

## Cell Membranes

The cell membrane controls what enters and leaves a cell. The membrane only lets certain substances cross into the cell, and therefore it can be said that the cell membrane is **selectively permeable**. Refer to the definitions below:

Selectively Permeable – Allowing only certain materials to pass through.

Permeable – Allowing materials to pass through.

Impermeable – Allowing no material to pass through.

To understand this, imagine pouring water and sand into a plastic bag, neither would pass through (Impermeable). Now imagine pouring the water and sand through a pair of nylons, the water would pass, but the sand would be caught (Selectively Permeable). Finally imagine pouring the water and sand through a mesh screen, both materials would pass through (Permeable).

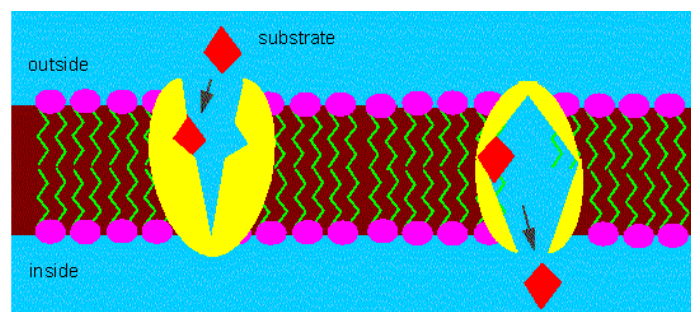
To explain how materials move into and out of a cell, one must first understand **diffusion**. As you know particles in liquids and gases are always in motion. As they move, particles tend to spread out. If there is a large concentration of one type of particle in an area, they will tend to move away from that area. This movement of particles, from an area of high concentration to an area of low concentration, is called diffusion. For an example of diffusion visit the following web address:

<http://www.indiana.edu/~phys215/lecture/lecnotes/lecgraphics/diffusion2.gif>

This image shows how when there are more particles on the left, more particles are moving to the right, but when the particles are equal, then the movement from right to left is equal. This is the same with cells. When there is a lot of oxygen of outside of a cell, more oxygen will move into the cell than leave the cell. When there are equal amounts of oxygen inside the cell and outside the cell, then there is equal movement.

When the substance diffusing through a cell is water, the process is called **osmosis**. Water composes approximately 70% of a cell, so the control of water in a cell is very important. When you exercise, you sweat, removing water from your body. This in turn draws water from your cells. That is why it is important to remain hydrated.

Some particles, such as glucose, are needed in higher concentrations, and thus the natural movement of diffusion will not work. For these particles the cell needs to use energy to pull particles into its interior (similar to pushing a car up a hill instead of letting it roll down the hill as it naturally would). To carry out this action the cell membrane has special parts called **carrier proteins**, which are like revolving gates that trap certain particles and pull them inside. The process carried out by these carrier proteins is called **active transport**. The following picture shows the carrier proteins at work:



*Figure 1: Carrier Proteins Performing Active Transport*