

**Terminology for use with QUANTUM SILVER research.**

**Note!** *This collection of terms, words and brief explanations is meant to assist in the ongoing research into Quantum Nano Silver suspended in water, the introduction of a standard for its production, use in clinical trials 'In Vitro' and its long-term storage.*

**ADMITTANCE (SYMBOL- Y)** 1. The reciprocal of impedance. 2. The ease with which an alternating current flows in an electrical circuit, such as a motor or transformer winding.

**AFM:** Atomic force microscope, also named scanning force microscope. It is able to resolve pico meter sized objects.

**ANALOGUE MEASUREMENTS:** The use of analogue based instrumentation such as galvanometers, analogue multimeters and Vacuum tube voltmeters, devices and equipment to measure the environment by way of magnetism, light sensitive devices, pressure-sensitive devices as distinctly different from using digital technologies. Analogue is always a constantly changing but continuous (without stopping) phenomena. Analogue, can also be best illustrated by undulating positive and negative excursions such as those of sine waves going from zero to a gradual higher amplitude (positive) return to zero and now a negative amplitude and returning to zero once again, making a complete circle albeit in two halves.

**ANALOGUE ELECTRONICS:** Analogue electronics measurement of continuous events in one form or another as compared to digital events like precise steps like a staircase configuration.

**ANION:** A negative ion having an excess of electron(s).

**ANTIOXDANT:** Also referred to as a 'free radical scavenger. Antioxidants are Vitamin A (converted from Beta Carotene) and the vitamins C (Ascorbic acid) and E, all of which are found in the vegetables we eat and capable of counteracting damaging 'free radicals'. Sodium Boro hydride is used in the same way to neutralise Silver Nitrate ( $\text{AgNo}^3$ ).

**ATOMIC CLUSTER:** A localised collection of atoms that form a cluster due to covalent electron bonding, i.e. donated electrons.

**ARGENTUM:** Latin word for Silver and hence its identification on the periodic table as Ag. Its neighbours to the left are Palladium and to the right Cadmium.

**ASYNCHRONOUS:** Where one situation is not in step (not synchronised) with another. Where the lack of synchronising is completely opposite, the two situations cancel out..

**BIOFILM PROTECTED BACTERIAL COLLONIES:** Those considered as drug resisting bacteria or super bugs are:

1. *Staphylococcus aureus* (Staph) 2. *Enterococcus fuecium* (EF), 3. Tuberculosis (TB), 4. *Streptococcus Pneumoniae* (Strep), 5. *Enterococcus faecalis*.

**BLACK LIGHT:** Alternative expression of broad band Ultraviolet light at around 360nm.

**BROWNIAN MOTION:** An unpredictable, random and erratic zig zag movement of micro and nano sized particles in a liquid media like water, brought about by a continuous collisions with surrounding molecules. Brownian motion is named after Scottish botanist Robert Brown.

**BICHROMATIC MICROSCOPY:** The observation of samples with a microscope enhanced with reflected red light and transmitted green light. This technique will show metals such as irons as red and organic materials as green.

**CAPACITANCE (Abbreviated C):** 1.The inherent property of an electric circuit that opposes a change in voltage. (The property of a circuit, whereby energy may be stored in an electrostatic field).2. A property which permits storage of electrically separated charges when potential differences exist between the conductors.

**CAPPING AGENTS:** Chemicals that are used to cover and protect and/or stabilize metallic nanoparticles from unwanted aggregation. Of no benefit to atomic silver clusters, as it insulates the interfacial static electrical charge.

**CARBON DIOXIDE (CO<sub>2</sub>):** A harmless colourless and odourless gas consisting of a single carbon atoms covalently double bonded to a pair of oxygen atoms. The most likely location is as bubbles in soft drinks and as a by-product of our metabolism

**CATIONS:** Positively charged ions attracted to the cathode.

**CELL:** In most cases a square or rectangular glass contained for the benefit of holding water or other fluids for subjecting to light source tests.

**CHARGE CARRIERS:** Ions in a liquid that are either cations or anions, attracted to the cathode or anode respectively.

**CIRCULAR POLARISING FILTERS:** These consist of a linear polarising filter (front) and a quarter wave plate at the rear, where it converts the selected polarisation to a circularly polarised light inside the camera. It is used with digital cameras.

