

WATER, WHAT IS WATER REALLY?

We all drink water and most of us take it for granted that water will always be available as it was in the past and will continue. But is that a reliable supposition?

Some of the facts that I was able to access from Google are as follows:

1. Water covers 71% of our planet Earth.
 - a. Our Oceans hold 96.5%
2. Adult men consist of 60% water.
3. We consume:
 - a. An average of 3.7 litres a day if we are male, and
 - b. 2.7 litres a day if we are female.
4. Fresh water is about 3% of all the water available but only 1.2% can be used as drinking water, of which 0.3% is in liquid form on Earth's surface:
 - a. 87% in Lakes
 - b. 11% in Swamps
 - c. 2% in Rivers
5. A human can survive without water for about 2 days to a week under certain conditions.
6. There are about 8.1 billion people alive on Earth in 2024 of which:
 - a. 50.4% are male.
 - b. 49.6% are female.

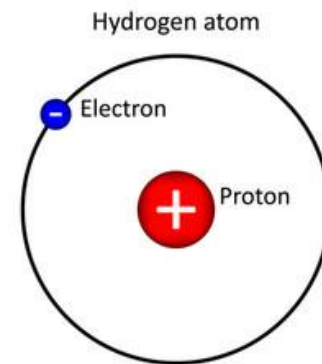
These are 'sobering' statistics and so I decided to try and write to understand *what is water, really?*

My past courses in Chemistry and Physics identified water as Hydrogen Dioxide made of two (2) Hydrogen atoms attached to one (1) Oxygen atom (H₂O). There are 118 elements in the Periodic Table with:

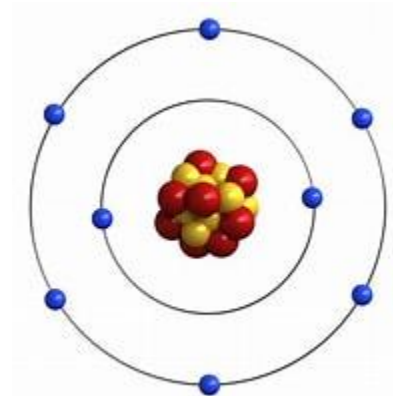
1. Hydrogen being number 1 (the number indicates the number of electrons and protons, respectively) in the Periodic Table and
2. Oxygen being number 8.

Since this is such an essential liquid for all living creatures and especially our humankind, I will attempt to explain water in more detail.

The **Hydrogen atom** consists of one electron orbiting a core of one proton as illustrated in the adjacent illustration. For those of us who are not Scientists, let us just accept this as being like our planet Earth orbiting our Sun in a counterclockwise direction. The Proton is positively charged while the electron is negative. There is an attraction to each other, but the electron is 'attempting' to project away from the proton as our planet Earth is attempting to project away from the Sun. Scientists have just recently, discovered that a graviton is responsible for keeping the proton and electron in equilibrium.



The **Oxygen Atom** has an atomic structure as in the two-dimensional diagram on the right. It has:



1. 8 Electrons spinning around a nucleus and defined as:

".....a stable subatomic particle with a charge of negative electricity, found in all atoms and acting as the primary carrier of electricity in solids..."

2. 8 Protons exist in the core (Nucleus) of the atom are defined as:

".....a stable subatomic particle occurring in all atomic nuclei, with a positive electric charge equal in magnitude to that of an electron, but of opposite sign..."

3. 8 Neutrons also exist in the core (Nucleus) of the atom are defined as:

".....a subatomic particle of about the same mass as a proton but without an electric charge, present in all atomic nuclei except those of ordinary hydrogen...."

4. Gravitons (Nucleus) within the atom provide the "gravity" for all the particles to remain in equilibrium:

".....A graviton is a hypothetical particle that is thought to be the carrier of the gravitational force. [It is analogous to the well-known photon of the electromagnetic force¹](#) If it exists, the graviton would be a massless, electrically neutral, spin-2 boson that travels at the speed of light² However, there is no complete quantum theory of gravity that can describe the graviton consistently with general relativity and the other fundamental forces³ Some [physicists hope that string theory, a framework that unifies all particles and forces as vibrations of tiny strings, could provide a way to detect the graviton experimentally⁴](#)..." Recent news is that a Graviton is a confirmed particle.

5. There are other subatomic particles as Quantum Physicists now identify them but I will leave that to the serious readers.

The **Water Molecule** is an atomic structure as in the two-dimensional diagram on the below. It is comprised of two hydrogen atoms and one oxygen atom. The hydrogen atoms are at an angle of 104.5 degrees to the oxygen atom as illustrated in the reference diagram.

