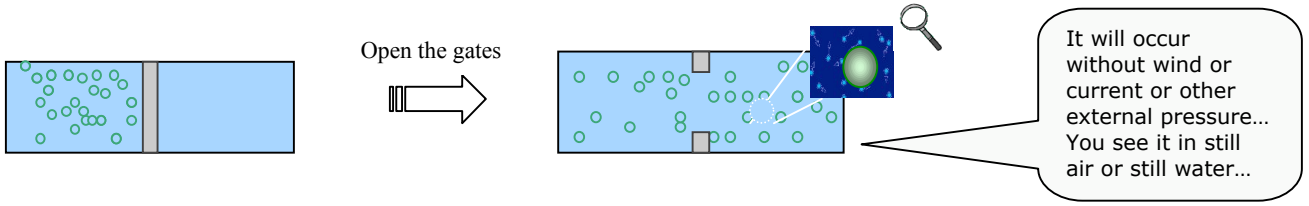
The Ever-Spreading Molecular World

Diffusion and Osmosis

What is it?

Spreading of molecules or tiny particles of materials in all directions, moving from areas of high concentration to areas of low concentration, until uniformly distributed; occurs in gas, liquids or solids, allowing diffusing particles to gradually mix with surrounding molecules.



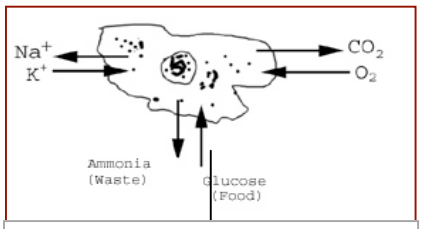
Why is it?

Every microscopic particle is bombarded from all directions by surrounding molecules that are moving non-stop; diffusion is driven by heat energy; the higher the temperature the greater the rate of diffusion

In Living Organisms

Every cell, from a free-living bacteria to a cell in the plant or animal's body, uses diffusion to exchanges gases, nutrients and waste materials with its microenvironment. The flow of molecules is determined by the concentration gradients in and out of the cell.

Single Cell



Cell Breathing
Oxygen and CO2 diffuse through cell wall

Cell Water exchange
Water diffuses in and out of the cell

Cell Transport of ions
Small ions diffuse in and out of the cell

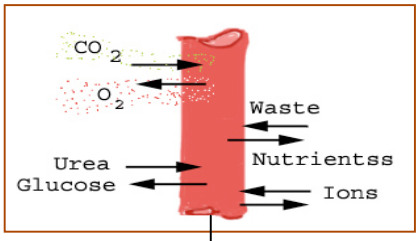
Cell Nourishment
Organic materials diffuse through membrane

Cell Reactivity
Na+/K+ diffuse through cell membrane

Cell Shape:
Osmotic pressure & turgor pressure on cell wall

Waste elimination
Waste products and toxins diffuse out of the cell

Animals



Digestion
Nutrients diffuse from the stomach and intestine into bloodstream

Water exchange
Absorption of water from colon into blood

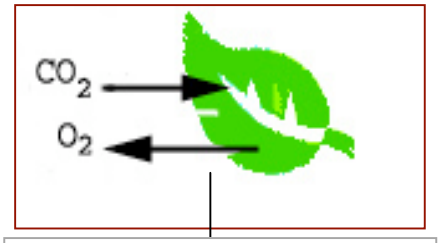
Breathing
Oxygen and CO2 diffuses in lungs and tissues in and out of bloodstream

Excretory system
Diffusion of water in the kidney; and evaporation of water and salts via skin

Nervous system
Na+/K+ diffuse via neuron's membrane in nervous signals transmission

Waste elimination
Water, salts and waste products

Plants



Photosynthesis
CO2 absorbed by diffusion through leaf stomata

Water movement
Water diffuses from soil to plant's roots

Transport of ions
Small ions diffuse in and out of the plant via plants' roots

Nourishment
Organic materials diffuse from leaves to other cells

Cell reactivity
Na+/K+ diffusion via cell membrane

Plants shape
Osmotic pressure & turgor support the shape of plant cell

Waste elimination: oxygen, byproduct of photosynthesis diffuses out of the cells