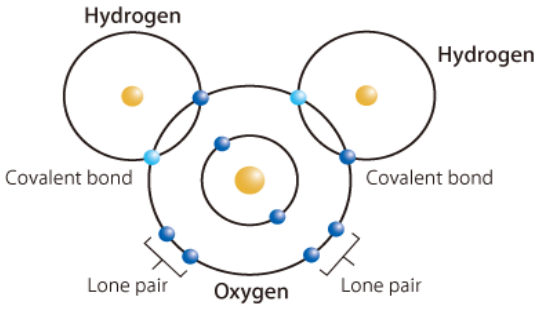
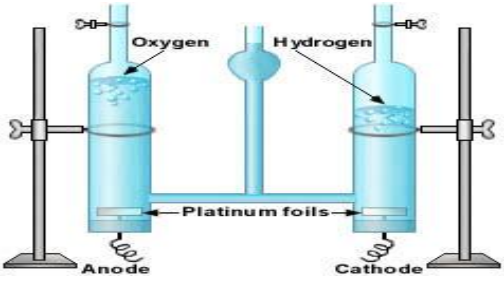
# WATER

Water is a substance composed of basic molecules, each consisting mainly of two hydrogen atoms (1-Hydrogen isotope) in +1 oxidation state and one atom of oxygen (16-oxygen isotope) in oxidation state -2 , connected together by an electromagnetic charge (H2O). In its pure form is odorless, it has very little color and no taste.

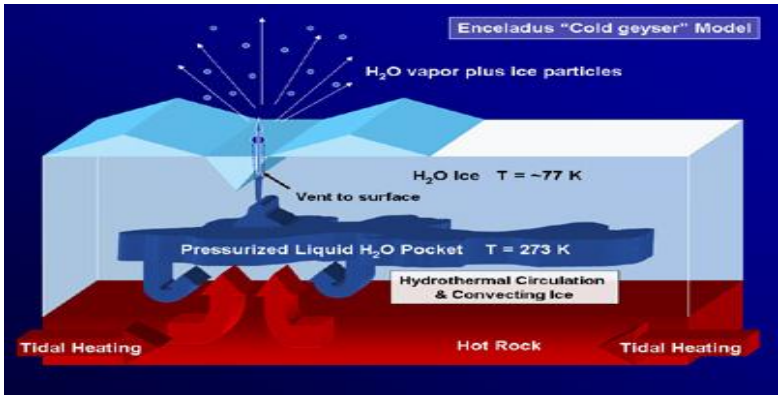



Water occurs during the combustion of hydrogen isotopes in the presence of oxygen and its molecules can be decomposed into hydrogen and oxygen by applying an electrical current under the principles of “electrolysis”

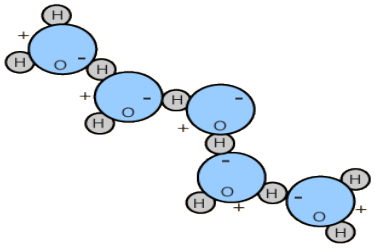



Water is the only common substance that occurs in Earth's atmosphere in the 3 common states of matter (solid ice, liquid, and gas as steam), being the most common liquid phase in the atmosphere and the lithosphere.

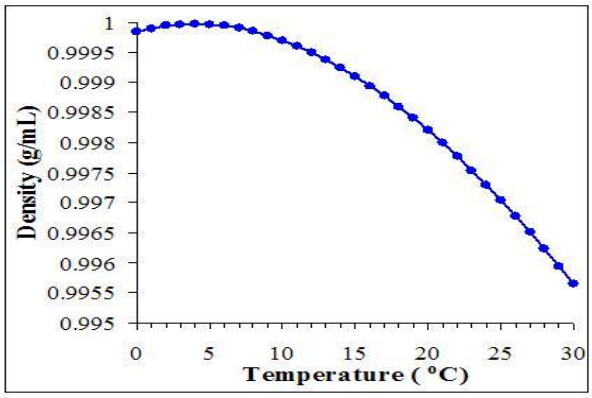
Water also occurs as a supercritical fluid (with gas and liquid characteristics) at pressures greater than 250 atmospheres and temperatures above 380 ° C anywhere in the Earth below 3 km depth.



