

Chapter 1. Draft paper only. Not for publication. Website placing only.

FLAWS IN SCIENCE: The unrecognized absorption of Silver at 420nm and More

Introduction: The Photo-electric effect

In 1905 Einstein gave an explanation of the Photo-electric effect that had managed to confuse science since the late 1800s. To somehow identify the problem, the following illustration will be introduced that involved a glass ball evacuated and fitted with two electrodes at either end.

To the amazement of the experimental scientists, when a galvanometer was attached to the two terminals, a small amount of current would flow whenever the system was illuminated, irrespective of the fact that the glass ball was in a vacuum state. However, a problem arose when more light was created but without an increase in current. Einstein explained that the lack of response was due to radiation being of by low energy radiation. However, by using higher energy radiation at Ultraviolet radiation more current would flow between the two electrodes. He went on to explain that ever increasing current would result at at ever shorter wavelengths. Ultraviolet radiation colliding with the atoms of metals would cause the emission of electrons and that phenomenon was The Photo Electric Effect. Unfortunately, this was only part of the story. Visible violet light at 420nm and at 2.95eV (electron volt) is indeed also an ionising light, just like UV. For unknown reasons this fact was either not considered or simply dismissed as irrelevant. As a direct result Science as a whole ignored that fact and it remained unrecognized. It was not until 2009 when it was finally was proven that at 420nm, Silver absorbs light at that very wavelength. This was irrespective of all that was known during the almost 100 years use of Black & White photography physics.

The reality.

Ultraviolet radiation's ability to collide with matter and remove electrons is referred to as an ionising radiation and is really a quantum effect and the basis for the success of Black & White photography for almost an entire Century. Silver halides were used to record images through exposure of violet light, creating latent images on silver halide treated film that could be developed and fixed with chemistry. Silver does have a spectral absorption at 328.1nm but for some reason it was not realised that there was also a spectral absorption at 420nm visible Violet light with an energy level of at 2.95eV. Ultraviolet light is blocked by water and below 200nm Ultraviolet water is blocked altogether. At the longer spectral wavelengths such as Blue, Green, Yellow, Orange and Red. Photon for these colours have insufficient energy to ionise and light just bends in the water and causing thermal agitation. It is referred to as the Refractive Index where part of the incoming light is reflected and the remainder refracted (bent).

The search for a stable and consistent nano meter sized silver.

Colloidal silver is not a recognised substance and no more than an unstable mix of ionic silver with perhaps a small proportion neutralised silver. Identifying this mixture as a colloid is also incorrect. Due to its many inconsistencies and lack of scientific and technical identification and

questionable properties, I started looking for something more identifiable that could be accurately described and produced in a standard way and also be more predictable. The search was for a nano silver product completely depleted of ionic content and thus totally neutral. It is a fact that a single positive ion can interfere and destroy a neutral atomic silver cluster by destroying the neutral charge of its covalent bonding. I had read about Photo-electron transfer using Ultraviolet radiation but soon rejected this method due to its absorption by the water used. I needed to come closer to visible light where absorption would not pose a problem, but what spectral frequency to use? I started thinking and looked up the properties of silver and taking note that Silver reflects 97% of all visible light, but that left 3% unaccounted for. Back to my research, when my attention was drawn to a short statement from an amateur astronomer complaining about the difficulty he was experiencing with his telescope: photographing blue stars. Blue stars all appeared dim and required long exposure times when photographed. Obviously, to the 'blue' spectral colour, silver was somehow a bit blind. Sometime later I realised that the so-called blue light was in fact a part of the spectral colour violet at 420nm, a large part of the 3% not reflected but absorbed and thus not visible.

Note 1. Most amateur telescopes are fitted with a parabolic mirror that in many cases is self-ground from a thick slab of glass. At 17 years of age, I ground a 150mm parabolic mirror myself. Parabolic mirrors are used as a means to have a greater chance of all of the starlight falling on a little mirror before the stars are looked at through an enlarging eyepiece. Generally, these reflecting mirrors are coated with a very thin layer of silver, and here was the problem. The unaccounted for 3% of light was actually a narrow bandwidth of spectral violet light at 420nm. Realising this, the amateur astronomer took away the silver layer and replaced it with an aluminium layer and reintroduced a silver layer on top of that. Aluminium continues to reflect that part of the spectrum and the silver did the rest. I had found a valid reason for the 3% and have used that wavelength in all of my experiments and nano silver production runs. On top of that, I also found that water at that same set of wavelengths is for some reason highly transparent and thus no impediment for photons at 420nm to traverse the water and neutralise ionic silver.

