Discussion paper on the subject of the electrical properties of water.

Preamble: ***The electrical aspects of water takes many forms. The so-called Zeta potential as an interfacial charge between water and other matter, the high resistive properties that are not Ohmic, the so-called Exclusion Zone of water as expressed by Professor Gerald Pollack in his book 'The Fourth Phase of Water' and other intangible properties such as memory and its non-absorbing character at around 417 to 420 nm. The most important of these issues will be discussed hereunder:***

Introduction:

It has become apparent that much of what we think we know and are told about water, may not be true and even in error, as much about water is generally poorly understood. Evidence of this ignorance is shown in the difficulties experienced by those individuals and corporations attempting to produce so-called colloidal silver and failing in that. The problem: Ionic silver in the mix, the use of unpure water and silver containing dangerous contaminants and ALL without any quality controls. What is even more questionable is a complete absence of any accurate description of what constitutes this colloidal silver and the absolute need for a standard.

The water used:

One would think that there would be little difference between relatively pure distilled water and commercial deionised water, that is, until the electrical properties are compared between the two products. Generally speaking the conductivity of distilled water is at least a factor of ten higher when measured with a high input resistance multimeter compared to deionised water. In one case the relative (reciprocal) conductivity was 2.2 micro Siemens for distilled water to 0.22 micro Siemens for deionised water respectively. To make matters worse, the testing of water using conductance (conductivity) by way of the measure Siemens or fractions thereof instead of ordinary current and the rule of Ohm's Law is a scientific anomaly made even more questionable by being based on a hypothetical concept. Water is incomparable with solid metal conductors and any current practices should be completely overhauled. Testing based on accepting that water as a dielectric and has insulating properties unlike any other substance in the Universe, must be borne in mind. The use of specially designed high input resistance and low current measuring procedures must be introduced for a more appropriate and accurate determination.

Interfacial charges:

Water is a liquid and feels wet to the touch. However that is not the case with most metals in their natural state. In order to avoid electrical contact with water, a static electric charge is formed between these metals and the water. This is referred to as a hydrophobic condition between water and submerged metals. This static electric charge is known as the Zeta potential. In the case of a silver atom, which has an unpaired electron in its outer orbit, a pseudo negative charge of the atom (electron is furthest away from the nucleus) gives rise to being attracted to the two Hydrogen atoms (positive charged) as part of the water molecule. With the Oxygen atom (negative charged) turned outward, a polarization of the water molecule occurs. Something similar also occurs with Gold and copper atoms, equally endowed with unpaired electrons in the outer shell. Even dissimilar metals close or touching each other whilst submerged in water create a voltage potential causing oxidation. However the water must be relatively impure and be conductive.

The Zeta potential referred to is a paradox on its own and not well understood, even by many scientists involved in 'wet physics'. At this point in time the basic measurement of the Zeta potential, claimed by some able to reach a maximum level of 100mV at a negative potential in the case of silver. It is measured collectively in a number of ways, including movement between electrodes and the subsequent Doppler- effect. This strategy is based on the assertion that the faster a so-called particle travels when subjected to an electrical charge, the higher will be its Zeta potential.

Most of what has been written about the Zeta potential was presented in the early 1900s with the introduction of the so-called Double Layer effect and known as the DVLO theory. DVLO theory relates to the four scientists involved in it: Derjaquin, Landau, Verwey and Overbeek. The theory predicts that a static negatively charged atomic silver cluster in the water is quickly surrounded by positive charges provided for by the hydrogen atoms as part water molecules or hydrogen ions (protons). Overall a negative charge is maintained due to the oxygen atoms facing outward. Initially the water experiences a so-called Iso-electric point (no interfacial charges). As the Zeta potential increase its repulsive negative potential it will exceed the always present attractive charges of the 'van der Waals' charge at minus 25 mV. Other electrical potentials and charges such as the Stern Potential (positive charges surrounding the metal cluster and referred to as the Stern layer), the Nernst potential, the Shear plane and the Diffuse layer of ions and Counter ions are not generally mentioned.

Our research indicates a drastically different departure from the aforementioned accepted theory, as explained as follows:

Instead of measuring the Zeta potential collectively of the entire content of the specimen under test, it would improve our understanding if the Zeta potential of just a single cluster of atoms could be measured. The reason for this is we should not assume that all atomic clusters are the same size. It would be expected that a cluster of 100 atoms as compared to an atomic cluster of 10.000 atoms is hardly likely to produce the same Zeta potential. It requires mentioning also that even individual atoms part of a cluster may create their own Zeta potential with the water as well. However now for the realistic side to measure a Zeta potential of a single atomic cluster sized at 5nm. At the present we are unable to measure something that small we cannot see. With such difficulties measuring a cluster of atoms, a single atom would be even more difficult to assess its Zeta potential. It may even be, that the so-called static electrical charge of the Zeta potential does not even exist and may be something else altogether, as illustrated by the following:

The scene is a quantity of water containing quantum sized silver, i.e. silver clusters of a size 10nm and below and no longer subject to gravity. It would be suspended in the water even without a Zeta potential, but imagine there is a Zeta potential at minus 50 mv. It will push similar clusters away by its alleged repulsive charges, i.e. like charges repel and unlike charges attract. A disturbance in such a static repulsive could occur if a counter ion came in between equally charged clusters. Then there is the problem of CROWDING. With the introduction of an increasing Zeta potential and a stronger repulsive force, there must occur some form of expansion. It would be normal that more room would be required to allow the full zeta potential force to exert itself, provided there is sufficient water and room for it to do so. This can be compared to a room full of people at capacity and then asking everyone to spread the arms sideways and rotate. Most likely it will cause collisions and striking.

Fortunately my theory may stop this from happening by accepting that an increase of Zeta potential is directly related to the ratio of its surface area to volume, i.e. the smaller the atomic cluster (larger surface area) the higher the Zeta potential. When the so-called crowding would occur, quantum confinement would safeguard the Zeta potential. This may not be such an unusual assumption as it is already accepted that quantum sized silver contains quantum confined electrons.

To really measure all aspect of the Zeta potential properly and scientifically is going to be an almost impossible and formidable task. Out of all possible ways to determine the Zeta potential, a capacitive reactance at pico farads with a specially constructed probe could provide some indirect answers.

The exclusion Zone of water, or EZ water for short.

Alongside the claim for the existence of memory retained by water, there is also a claim that at certain locations, specifically, artificial materials, water appears devoid of electrical charges. Insufficient evidence makes it difficult to scientifically substantiate such claims and write about it.

Epilogue:

What is electrical current and what is not?

Electrical current is the flow of electrons in a solid conductor such as copper wire or a silver bar under the influence of a direct current voltage potential. Only a resistance by way of an electrical resistor is able to oppose that current when traversing through the conducting medium. The basis under which this occurs is Ohm's Law. A type of electrical activity in water, being a dielectric and thus an insulator, is only able to allow ionic charge carrier flow, generally in opposite directions. These are not electrons, but both positive and negatively charged ions, which are attracted to the cathode (cations) and anode (anions) respectively. Any electrons deposited in the water (negatively charged as hydrated electrons) will be captured by any cations in the water from Hydrogen as protons and only released by ionizing photons in excess of around 2.94 eV, i.e. violet and ultraviolet radiation.

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