**CLASSICAL PHYSICS:** All physics other than quantum physics which deals with matter inside atoms.

**CLUSTERS:** Formation of atoms suspended in water.

**CONDUCTANCE (SYMBOL G):** 1.The ability of a circuit to conduct current. It is equal to amperes per volt and is measured as Mhos.  $G = I/R$ .2. The real part of Admittance. (The Reciprocal of resistance, and also measured in Mhos).

**CONDUCTANCE (Chem. Symbol G):** The ability of a circuit to conduct current. It is equal to amperes per volt and is measured in mhos.  $G = 1/R$ .

**CONDUCTIVITY:** 1.The ability of a material to conduct an electric current. It is the reciprocal of resistivity. (**Author:** not resistance. 2The conductance between opposite faces of a unit cube of material. The volume conductivity of a material is the reciprocal of the volume resistivity. (The ability of a material to conduct current - The reciprocal of Resistivity).

**CONTAMINATION:** The contamination of a liquid is the amount of foreign material that should not be in there.

**COSMIC RAYS:** High energy particles from space like protons that constantly rain down on radiate on Earth going right through most metals at a rate of approximately 200 per second/per square meter. Like all other radiation from Ultraviolet and X-rays, can cause cell damage if direct collisions occur.

**CURRENT HUGGING:** Current hugging is created during parallel resistance, when one of the two resistors of the pair has a slightly lower resistance and thus drawing more current than the resistor with the higher resistance. Prevention of 'current hugging' is used with arrays of power transistor in audio amplifiers or power supplies. Each of the transistors are fitted with a low value high current resistor, i.e. 0.33 Ohm at 5 or 10 watts to even out the current.

**CUVETTES:** Usually small and 75mm long 10 x 10mm square plastic containers to hold liquids for analysis in a spectrophotometer. Some cuvettes are made from quartz glass in order to allow far ultraviolet light to pass up to 200nm wavelengths,

**DEIONISED WATER:** Water from which most of the ions have been removed to be considered suitable for use as a basis for producing electro-photochemical atomic clusters at pico and nanometre sized clusters

**DIFFRACTION GRATING:** A block of optical glass engraved with parallel lines. The closer the lines are, the shorter the wavelengths it can produce. It can be a transmission or a reflecting type of diffraction grating. It breaks up light into a spectral band like a glass prism.

**DIGITAL ELECTRONICS:** Digital electronics can best be explained by interrupted analogue electronics. Analogue electronics is a continuous condition that is often digitised for specific processing in order to obtain wider bandwidth and higher dynamic ranges in audio and radio equipment. It can be compared to a sine wave that comes in small steps like a staircase going up and down simulating such as sine wave. The more steps there are in a given waveform the closer it becomes like a real sine wave.

## **DIODE LASER**

**DISPERSION:** Matter placed in a contained of liquid in which it will disperse itself, i.e. spread as far as it is able to.

**DIELECTRICS:** Glass, plastics and other insulating materials, even water, are referred to as dielectrics and offer extremely high ohmic resistances in the order of millions and even thousands of millions of ohm and almost completely opposing any flow of current.

**DISTILLED WATER:** Water that has been superheated to the point of steam that enters a cooling system and returns to a purer water than before. Its maximum resistance is generally not higher than 1 million Ohm. Contrary to popular belief, very small contaminants can be carried by the superheated into the cooling chamber and again contaminate the water, albeit to a lesser extent.

**DISSOLVED SOLIDS:** This is a contradiction in terms as something that is a solid cannot be dissolved. It is generally referred to as ionic matter in water and measured in fractions of Siemens.

**ELECTRO-MAGNETIC WAVES:** Photons at frequencies/wavelengths from sub-harmonic radio waves, broadcast radio, Mega Hertz, Giga Hertz, into visible light at Tera Hertz, Ultraviolet, X-rays and Gamma rays and finally Cosmic wave, spanning an enormous spectrum of energy in the Universe

**ELECTRO-PHOTO-CHEMISTRY:** Electrical energy coupled with photonic energy to initially remove electrons and subsequently return them. Simultaneous oxidation and reduction. The aspect of reduction is also known as **Photon Electron Transfer**.

**ELECTRO-PHORESIS:** The movement of charged particles in water due to the application of an electrical field potential, whereby positive charge carriers move to the cathode and those negative to the anode. The actual voltage potential determining the speed by which this movement occurs.