Combining Current, Voltage and the the aspect of the photo-electric effect at 420nm.

All attempts at producing stable and consistent nano silver, irrespective of whatever technology was used, was bound to failure: the application of reduction after oxidation was missing. Adding the photo-electric effect to the equation proved to be the most efficient method of reducing ionic silver to neutral silver and a more superior nano silver that will remain stable for decades under the proper conditions and the following procedures:

1. Fill a tank made of borosilicate glass (Pyrex type) or acrylic material (perspex) with deionised water with an ionic flow of maximum 5 micro amperes, but preferably lower at 1 micro amperes.
2. Install two 3mm diameter silver electrodes of a purity approaching 99.999% at a length no shorter than 100mm held in place by a perspex rod and distanced at least 200mm apart.

Note 2. It would be prudent to fit a short nylon sleeve over that portion of the electrode where it breaks the surface of the water to stop leakage of any silver to the water surface. The 200mm distance is to allow time of the reduction process to occur. See below:

3. An elevated voltage is needed to allow a sufficient ionic current of 500 micro amperes to flow from the silver cathode to silver anode and overcoming the inherent resistance of the water.

Note 3. Several times an experiment was conducted in order to determine what level of ionic current flows at what voltage level. It was experimentally found that 500 micro amperes could flow in excess of a potential of 300 volts of capacitor filtered direct current (DC). A 240VAC input is an ideal voltage to rectify ($240\text{vac} \times 1.4 = 336\text{dc}$) and filter with large capacitors, assuring an ionic current of 500 micro amperes will flow. Much later a special experiment with a precisely regulated voltage showed that between 100mV and 103 volts DC the increasing current level as the voltage level rose higher proved to be proportional. At much higher voltages however above 336 to as high as 672 a tripling of the voltage the current rose non-linear from 500 micro amperes to 1,500 micro amperes respectively. A three-fold current increase for a doubling of the voltage.

4. Whilst the ionic current will automatically take care of the ionization of the silver, the simultaneous reduction of the ionic silver as cations attracted toward the cathode electrode, occurs by way of a 420nm intense light source. This consists in its simplest form as an array of 280 standard size (6mm) violet LEDs radiating 420nm and fitted on a 250x100mm PCB in 28 parallel rows of 10x LEDs in series each drawing 20mA in series. At a maximum voltage of 3 volt each that would require a DC power supply of 30 volts at a current rating of $28 \times 20\text{mA} = 560\text{mA}$.

Note 4. Voltage needs can vary with some LEDs allowing higher voltages and higher current. It is recommended to keep to Manufacturers specifications for an extended maximum life.

Warning! Contrary to general awareness, violet light at 2.95 electron volt (eV) exhibits properties as an ionizing agent and is harmful to the eyes. Direct viewing must be avoided and even photographs taken will be overexposed.

5. Explaining the entire procedure of the production in a simple and complex way:

A. The simple way: When everything is ready, water in the tank. electrodes partially submersed in the water and distanced 200mm apart and at least 50mm away from the back, front and bottom of the tank and the 420nm LED array and connected to a 30 or higher volt DC power supply. The placing of the LED array must be located just above the water's surface, i.e. 50 to 75mm above and facing downward to the water. Placing the LED array vertically against one of the walls of the tank would severely impact this light source by absorptions and internal reflections.