So why do the hydrogen atoms attach to the one oxygen atom is explained as follows:

"...**Water**, the essential molecule for life, is composed of two hydrogen atoms and one oxygen atom. Let's delve into the fascinating reasons behind this arrangement:

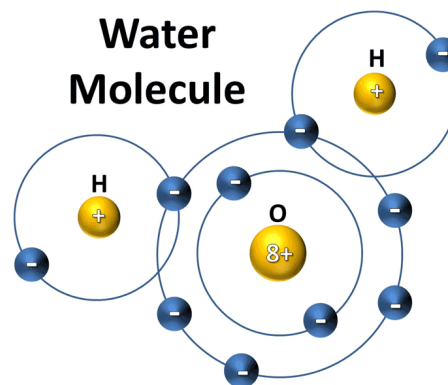
1. **Molecular Structure:**
 - A water molecule consists of **two hydrogen atoms** bonded to an **oxygen atom**.
 - The overall structure of water is **bent**, forming an angle of approximately **104.5°** between the hydrogen-oxygen bonds.
 - The oxygen atom also carries **two pairs of unshared electrons** (lone pairs).
 - Due to the repulsion between electron pairs (both shared and unshared), water adopts a tetrahedral shape, with the O-H bonds forming two out of the four "legs."
2. **Polarity of Water Molecules:**
 - Oxygen is more electronegative (electron-greedy) than hydrogen.
 - As a result, the oxygen atom hogs electrons, creating a partial negative charge at the oxygen end.
 - The hydrogen atoms have a partial positive charge.
 - Water is classified as a **polar molecule** due to its polar covalent bonds and bent shape.
3. **Hydrogen Bonding:**
 - Thanks to their polarity, water molecules attract each other.
 - The **plus end** of one water molecule (a hydrogen atom) associates with the **minus end** of another (an oxygen atom).
 - These attractions are examples of **hydrogen bonds**, which are weak interactions formed between a hydrogen atom with a partial positive charge and a more electronegative atom (such as oxygen).

[In summary, the arrangement of two hydrogen atoms bonding with one oxygen atom in water allows for the formation of hydrogen bonds, which play a crucial role in water's unique properties and its ability to support life...](#)"

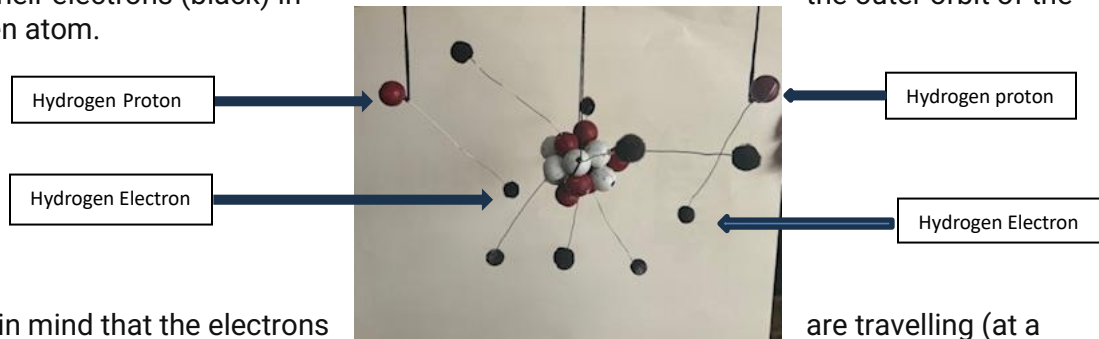
In order that the writer better understand this subject, he constructed three-dimensional models of the Hydrogen, and Oxygen Atoms as well as the Water Molecule.

Water exists in there natural (3) states:

- Gaseous (air and steam)
- Liquid (in our lakes and rivers and underground)
- Solid (ice)



Here is a three-dimensional perspective of the water molecule as it may exist in nature (my attempt at building a water molecule). The two red balls are the protons of the Hydrogen atoms with their electrons (black) in the outer orbit of the oxygen atom.



Keep in mind that the electrons are travelling (at a percentage of the speed of light under certain conditions); at very high speeds in the gaseous phase.

As I write this, most of my readers are not Quantum Physicists nor am I but like you, I am fascinated at the Science that we need to know in order understand what is talking place all around us.

Discussion

A) *How much drinking water does humanity require as an estimate?*

Let us focus on the fact that our planet has a great deal of water but only 1.2% can be used as drinking water. Earth's 8.1 billion population competes for the 0.3% that exists in liquid form.

Google facts suggest that our daily needs are:

1. Male
 - a. 50.4% of 8.1 billion = 4.0824 billion people
 - b. At 3.7 litres a day consumption this equates to 4.0824×3.7 liters = 15.10488 billion litres (3.284 billion Imperial Gallons) per day
2. Female
 - a. 49.6% of 8.1 billion = 4.0176 billion
 - b. 2.7 litres per day = 10.84752 billion litres (2.358 billion Imperial gallons) per day
3. The world water consumption is:
 - a. 25.9524 billion litres (5.642 billion Imperial gallons) per day

B) *Factors affecting our drinking water supply.*

- a. Air pollution affecting lakes and rivers which supply most of the water to our communities.
- b. Industrial waste effluents into lakes and rivers
- c. Precipitation that affects the supply to lakes and rivers
- d. Climate change
- e. Chemical saturated into well water supply.
- f. Other

Mankind needs to be very concerned and protective in our conservation of water for our survival.

C) The Writers comments:

- a. Most communities are accessing open water sources that have pollution of some sort and this is why expensive water purification plants are necessary to purify this water as well as add Chlorine and other chemicals to protect against bacteriological contamination.
- b. There are also filtration needs to clarify and render the water clear for health and acceptance by the public.
- c. As a charitable Society where I serve as a member, it considering marketing its excess well water supply to those in the area who have need of water in order to supplement operational costs so that the Society can continue its operation.
- d. I wanted to get a better understanding of the scope of the Water Issue.
- e. I am not a Scientist nor a Quantum Physicist, but I am always ready to learn something new.

Written by EWV and posted February 29, 2024 (the extra day once every four (4) years)