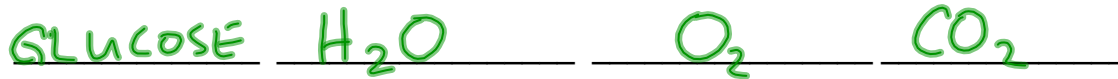


## ENERGY AND ORGANISMS

All organisms require energy to live. You have already studied how energy is moved through a food chain. Plants capture energy from the sun and then convert it into chemical potential energy in the form of GLUCOSE. This process is called PHOTOSYNTHESIS. Plants and animals then release this chemical potential energy into their cells in a process called CELLULAR RESPIRATION.

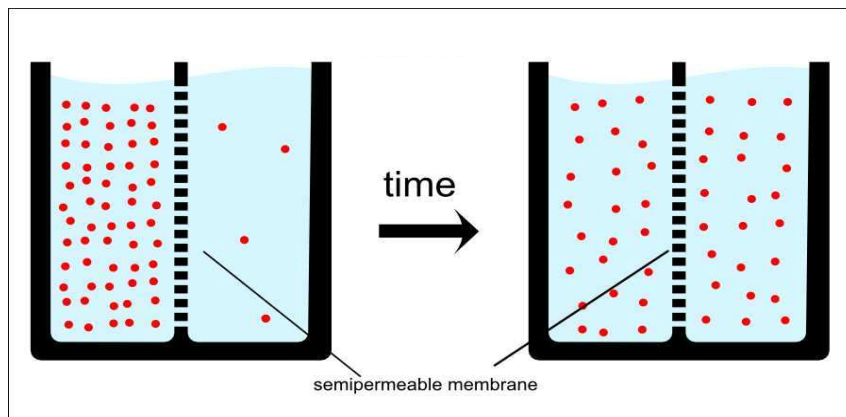
There are only 4 basic chemicals in both of these processes:



We need to examine how these chemicals get in and out of the cell and we must examine the various strategies that organisms use to do this effectively.

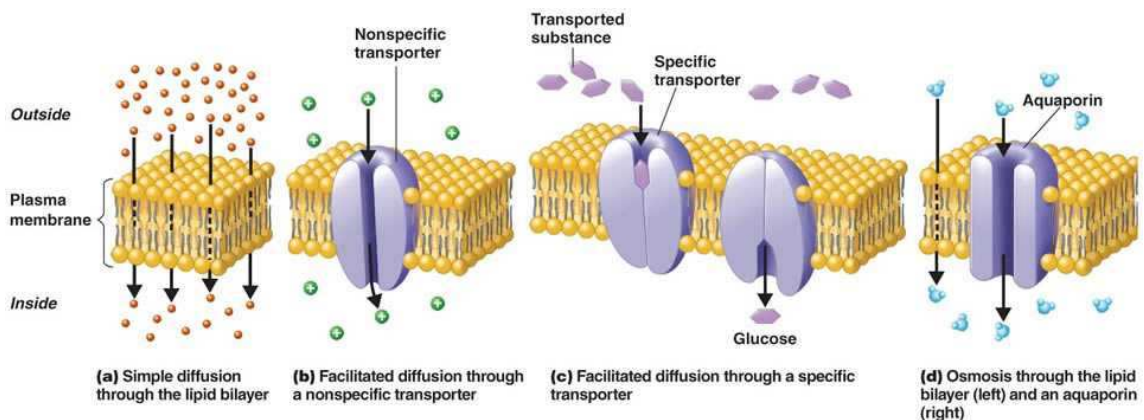
## DIFFUSION

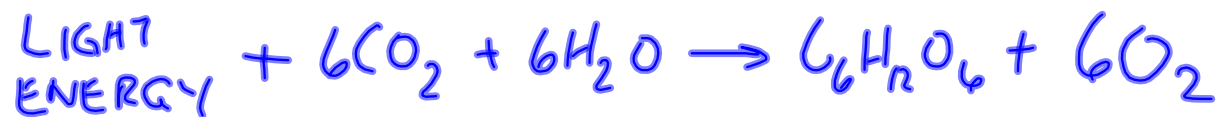
Diffusion is a process by which a substance spontaneously spreads out in all directions from an area of HIGH concentration to an area of LOW concentration over time. Cells have a selectively PERMEABLE membrane which allows some substances to pass through and prevents others from passing through.