With switch-on both the current through the water and lighting-up the LED a number of things happen:

1. Irrespective of the voltage level but more in particular ***the equilibrium voltage of water***, the water molecules will start to be polarised with the hydrogen pointing to the cathode electrode and the Oxygen side being orientated to the anode electrode. With a high enough voltage potential, claimed to be 1.23 volts DC, self-ionization of the water molecules occurs by the formation of H^+ and OH^- . H^+ is a Hydrogen atom deplete of its only electron. If the pressure increases, the hydrogen and Oxygen atoms will separate altogether and continue to exist and collected as individual Hydrogen and Oxygen gases. Prior to such separation however, the OH^- will be attracted and flow toward the anode electron as an anion. When it arrives at the silver

anode it will grab a silver atom and extract its outer and unpaired 47th electron, which will be absorbed by the water as a hydrated or solvated electron. The silver atom now away from its bulk metal electrode and missing an electron is now charged positively and moving slowly with some drag toward the cathode and ionic silver (Ag^+) is born and seeking neutralization.

2. Simultaneously however, the overhead located 420nm light array is causing multiple collisions with its 2.95 electron volt (eV) energy and dislodging the captivated Hydrated electrons by forming a ***virtual sub-atomic photon-electron particle*** and able to scurry away or indeed attracted by a close ionic silver atom and turning it neutral. Having turned the silver ion into a neutral atom however can only exist that way for a brief moment before turning ionic again, except in the situation where two silver ions in extreme close contact with each other turn neutral simultaneously and form a covalent bond by donating electrons for that bond. This creates a silver molecule called a dimer, a stable identity and join with other dimers to form stable covalent bonded neutral atomic silver clusters.

B. The complex situation:

While all of this is going on, creating water ions, silver ions and hydrated electrons, the water disturbing voltages and current are still ionizing the water molecules and there can be no surprise for the hydrated electrons to be used up to maintain the integrity of the water. It would be no surprise also that somehow covalent bonding occurs between the neutral silver atomic clusters and water molecules. Generally, under normal metallic silver submerged in water is considered '***hydrophobic***' or '***water-hating***' as the two substances will not come closer to each other and a static-electric charge named the Zeta potential will be created and separate the two. So now, the silver atoms are appearing to form covalent bonds where each substance is part of the other. The evidence that this actually occurs is supported by the following conditions:

1. Adding fresh water to an existing mix of water and silver formed by the already discussed process, causes an ionic disruption and instability, making diluting the product impossible. That also means that batches will require production in specific concentrations such as 5ppm, 10ppm and so on the match as the required Minimum Inhibitory Concentration (MIC) by medical authorities.

2. When the final product is measured on its ionic content, using a very high resistance input analogue based meter of no less than 10,000million Ohm, the reading obtained is no different than the same measurement obtained on the original pure deionised water, i.e. from around 2 to 5 micro amperes on a 100 micro ampere meter FSD (full scale deflection).

3. This nano silver, better identified as quantum nano meter-sized neutral atomic silver clusters held in a static electric suspension, originated in early 2009. The method of production has proven to be both consistent in its operational end product. Its stability by keeping the substance in Pel (polyethylene) soft drink bottles fully filled and kept in semi-darkness has also maintained its stability for at least a decade. Dated from 2009 until 2016, and contained in at least a hundred of 1.25-liter and 3-liter bottles filled with this nano silver has proven stable with the only change showing a slight characteristic yellow tinge. A preliminary report including photographs showing the contents has been recorded (reference: L. Walsh 2023).

Note 5. Removing an electron (a sub-atomic particle) from a metal atom in water and using photonic energy to subsequently return the electron through the use of a photon is part of the Quantum Physics world. When it was discovered that light consisted of particles that also presented these particles to be wave-like, this dual nature energy was termed a 'Quanta' and hence Quantum Physics was used to describe the workings inside the atom. Since then, the photon as a particle is thought to be the exact moment of observance of an ever-lasting wave function. For those and other reasons referring to this product as quantum silver is justified.

END OF CHAPTER 1. To be continued!

ADDENDUM.

1. An explanation of ionic water occurred in the mid 1900s.

It was named the Double ionic layer theory, dubbed the DLVO theory drafted by four scientists named: Boris Derjaguin, Lev Landau, Evert Verwey and Theodoor Overbeek. This theory sets out the electrical charges and the forces between the water and anything else in the way of foreign substances and its dispersion in such water. Some of these charges such as the Stern layer and potential, the Zeta potential and the attraction of the van der Waals forces all effect what is happening in the water both in a hydrophilic (water loving) or hydrophobic (water hating ways, by mostly metals including silver) reactions. For some reason however this may apply to molecular models, but at quantum levels other rules appear to be needed. Some of these are:

- * The quantum confinement of electrons constrained by small single digit nano meter sized atomic clusters causing so-called blue shifting to impacting high energy photons.
- * The quantum confinement of water molecules themselves.
- * The absence of gravitational forces on single digit nano meter and pico meter-sized clusters all less than 10nm in size.
- * It is more of an electrical suspension than a dispersion as quoted in the DLVO Theory.

