



WATER IS THE ULTIMATE SOURCE OF HYDROGEN ENERGY: SCIENTIFIC CITATIONS AND QUOTATIONS

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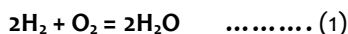
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Abstract: From the ancient times, mankind has always been aware all life on earth depends upon water, the principle ingredient of all living cells. Its importance in forming the creation in all of its aspects in general and the living-creatures in particular, as well as human kind, animals and plants is evident to all of us. It is highly important to know that water has played a major role for human kind. When the Ionian philosopher Thales of Miletus (624-545 BC) replaced the Gods with Natural Laws as the force governing all phenomena, he made *Water* the central element in his theory. The paper addresses the issue that water, besides its indispensable usage by human beings in drinking and in everyday life, is the key element in providing life with energy, in the form of *Hydrogen*. The main aim of this work is to shed some light on the relationship between hydrogen, water and energy. A review of some scientific unique physical and powerful properties of water is presented. The high specific heat, caused by hydrogen bonding is behind the resistance to temperature change. Its availability for mankind made it the standard of the thermometric scale. Next, to present to the community of scientists some scientific citations and quotations that support our statement that water is the ultimate source of hydrogen energy. Newton, an avid alchemist set forth in *De Natura Acidorium*, the views that all substances can be reduced to water. *Eventually, hydrogen, one of the components of water can be derived from it.* What's most amazing is that all of these citations, scientific statements and notions had been proven to be in perfect agreement with science and our modern-day scientific discoveries that were not known to man 1,500 years ago. This understanding of the use of water in providing energy in the form of *hydrogen*, adds a new dimension to our scientific thinking, that life on earth depends totally upon water, the principle ingredient of living cells.

Key Words: Hydrogen, Water resources, Water & Energy, Hydrogen & Energy

INTRODUCTION

It is rather interesting to report the analogy that shows that our bodies are approximately 2/3 water, the earth is approximately 2/3 water and the universe is again approximately 2/3 water. The majority of everything around us and in us, beyond what we can see is water. A quick look at the chemical equation for the formation of water tells us more.



This formula for water carries with it a very significant piece of information. Water is 2 parts hydrogen; the most abundant element in the universe and 1 part oxygen; the third abundant element on earth. Hydrogen however, is considered the central part of water. It constitutes 2/3 of water, with ratio 1:1, hydrogen: water.

Hence, we can establish the amazing formula of the 2/3. In other words, we have a plentiful source of hydrogen equivalent to the (2/3) times (2/3) times (Quantity of available water on earth).

Hydrogen and Water

In the equation of water formation, as shown by equation (1), the question is raised: what about the energy of formation? The formation of water from its elements produces, in addition to water, a tremendous amount of energy, 572 kJ per 2moles of water. We therefore, should rewrite equation (1):



This is what we refer to as an exothermic reaction. It is also recognized as a combustion reaction, where hydrogen is combusted with oxygen producing water.

The question is raised again: if we reverse the reaction given above in the other direction, can we generate hydrogen from water by adding energy?



Equation (3) represents an endothermic reaction, where water is used as a fuel to produce hydrogen and oxygen.

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The next crucial question comes is it feasible to use energy to break water to form hydrogen, which eventually will be used as a fuel to combine with oxygen to give energy back? In fact, because of the laws of thermodynamics, you can't breakeven in this exchange of energy. However, the answer could be reached by using sustainable energy sources (renewable energy sources), solar energy and wind energy, to split water releasing hydrogen.

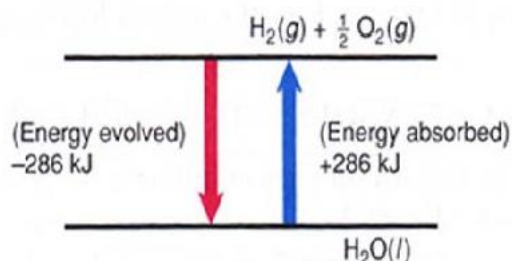


Fig.1: Energy Involved in the Formation of Water from H₂ and O₂ (Source: "Chemistry in Context" Wm C Brown Publishers, Dubuque Iowa, 2nd edition, A project of the American Chemical Society, ed: A. Truman Schwartz et al., 1997, Chapter 5 "The Wonder of Water")

Water Resources

Water covers 71% of the Earth's surface, and is vital for all known forms of life. Almost, 97 percent of the water on the Earth is salt water and only three percent is fresh water; slightly over two thirds of this is frozen in glaciers and polar ice caps. The remaining unfrozen fresh water is found mainly as groundwater, with only a small fraction present above ground or in the air.