[http://highered.mcgraw-hill.com/sites/0072495855/student\\_view0/chapter2/animation\\_how\\_diffusion\\_works.html](http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter2/animation_how_diffusion_works.html)

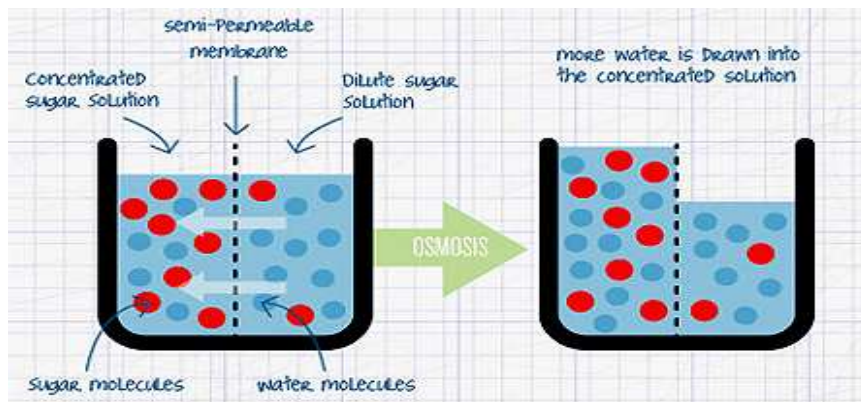
There are a few types of diffusion including simple, FACILITATED, and osmosis.





## OSMOSIS

The diffusion of **WATER** through a selectively permeable membrane from a region of high concentration of water to one of lower concentration of water is called **osmosis**.



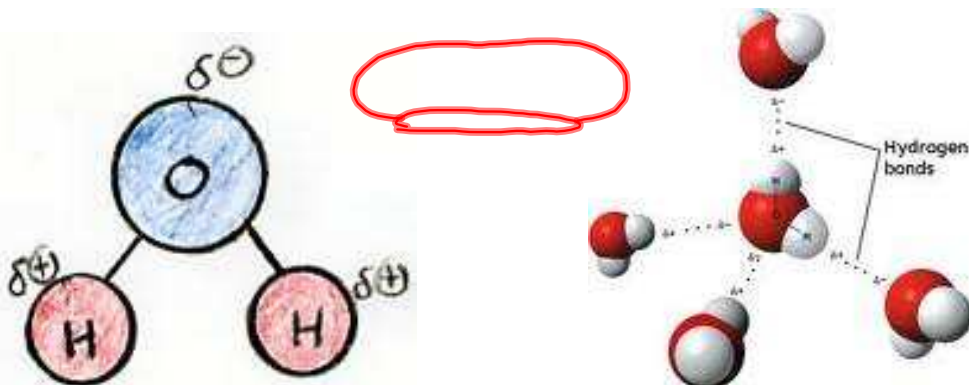
[http://highered.mcgraw-hill.com/sites/0072495855/student\\_view0/chapter2/animation\\_how\\_osmosis\\_works.html](http://highered.mcgraw-hill.com/sites/0072495855/student_view0/chapter2/animation_how_osmosis_works.html)

## SPECIAL PROPERTIES OF WATER

<http://sciencespot.net/Media/pennylab.pdf>

### *The Magic Penny*

Water is a polar compound made up of 2 **H** atoms and 1 **O** atom that have covalent bonds (**SHARED** electrons). Because oxygen atoms are much larger than hydrogen atoms, the oxygen has a stronger pull on the electrons than hydrogen does; so they don't share electrons equally; the shared pair of electrons are actually **closer** to the oxygen atom. This leaves the oxygen end of the molecule slightly negatively-charged and the hydrogen end of the water molecule slightly positively-charged. Water is a polar molecule that therefore acts like a magnet. The slightly negative oxygen end is attracted to the slightly positive hydrogen end of the next water molecule and they stick together like glue. This **cohesion** of water allows it to be a pivotal component of plants and animals.



Water also has the ability to stick to the surface of its container. Have you ever tried to pour every single drop of water out of a beaker or test tube? It's virtually impossible, because water is **adhesive**; its molecules tend to stick to the side of the containers that hold them.

## HOMEWORK

1. Name two similarities and two differences between diffusion and osmosis.
2. Why would some people add salt to their meat only AFTER it's cooked?
3. Why would it be safe to inject a solution of 5% glucose directly into a vein, but not a solution of 20% glucose?
4. How do the produce departments of grocery stores keep vegetables looking fresh and feeling crispy? Describe why this works.
5. Do you think that a change in temperature would affect the rate of diffusion and/or osmosis? Why or why not?