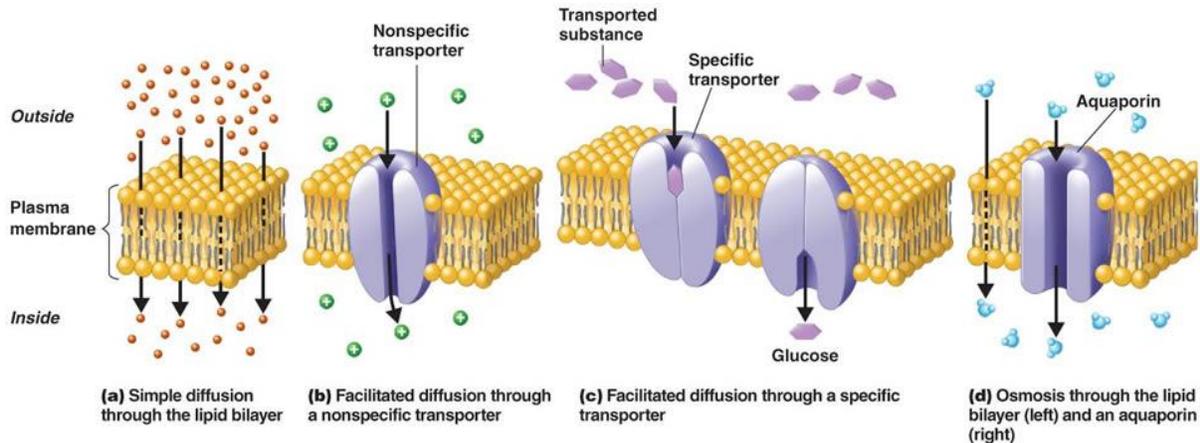


MEMBRANE TRANSPORT

Video Link: https://www.youtube.com/watch?v=QqsF_UJcfBc

Wikipedia: http://en.wikipedia.org/wiki/Cell_membrane



The cell membrane is composed of two layers (bi-layered) of phospholipid molecules. Each phospholipid molecule in each layer is represented with a yellow, round hydrophilic (water-loving) head and long hydrophobic (water-disliking) tail-like regions. The hydrophilic region (head) faces the interior (intracellular fluid or cytosol) or exterior (extracellular or tissue fluid) of the cell. The hydrophobic regions (tails) face each other and stay away from the watery fluids. Substances move in and out of a cell without (**Passive Transport**) or with (**Active Transport**) need for energy.

<https://www.youtube.com/watch?v=s0p1ztrbXPY>

<https://www.youtube.com/watch?v=STzOiRqzzL4>

Passive transport includes diffusion (substance) and osmosis (water).

Diffusion (passive) or movement of a substance from higher to lower concentration occurs along a concentration gradient of the substance until it reaches equilibrium (same concentration level). Movement can occur either way, inside to outside or outside to inside depending on the concentration gradient at a given time. Gases and hydrophilic substances can diffuse or pass directly through the hydrophobic bilayer of the cell membrane. But, water and water-based substances like nutrients and wastes move in and out of a cell with the help of protein-channels (non-selective or selective, **facilitated diffusion**). The protein-channels move one or more substances based on size, either in the same or opposite direction...

Osmosis is a form of diffusion, but it refers to the movement of water from higher to lower concentration along a concentration gradient and across a membrane (semi-permeable, selectively permeable i.e., allows water and substances selectively based on size).

Active transport occurs, when substances have to be moved from lower to higher concentration against the concentration gradient with the help of energy (ATP, Adenosine Tri-phosphate) or vesicles. If the substances are too-big to pass across the membrane or protein-channels, they need to be moved with the help of vesicles (function like vehicles, i.e., transport). **Vesicle-mediated** transport can occur from inside of a compartment to outside (**exocytosis**) or from outside to inside (**endocytosis**). Endocytosis of solids (bacteria, cell debris, waste particles) is phagocytosis (cell-eating) and of liquids (dissolved toxins or unwanted substances) is pinocytosis (cell-drinking).

