

In diffusion, a substance moves from an area of greater concentration to an area of lesser concentration until equilibrium is reached. Osmosis is the diffusion of water through a semipermeable membrane. Since water is so important to maintaining life, cells must stay in osmotic balance. Osmotic balance exists when the amount of water which enters the cell is equal to the amount of water which leaves the cell. Through a semipermeable membrane, water will pass from an area of higher concentration to an area of lesser concentration. If you stay in a swimming pool for a long time, you are in an environment in which the outside of your skin is exposed to a higher concentration of water than the inside. Water will pass by osmosis to the inside of your skin. This will make your skin puff up and wrinkle from the water which was drawn into your skin. If salt or sugar is added to the liquid environment of bacteria, the salt or sugar causes there to be a lesser concentration of water outside the bacteria than inside the bacteria. Through osmosis water leaves the bacteria causing dehydration and death. This is why salty or sugary foods seldom grow bacteria.

Osmosis and diffusion allow things to enter cells through passive transport. Passive transport means that the cell does not have to use energy to move these substances into or out of the cell. There is another kind of passive transport called facilitated diffusion. In facilitated diffusion, proteins in the cell membrane form pores which allow certain substances to pass. Without the protein pore, these substances would be too large to pass directly into the cell. The use of protein to aid (facilitate) the passage of particles from a region of greater concentration to a region of lesser concentration is called facilitated diffusion. The proteins involved in facilitated diffusion are called permease. It is through facilitated diffusion that sodium and glucose enter cells.

Whether passive transport occurs by osmosis, simple diffusion or facilitated diffusion, it always involves a movement of particles from a region of greater to lesser concentration. The cell does not have to expend any energy to transport these substances. But sometimes a cell must transport something from a region of lesser concentration to a region of greater concentration. To do this the cell must use energy to create this movement. When cell energy is used to transport a particle from an area of lesser to greater concentration it is called active transport. Active transport also involves permease molecules. Permease involved in active transport are known as pumps. It is by active transport that cells rid themselves of harmful particles which could poison and kill the cell. Materials which are too large to enter or leave the cell by passive or active transport can enter or leave through endocytosis or exocytosis.

Endocytosis is the process by which a cell uses energy to surround and take in large particles. If a solid particle is taken in through endocytosis, this process is referred to as being phagocytosis, a word which means "cell eating." It is through phagocytosis that white blood cells eat bacteria. If a liquid is taken in through endocytosis, this process is called pinocytosis, a word which means "cell drinking." A reverse process is used to rid cells of wastes or to expel useful substances needed elsewhere. This process is called exocytosis (cell exiting).