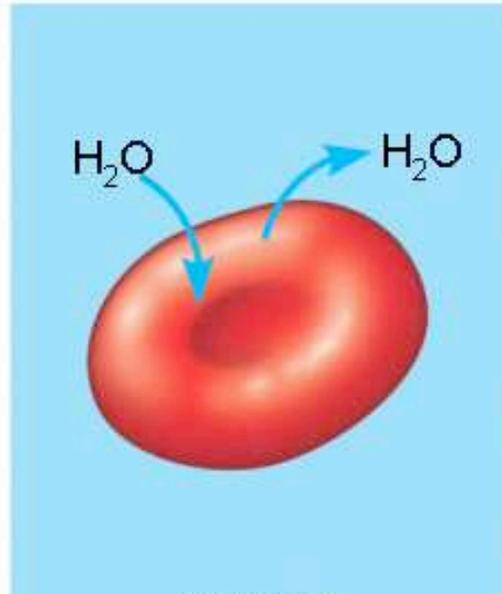
Hypotonic solution



Water flows **into** cell

Result: Cell lyses (Blows up)

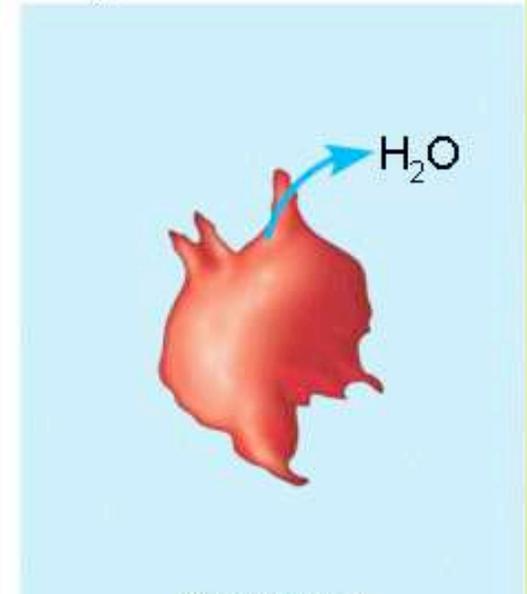
Isotonic solution



Water flows **into** and **out** of cell

Result: Equilibrium

Hypertonic solution



Water flows **out** of cell

Result: Cell shrivels



# Turgor and Plasmolysis

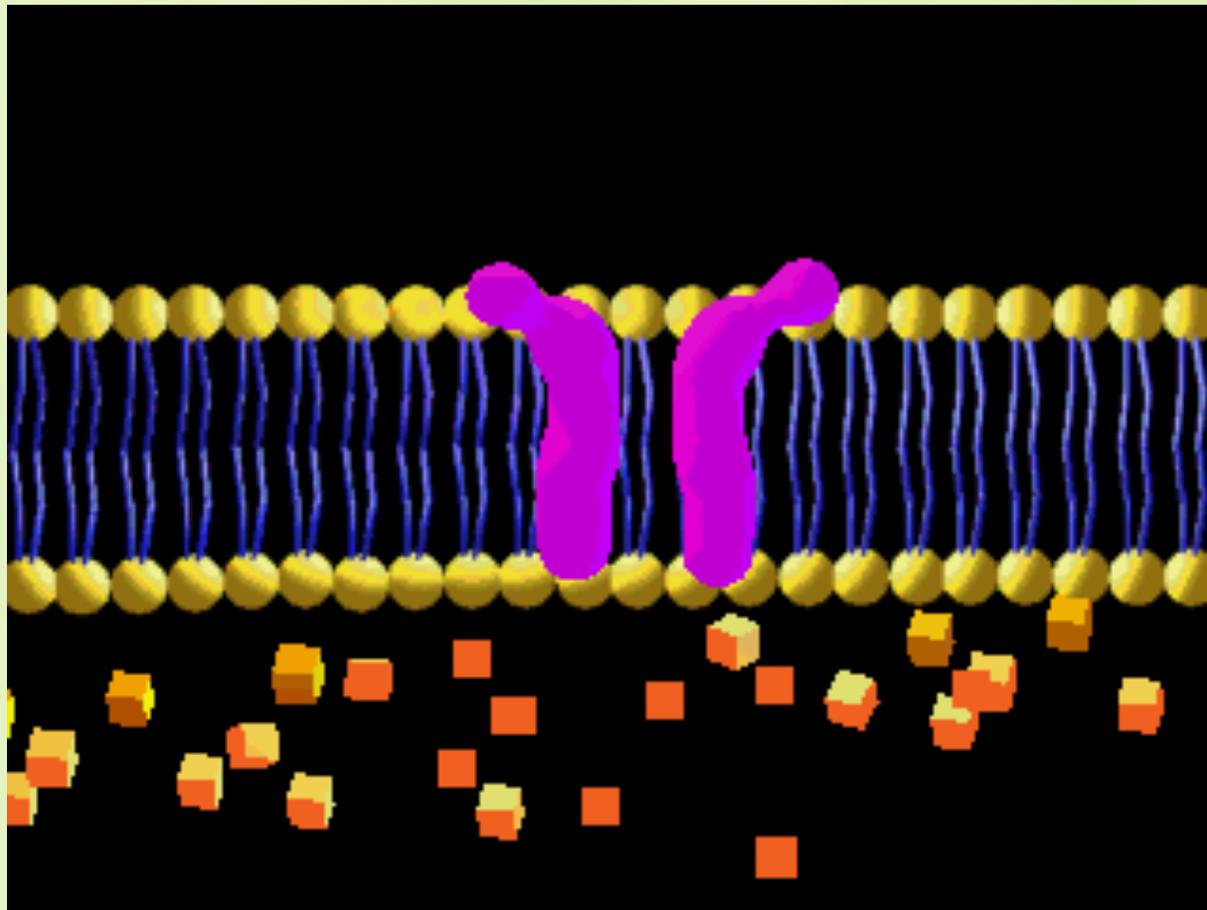
- ✿ The pressure that the water in a cell exerts on the cell membrane is called **Turgor Pressure**.
  - ✿ This occurs in a hypotonic solution because water flows into the cell.
- ✿ When a cell loses turgor pressure due to the loss of water it is referred to as **Plasmolysis**.
  - ✿ This occurs in a hypertonic solution because water flows out of the cell.



# Facilitated Diffusion

- ✿ Some molecules are too large to diffuse across a plasma membrane.
- ✿ This means that even if the concentration gradient is in their favor they could not get in or out.
- ✿ Cell membranes contain **carrier proteins** that can open and close to let these larger molecules pass.
- ✿ This is called **facilitated diffusion**.

# Take A Look: Facilitated Diffusion





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