Water on earth moves continually through the hydrological cycle of evaporation and transpiration (evapotranspiration), condensation, precipitation, and runoff, usually reaching the sea. Evaporation and transpiration contribute to the precipitation over land. The world's water resources include the entire range of natural waters that occurs on earth in all different phases: vapor, liquid, and solid. Distribution of water on earth is presented next in Table 1. Of these, the most available resources for use are the waters of the oceans, rivers, and lakes. Other available waters include ground water and deep subsurface water.

In addition, it should be observed that about:

- 97.2 percent of the total earth's water occurs in oceans and inland seas.
- 2.2 percent in ice caps and glaciers
- 0.6 percent is liquid fresh water

Table I: Distribution of the Earth's Water

	Volume (1000 cu km)	Annual loss (1000 cu km)	Renewal Period (Years)
Entire Earth	1,460,000	520 by evap.	2,800
In oceans	1,370,000	449 by evap.	3,100
In earth's crust:	60,000	13 underground	4,600
a- zone of exchange	4,000	13 underground	300
b- lakes	750	-	-
c-glaciers & snowfield	29,000	1.8 runoff	16,000
d-soil / subsoil moisture	65	65 evap.	1
e-atmospheric vapor	14	520 precipitation	0.03
f- river	1.2	36 runoff	0.04

However, most of the liquid fresh water occurs as ground water (97.74 %) and the balance accounts for lake water, surface soil water, and river water, as illustrated next in Fig.2.

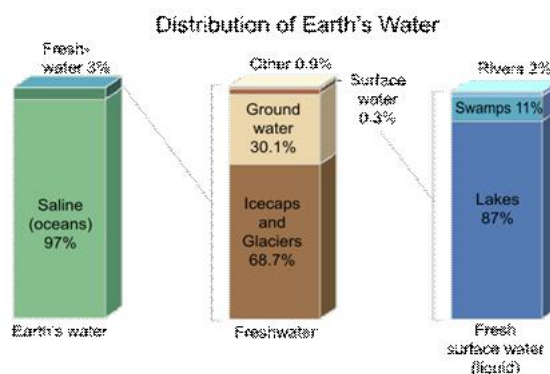


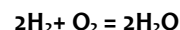
Fig.2: Earth's Water Distribution (Source: Wikipedia, the free encyclopedia)

Some Unique Physical Properties

All three phases of water: solid, liquid, and gas form vital links to life. Liquid water accounts for two-thirds of our body weight. To stay healthy, we need about one liter of water each day. Water helps blood and its components transport oxygen and nutrients and remove waste products through our circulatory system. Each time we exhale, water vapor leaves our bodies. The following physical properties are significant to be presented:-

1st Water is an extraordinary substance, anomalous in nearly all of its physical and chemical properties compared to other familiar single chemical compounds.

2nd - A quick look at the chemical equation for the formation of water tells us more.



It takes two molecules of the diatomic hydrogen gas, combined with one molecule of the

diatomic oxygen gas to produce two molecules of water. The result is a V-shaped, triangular molecule, as shown in Figure 3.

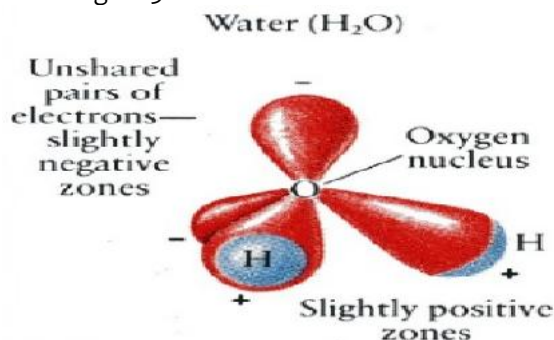


Fig.3: Structure of Water Molecule

While water molecules are electrically neutral, the oxygen atom holds a small negative charge and the two hydrogen atoms hold small positive charges. It is believed that this unusual electrical balancing, which is known as polarity, gives water some of its remarkable and unique properties. The high specific heat is caused by hydrogen bonding.