Osmosis/Tonicity Experiment

Video Link: <https://www.youtube.com/watch?v=crpeX8nBgJE>

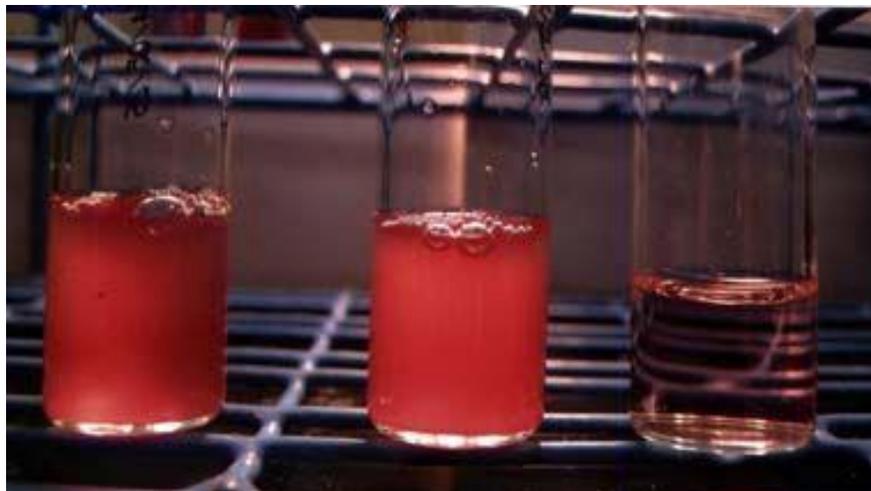
Procedure:

- ❖ Fill each one 2 ml glass tube given with each of the saline concentrations (0.85%, 3%, and 0% (distilled water). Add approximately 1 ml per tube (half-way) with the disposable plastic dropper.
- ❖ Add one drop of synthetic blood sample given to each tube and mix gently.
- ❖ Immediately add a small drop from each tube separately to a glass slide given, place a cover slip
- ❖ Observe the effect of the solution on red blood cells using a microscope as seen in the image at the bottom of the page.

Normal saline (0.85%)

High salt (3%)

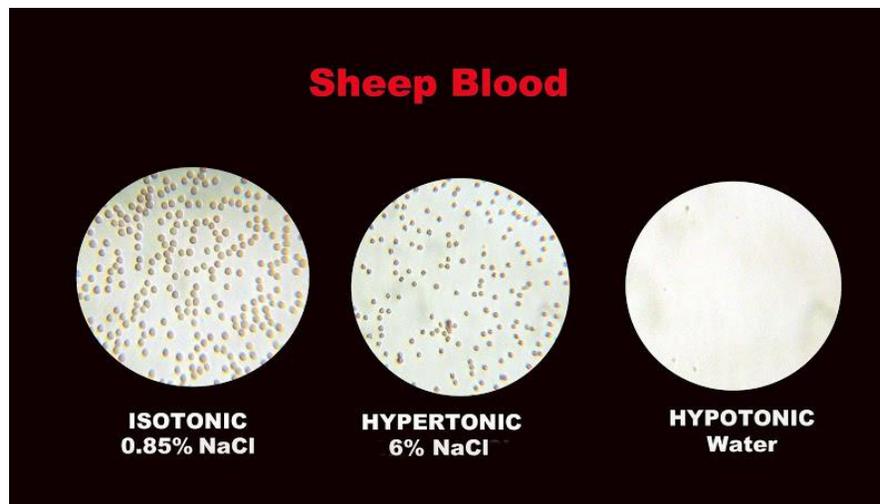
Low (no) salt (Distilled Water)



ISOTONIC (0.85%)

HYPERTONIC (3%)

HYPOTONIC (0%)



Cells appear normal

Cells shrink

Cells burst

No Effect

Water leaves cell

Water enters cell