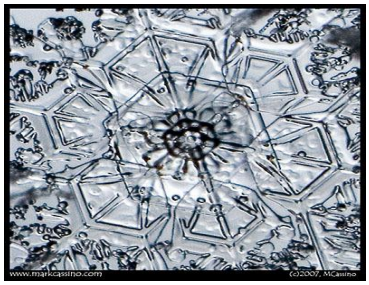
Oxygen has a lot of interaction spaces. When a molecule of water is formed in the presence of hydrogen, it will establish a “dipolarity” of the molecule with electromagnetic charge and a “non-homogeneous” behavior in constant motion, which will allow to set bonds with other molecules of matter.



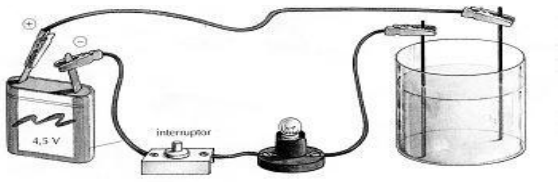
The density of water in the liquid varies little with changes in temperature and pressure. The minimum density at normal pressure is 0.958 tons/m3 at 100 ° C and its density increases as the temperature decreases to reach its maximum of 1 t/m3 at 3.8 ° C.



When water is frozen (at 0 ° C at 1 atmosphere pressure), the vibration or movement of the oxygen and hydrogen atoms is reduced. The molecules are expanded in the form of hexagonal crystal structure, with higher volume and lower density (0.917 tons / $m^3$)



The relatively homogeneous cohesion in pure water makes it an excellent electrical insulator, but with mineral salts or dissolved ions it will increase its electrical conduction capacity.




A water molecule can form up to 4 hydrogen bonds because it can accept two hydrogen atoms and donate two hydrogen atoms.

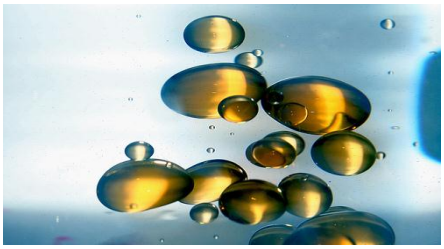
The collective action of unions of water molecules together in constant movement creates a “cohesion” with a coherent network that make molecules stick together,

but breaking and reestablishing the bonds between atoms of hydrogen and oxygen in an extremely fast way allowing a liquid behavior.

Dipolar nature allows water molecules to “adhere” easily to other elements or compounds. When water comes in contact with another material, it is possible that the adhesive forces of the molecule with the surface are stronger than the cohesive with other water molecules, causing the substance to be scattered instead of being united. For example, in an extremely clean glass, water can form a thin layer.

If a substance has properties that do not allow to overcome the forces of cohesion, water molecules will be “pushed” and the matter will not dissolve. In the case of

oils they will form layers in which substances with more density will settle and lower density substances will tend to remain above them.



Because of the cohesion between the molecules of water, the surface tension of water is high (72.8 mN/m at room temperature), this means that the molecules of the surface of the water are not surrounded by similar molecules everywhere, but only by internal cohesion of the internal molecules. The surface tension of water causes that droplets of water tend to be compact and round.