3rd - Because so much energy is required to break the hydrogen bonds, water resists temperature change. This is important because a number of biological processes can occur only within a narrow temperature change.

The hydrologic Cycle

The predominance of water on our globe is manifested by the fact that about 75 percent of its surface is covered with water. The global water balance is controlled by what is called “Hydrologic Cycle.”

The principle factor governing this cycle is solar energy. Evaporation from land and oceans takes place accordingly. The cycle reflects the relationship between the heat and water balances of both land and sea.

Water and Energy

Scientific Citations: Ancient men sensed the importance of *Water* and *Sun* and made them the central elements in their life. This is explained by the following:

First, for water, the Greeks considered the Titans Oceans and Tethys the parents of creation. The Ionian philosopher/scientist, Thales substituted natural forces for Gods being the causes of natural phenomena. However, he retained *water* as the central principle or “element” of his cosmology. His successors, in particular Aristotle added other primal elements. These are: *Fire, Earth and Air*.

For many centuries the four elements, including *water* formed the basis of *alchemical* beliefs. Newton, an avid alchemist, set forth in *De Natura Acidorum*, the view that “all substances can be reduced to water”. Eventually, *hydrogen*, one of the components of water, was considered to be the primal element, largely because it was found to be the lightest of all elements. This hypothesis was not abandoned until the 19th century.

Second, for sun, the pharaoh Amenhotep (Akhenaten), his wife queen Nefertiti and their children honored the solar disc “Aten”-with its life-giving rays as the only God, (1350 B.C.), as shown in Figure 4.



Fig.4: Akhenaton Honoring the Sun

The Break Through: When *water* provides *heat*; then our daily living needs of both *food* and *energy* are realized from a *single* source: that is *water*. This is established, of course, by using the *sun*, which represents the singly most massive influx of energy reaching the earth. Hydrogen production, by splitting the water molecule using solar energy is a scientific fact. When used as energy source, hydrogen combines with oxygen to give energy plus water vapor, which is recycled back to the atmosphere.

Water has been used over the years to provide hydroelectric energy in many part of the universe. Now, it is time to utilize water as the ultimate source of hydrogen.

Taking the solar system, by itself, it is known that the maximum intensity of sunspots corresponds with the maximum intensity of magnetic storms on the earth. The universal law of gravitation seems to bind all mass and hold it together. Physical facts, on the other-hand, point out that planets were thrown off (clove)

from the vast quantities of diffused nebular matter, of which the central condensed core is the sun.

It is God's well-ordered providence that made from water every living thing to bring life on earth through WATER. About 72 % of the surface of our globe is covered with water; and it has been estimated if the inequalities on the surface were all leveled, then the whole earth's surface would be under water. This explains the fact the existence of firm mountains on earth is a source of security to life in this regard.

In addition, our latest knowledge of biological science refers proves that life began in water. The constitution of protoplasm is made up of about 85 % water.

It can be stated that water which is made up of Hydrogen & Oxygen provides mankind with life through the following,

- As liquid to provide our daily need of food, drink... etc.
- As a source of energy in the form of Hydrogen.
- As a source of oxygen as well.

CONCLUSIONS

The relationship between solar energy and water was demonstrated, through the "hydrologic cycle". Most important, the link between water and hydrogen was explained by the hydrogen-water cycle; which offers different options to produce hydrogen from water using renewable energy sources, which are solar-derived.

Citations and interpretations that may imply that water is indispensable for human beings in providing energy in the form of hydrogen are presented. In other words, when Water provides heat, in the form of Hydrogen, our daily living needs of both food and energy are realized and maintained from a single source that is water. This is realized by using the sun, which represents the singly most massive influx of energy reaching the earth.

This understanding of the use of water in providing energy in the form of hydrogen, adds a new dimension to our scientific thinking, that life on earth depends totally upon water, the principle ingredient of living cells.

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