2. Is water really a dielectric substance and allowed to endowed with a Dielectric Constant value?

For at least two hundred years, SCIENCE has tried to prove that water is indeed a substance worth considering a dielectric by awarding it with a dielectric constant value of approximately 80, in comparison of a vacuum having a dielectric constant of 1. Closer examination of this so-called fact questions this dielectric constant value as shown by the following scientific facts:

A. Water cannot and should not be compared with substances like for example a sheet of glass, acrylic or poly-carbonate as water is a mixture of the two gasses Hydrogen and Oxygen in a ratio of two to one.

B. Water is a very volatile substance breaking its bonds at a steady rate of 10^{-15} and 10^{-18} seconds, something not happening with the substances mentioned in A.

C. Water is a substance of a dipolar nature and capable of ionising itself or ionising or dissolving many other substances, even metals.

D. Only water is claimed to possess and exhibit a double (ionic) layer effect, a Stern potential, a Nernst Potential and a powerful Zeta potential and in some conditions a Quantum confinement effect, not present in any of the other substances included in the Dielectric Constant Value Group.

E. It is mystifying why there exists a Dielectric Constants for a host of varying substances Ranging from a vacuum value at 1 to water with at around 80 and the many other substances considered a dielectric without any of these stipulated at what purity the CONSTANT has to be measured. In particular a vacuum, air and water, needing a vessel in which it must be contained and again their purity. That is difficult in the case of a vacuum and without getting involved in atm, PSI, mmHg, Torr or mbar, simply choosing a level of vacuum such as created by an efficient vacuum pump on Earth or the vacuum of outer space. Air and water are equally subjected to a standard and the containment required would affect the measurement as well. Glass is another substance **hard** to pin down for measurement such as having to determine the type of glass to choose, being a soda-glass, a crown or flint glass, a borosilicate glass, lead glass or a piece of pure quartz. Unless the type of material the dielectric material is represented, a dielectric constant can never be precise. Complicating things further, is finding a standard way in which all dielectric materials can be measured in identical ways and by way of some standardised and known measurement. Such as Ohms, voltage, current or capacitance reactance.

Special Comment:

The ingredients for the majority of Dielectric Constant measurements use in principle a capacitive reactance on one of the forms of the electrically based Wheatstone Bridge and alternating current, despite most capacitors used for filtering and storing direct current for powering regulated and common power supplies. Unfortunately, in all cases where capacitive plates are used, interfering parasitic capacitance is ever present and compromising accurate readings. In 2023 I have found a way to utilise capacitive plates in such a way, that interfering parasitic capacitance is completely ignored and accuracy in measuring the capacitive reactance up to 10^{-12} is obtained.

E. Many substances and metals will hold an 'STATIC' Electric or Direct Current charge even after the source of the electric charge has been removed, something that is unlikely to remain in the water.

F. A dielectric substance to which water has been included is considered an insulating substance. This can only be partially true if the water is 100% absolutely pure and kept isolated from the Environment. In all other cases, water exposed to the environment will almost immediately form carbon dioxide and dissolve matter falling into it. Again, a property inconsistent with other more durable dielectric-named substances.

CONCLUSION:

For water that has no form to be given a Dielectric Constant and unable to be compared to any other substance and materials that do have form, would seem a flaw in the science of the Dielectric Constant realm in its present doctrine. Or in other words: If a fixed form of a lump of glass of infinite viscosity is both an insulating material and a dielectric, formless

substances like water, air and a vacuum definitely are not. Nevertheless, instruments have been designed capable of testing most substances that do have form and those that do not in identical ways and parameters on their pseudo-dielectric properties. Details of such instruments will be made public in the near future.

Hans Laroo