**ELECTRON MICROSCOPE:** A high magnification microscope in the order of tens of thousands time magnification due to high voltage accelerating electrons casting an image onto a fluorescent screen, without the limitations of an optical microscope's diffraction limit.

**ENTROPY:** A constant change from order to chaos and the dissipation of heat to coldness

**EMULSION:** The combination and interaction of two dissimilar fluids like oil and vinegar, which is neither soluble nor miscible, i.e. a homogenous mixture.

**FARAD:** An electrical unit of Capacitance, a way of measuring the value of a capacitor or condenser. A Farad is a very large value as generally in electronics values more like Pico farad  $10^{-12}$ , Nano farad  $10^{-9}$ , Micro farad  $10^{-6}$  are used.

**FARADAY, MICHAEL:** English Scientist with many scientific discoveries to his name and creator of the First and Second Law of Electrolysis and setting the basis for recognising that the amount of electrical current is directly related to the removal of atoms from an anode. 1791-1861.

**FEMTO:**  $10^{-15}$ .

**FREE RADICALS:** Free radicals are mainly unpaired electrons. Silver in particular has an unpaired electron in its 5<sup>th</sup> (outer) shell. It shares this with copper and gold which have unpaired electrons in their 4<sup>th</sup> and 6<sup>th</sup> outer shells respectively. Antioxidants possess a full complement of atoms and when near atoms like silver, gold and copper they donate one of their electrons to pair-up with the unpaired electron facilitating a form of neutrality that is no longer harmful to living cells. Ionic silver is neutralised generally by hydrated electrons during a collision with photons in the spectral light region of 420nm at 2.95eV, an ionising or reduction radiation.

**HELMHOLTZ LAYERS:** There is an inner and an outer Helmholtz layer in the realm of Interfacial Science, consisting of  $H^+$  and  $OH^-$  at the surface of a semi-conductor material, which in a similar fashion to the Double Layer theory is followed by a layer of

diffuse ions. With metals in water, it is the Stern Layer (positive ions) that relate to such an internal layer.

**HYDROPHILLIC:** Meaning water loving, i.e. seeking attachment with water, such as ions being totally absorbed.

**HYDROPHOBIC:** Meaning water hating, i.e. creating a static interfacial charge and avoiding water.

**IMMERSED SOLIDS:** Foreign material in water that carries no measurable charge that can either be organic or inorganic.

**INVERSE SQUARE LAW:** The physical law of changes to diminishing values as the square of the distance, in particular applied to light reducing in illumination as the square of the distance from its source. For example a measured intensity of a light source at 1 metre distance over an area of one metre will only be a quarter of that at 2 metres and one sixteenth at three metres.

**IMPEDANCE (SYMBOL - Z)** 1. The total resistance to the flow of an alternating current, as a result of resistance and reactance. 2. The total opposition (i.e., resistance and reactance) a circuit offers to the flow of alternating current at a given frequency; the ratio of the potential difference across a circuit or element of a circuit to the current through the circuit or element. It is measured in Ohms, and its reciprocal is called admittance.

1. The opposition to an alternating current as a result of inductance or capacitance. 2. Opposition to the flow of alternating current

**INDUCTANCE:** 1. The inherent property of an electric current that opposes a change in current. (The property of a circuit whereby energy may be stored in a magnetic field). 2. Property of a circuit that tends to oppose any change of current because of a magnetic field associated with the current itself.

**INFRARED:** The area of the electro-magnetic spectrum from 700nm and longer, that can be felt on the skin but not seen. It is beyond the colour red we can see such as from a heater and extending all the way to Far Infrared and radio waves..

**INTERFACIAL SCIENCE:** The science of how various materials act at the surface of water.

**IONIC SILVER:** Silver that has lost an electron during the electrochemical process and whilst in the condition completely dissolved in the water and invisible. Its existence however can be measured with a resistance meter or a Conductance meter.

**IONIC VALENCE BOND:** Atoms joined in such a way that an outer electron of one atom donates its electron to the outer ring of another atom. A good example is water, where hydrogen and oxygen form such a valence bond.