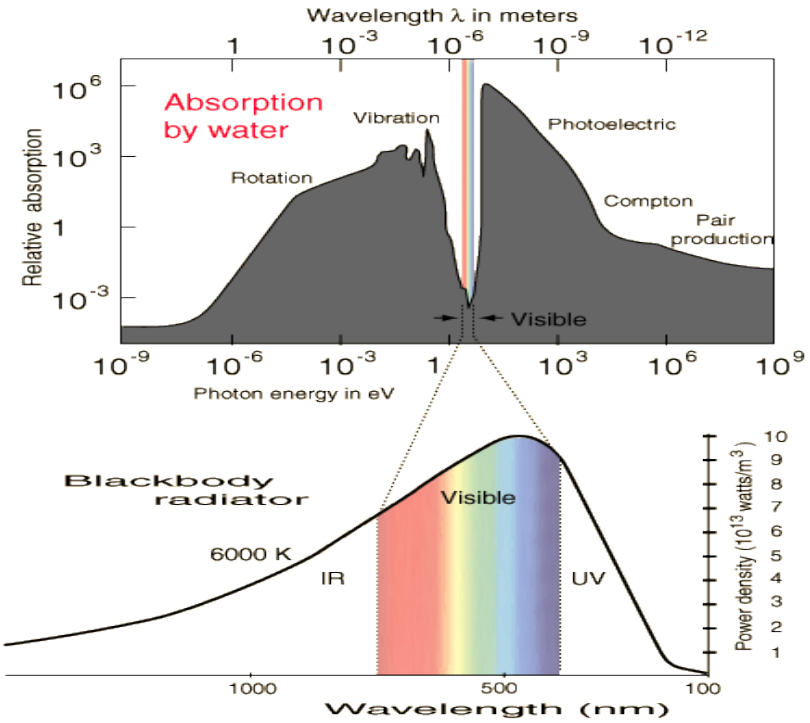
Small amounts of pure water have no color, but in large quantities water has a greenish blue color.

The interaction of light through a water molecule depends on the angle of light entering the water surface or dipole orientation of the molecule (that is rapidly

changing in its gaseous or liquid state, or  which is rigid to form crystals in its solid state), and of course the length of the electromagnetic wave, so it can cause light to be reflected, absorbed or diffracted.

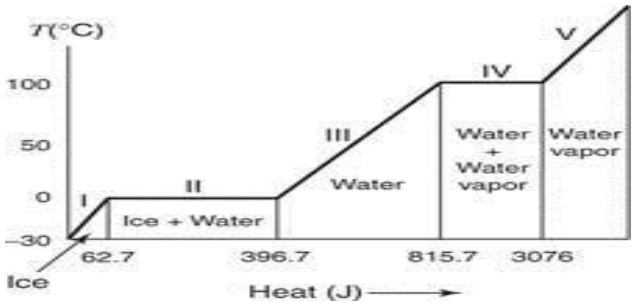
Water absorbs nearly all wavelengths of the electromagnetic spectrum. In the case of the emission of sunlight, water molecules primarily absorb the electromagnetic spectrum in the infrared region (waves from 1 kilometer lengths length to the size of a proton) which causes the excitation of water molecules.

Water has a small window that does not absorb  in the visible light spectrum (between 700 and 400 nanometers). Giving the appearance of being translucent.



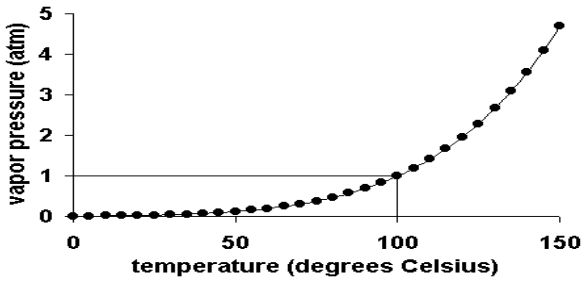

Water molecule reflects, absorbs or scatters most of the electromagnetic spectrum from ultraviolet (below 400 nm). Just above the visible spectrum blocking increases 9-fold orders in magnitude.

Water has a very high specific heat capacity (4.2 joules which is the amount of heat required to raise one gram of water one degree centigrade of temperature), being the second compound with highest specific heat capacity after ammonia, retaining a tremendous amount of heat efficiently .

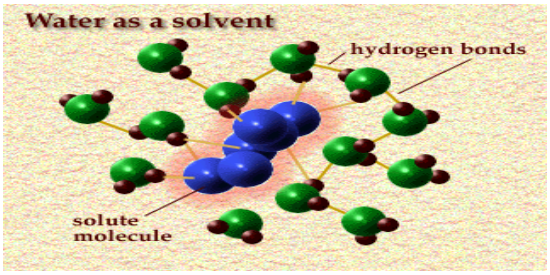



It requires a tremendous amount of heat to convert water into steam. That's why it can be used to extinguish certain fires.

