

Diffusion: random movement of particles

- In presence of chemical or electrical gradient, net movement from more concentrated to less concentrated area (i.e. moving down the concentration gradient)

Passive transport: diffusion of a substance across a biological membrane with no expenditure of energy

Osmosis: the diffusion of free water across a selectively permeable membrane

Tonicity: the ability of a solution surrounding a cell to cause that cell to gain or lose water

Isotonic: solution causing no net movement of water

- Same concentration in solution and cell

Hypertonic: solution causing cell to lose water

- Higher concentration in solution than cell
- Shriveled animal cell, plasmolyzed plant cell

Hypotonic: solution causing cell to gain water

- Lower concentration in solution
- Lysed animal cell, turgid plant cell

Osmoregulation: regulation of solute concentrations and water balance by a cell or organism

Turgor pressure: pushing of the plasma membrane against the cell wall

- Turgid = very firm
- Flaccid = limp

Plasmolysis: cytoplasm shrivels and the cell membrane pulls away from the cell wall

Facilitated diffusion: passages of molecules or ions down their electrochemical gradient across a biological membrane with the assistance of specific transmembrane proteins, does not require energy

Channel proteins: corridors allowing simple passage across membrane, doesn't require changing shape to facilitate movement

- Ion channels transport ions
- Gated channels open/close in response to stimulus

Carrier proteins: requires change in shape to facilitate movement

Active transport: the movement of a substance across a cell membrane against its gradient

- Mediated by specific carrier proteins and requiring an expenditure of energy (from ATP)
- Example: Sodium-Potassium Pump
 - A transport protein in the plasma membrane of animal cells that actively transports sodium out of the cell and potassium into the cell
 - 3 sodium (Na^+) out, 2 potassium (K^+) in

All cells have voltages across plasma membranes

- Electrical potential energy in the form of separation of opposite charges

Membrane potential: the difference in electrical charge (voltage) across a cell's plasma membrane due to the differential distribution of ions

- Inside (cytoplasm) is negative relative to outside of cell

Electrochemical gradient: the diffusion gradient of an ion, which is affected by both the concentration difference of the ion across a membrane (chemical force) and the ion's tendency to move relative to the membrane potential (an electrical force)

- Sometimes chemical and electrical gradients are aligned, but not always

Electrogenic pump: an active transport protein that generates voltage across a membrane while pumping ions

- Examples:
 - Sodium-potassium pump (3 Na^+ out, 2 K^+ in)
 - Proton pump (H^+ out)

Cotransport: the coupling of the “downhill” diffusion of one substance to the “uphill” transport of another against its own concentration gradient

Exocytosis: the cellular secretion of biological molecules by the fusion of vesicles containing them with the plasma membrane

- Example:
 - Secretion of insulin by pancreas cells
 - Release of neurotransmitters by neurons
 - Production of cell wall components by plant cells

Endocytosis: cellular uptake of biological molecules and particulate matter via formation of vesicles from the plasma membrane

- Examples:
 - Phagocytosis (“cellular eating”)
 - Pinocytosis (“cellular drinking”)
 - Receptor-mediated endocytosis