

Key Ideas for Transport

Cell Membrane Structure & Function:

- **Lipid bilayer with proteins** embedded in it
 - Protein channels aid in facilitated diffusion
 - Carrier proteins help with active transport
 - Receptor proteins help the cell membrane recognize specific molecules based on shape
 - Lipid bilayer allows for gas exchange (for example taking in oxygen and releasing carbon dioxide) by diffusion (no energy required)
- Separates cell from outside environment, gives it shape, provides protection against MOST, NOT ALL harmful substances & enables cell to communicate with its environment

Passive Transport:

- Molecules move along their concentration gradient from **high to low**
- **No energy (ATP)** is required for this process
- **Small molecules** that are not repelled can diffuse across the lipid bilayer (oxygen, carbon dioxide, water = osmosis, alcohol)
- Larger molecules or those that are repelled by lipid bilayer, can cross passively using a protein channel (such as glucose) = **facilitated diffusion**
- **Osmosis** = diffusion of water
- If you place a cell in a **hypertonic** solution (such as a salt solution), the **cell shrivels** as water moves high concentration (98%) inside the cell, to low (such as 90%) outside the cell
- If you place a cell in a **hypotonic** solution (such as pure water), the **cell swells** as water moves from high (100%) outside the cell to low (such as 98% or less) inside the cell
- Plant cells are not as effected by osmosis due to the presence of the cell wall
- When **plant cells** are placed in a **hypotonic** solution, the cell membrane pushes up against the cell wall as the large vacuole fills with water, creating **turgor pressure**

Active Transport:

- Molecules move against their concentration gradient from **low to high** (like climbing uphill with the sled)
- **Energy (ATP) is required** for this process

- Cells use active transport to **maintain a concentration** gradient for certain substances such as sodium (Na) and potassium (K) ions
- **If a question states that the substance should move a certain way by diffusion but doesn't, it is due to active transport**
- **If a question states that a concentration of a substance is kept high or kept low, it is due to active transport**
- **If ATP is being used to transport molecules in a diagram, it is active transport (ATP → ADP + P)**
- cells can also use active transport to take in solid particles (**phagocytosis**) or liquid particles (**pinocytosis**) or to get rid of wastes contained in vacuoles (**exocytosis**)
*therefore all of these **require energy (ATP)**