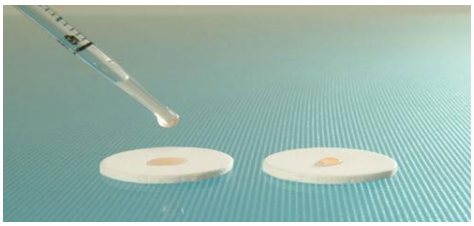
The boiling point of water is directly related to the pressure. At the top of Everest, water boils at 68 ° C (154°F), and can be in liquid form at hundreds of degrees Celsius in the depths of the crust.



Water is known as a “universal solvent”, which means that many substances are dissolved in it. Dissolving capability of a molecule in water is a function of whether or not it fits in the shape of the dipole water molecule to form coherent networks with other molecules.

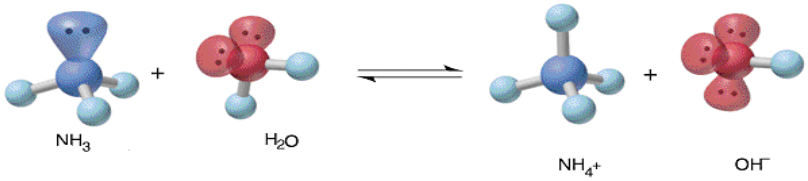



Salts, sugars, acids, etc. that are dissolved in water are called “hydrophilic”, meaning that the strength of “adhesion” with water is stronger than the “cohesiveness” between the water molecules. Substances which can not be dissolved, such as lipids and fats are called “hydrophobic”. When a compound contacts ionized water, is surrounded by water molecules, “hydrating” it.



El agua tiene un pH neutral de número 7. Químicamente el agua puede actuar como “base” cuando reacciona con ácidos fuertes recibiendo protones +H, y como “ácido” cuando interactúa con bases fuertes donando protones +H.

Water has a neutral pH of number 7. Chemically, water can act as a “base” when reacting with strong acids, receiving protons + H, and “acid” when interacting with strong bases donating protons + H.

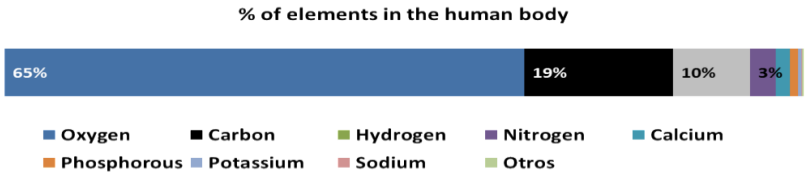



Water exhibits a “capillary action” when in surfaces with narrow tubes. The water adheres to the inner parts of the wall of a tube while surface tension tends to straighten the surface, causing the molecule to raise, then the water molecule is pulled upwards through cohesion.

When a plant sucks water, is because water will adhere to the inside of the tubes of the plant that are hydrophilic, while surface tension will make the molecule seek a consistent spherical shape. This process continues until water condenses sufficient volume to interact with gravity.

Water is the most abundant compound in the surface of the Earth, covering 71% of it.

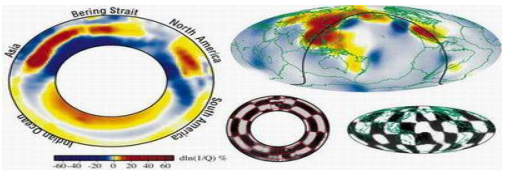
Water is a basic compound for all known forms of life, representing between 55% and 78% of the human body and up to 90% in fruits and plants. All known life forms need it, and if they do not have enough of it die.




Currently it is impossible to determine the exact amount of water that exists on Earth.

The U.S. Geological Survey estimates that over the lithosphere of the Earth there is approximately 1.33 billion cubic kilometers of water. The 96.5% within the oceans, 1.7% in groundwater, 1.7% at polar glaciers and mountains and less than 0.3% of water is in rivers, lakes and the atmosphere. Of the total water on the surface of the Earth, only 2.5% is freshwater, and 98.8% of this 2.5% is in ice (77%) or in underground aquifers.

However, this estimate does not consider the possibility of occurrence of water in the Earth's mantle or the rest of the lithosphere, and we believe that these data are extremely conservative.




Source: http://www.artinaid.com/2013/04/water/