

# Diffusion and Osmosis

Diffusion and osmosis are terms concerned with movement of molecules in solutions.

Diffusion – this is the movement of molecules from a region where there aren't many water molecules to a region where there is a lot more.

Osmosis – this is the movement of water molecules from a region where there are a lot of water molecules to a region where there aren't as many.

These two processes happen together and are normally as a result of Brownian motion.

What exactly happens at a molecular level in order to form solutions?

We all know that to make a solution involves dissolving something (a solute) in a solvent (normally water) and this then mixes so that it is evenly spread throughout the water. But in terms of the molecules involved what happens to achieve this even spread?

The molecules in the water are in constant motion even though we normally can't see it (it's known as Brownian motion and is driven by heat from the surroundings). Now say you were to place a teaspoon of solute, say sugar, gently down in the bottom of a container full of water as shown in the diagram. The result of this constant movement of water molecules is that it has the same effect as stirring your tea - it will cause the molecules of the solute and water to be mixed around and both eventually will be evenly distributed throughout the solution.

As far as the molecules *inside* the teaspoon of solute are concerned they are in a region of low numbers of water molecules while obviously the water molecules in the container which are outside the teaspoonful of solute are in a region of a large number of water molecules. So at the start, just after the solute is placed in the container, the solute molecules move (due to the Brownian motion) from a place where there are little numbers of water molecules into a region where there is a large number of water molecules (the rest of the container) i.e. the solute *diffuses* into the water. They move as a result of being carried along by the movement of the water molecules. As regards the water molecules themselves they will move in the reverse direction - from the region where there are lots of water molecules into the region where there are few water molecules i.e. the water travels by *osmosis* into the solute.

Solutions and semi-permeable membranes

Ok, so that's how molecules in a solution tend to move. Note that this Brownian motion continues even after the solution is evenly mixed and this serves to keep it homogenous. What happens when you introduce a semi-permeable membrane into the scenario? Well such a membrane only allows some molecules to flow freely through the pores i

Okay so what