**I<sup>2</sup>R LOSS:** Loss of energy in a conductor due to thermal friction.

**IR DROP:** Describes a loss of voltage potential.

**ISO-ELECTRIC POINT:** The iso-electric point is where water has no net electrical charge.

**ISO-TROPIC:** Having the same properties in all directions.

**JOULE:** A unit of energy equal to 1 watt per second.

**LASER:** An abbreviation of the full description of Light Amplification by Stimulated Emission of Radiation

**LASER POINTER:** A narrow beam simulating a laser beam in a limited way by distributing light over a narrow range of wavelengths from a laser diode. Not to be confused with a real laser that produces a single totally synchronised wavelength of light, i.e. all waves in step and not out of phase.

**LIGHT SCATTERING:** Scattered light is reflected light that derives its name by scattering reflected light in more than one direction. This is particularly increased by an increase of surface area and reduction in volume ratio. A further increase in surface area can also occur by unevenness.

**LIGHT SCATTERING, ELASTIC & INELASTIC: (1).** Elastic light scattering is a form of theoretical light scattering used in describing aspects of nuclear and particle physics in relation to kinetic energy propagation. Whilst this kinetic energy is constantly conserved within the centre-of-mass frame work, its direction and propagation can be deviated. **(2).** In comparison to elastic light scattering, the kinetic energy of Inelastic light scattering is **NOT** conserved. Inelastic light scattering is the more common and fundamental process in which energy of incident particle is either lost or increased. Compton scattering is a form of inelastic scattering of a photon by a charged particle. It is during this scattering process that the energy of the photon is transferred to an electron that recoils after this encounter. The loss of photonic energy is displayed by a loss of its energy as a red shift, a longer wavelength.

**LINEAR POLARISING FILTERS:** As distinctly different from a circularly polarising filter that is a combination of a linear polarising filter screened by a quarter wave plate for use with digital cameras. Linear polarising filters were predominantly use to take away unwanted reflections of glass and water surfaces during the era of Black & White photography.

## **MISCELLANEOUS ANOMOLIES AND ODDITIES**

**NANO, NANOMETER: A measure of  $10^{-9}$**

**OHM:** A unit of resistance expressed as R.

**OHM'S LAW:** The integral relationship between R resistance, I for electrical current and V or E for electrical voltage potential, i.e. 1 ampere will pass through 1 Ohm at a voltage potential of 1 volt. From that we can determine that if R resistance is halved, twice as much current can flow, yet increasing R by two will halve the current flow. Ohms Law dictates that by changing one of the parameters of either R, I or E, you will effect a change in at least one other.

**OLIGO-DYNAMIC EFFECT:** It is claimed that metallic ions such as silver denature proteins by binding to reactive groups, resulting in death of the cells. In the case of Silver, Gold and Copper, each having an unpaired electron in their outer shell, i.e. 5<sup>th</sup>,

6<sup>th</sup> and 4<sup>th</sup> shells respectively could cause a free radical type of destruction by short range static electric charge. All three metals are a source of free radicals.

**ORGANIC:** Anything living or originating from the living

**OSCILLOSCOPE:** An electronic instrument that can present representations of current, voltage and resistance values including waveforms on a cathode screen for viewing and studying. A bit like a very primitive television set but a very useful instrument in the electronic industry.

**OXIDATION:** The removal of one or more electrons from a substance causing rust. This creates an imbalance between the number of electrons and protons that are normally equal. This substance is now in an ionised state.

**PARALLEL RESISTANCE FACTOR:** In electronics there are two oddities that can either subtract or add, depending on capacitors and resistors. In the case of resistors placed in parallel, their individual values would reduce, i.e. two parallel connected resistors of each 1,000 Ohm would measure only 500 Ohm and connected in series (end to end) would read 2,000 Ohm. Capacitors on the other hand when placed in parallel would now be twice as high in the value of Farad and when in series only be half of that value. Parallel resistance are particularly relevant when measuring conductivity levels in water when considering the combined resistance of the water placed in parallel with the instrument used for measuring. If the water would have a value of 10 million Ohm and the meter used had only an input resistance of 1 million Ohm, the measured total resistance would be slightly less than 1 million Ohm, a very large error factor. A good guide for water would be to have an instrument with an input resistance of at least 10KM Ohm (10,000 million Ohm)

**PARTICLE:** 1. Name used in the realm of nuclear particle physics. A particle is an atomic object whose weight is greater or equal to the weight of an electron. 2. Something that is not complete but a small part of something. 3. Bulk silver that has been finely pulverised and dumped in water in order to emulate so-called "Colloidal Silver" which it is not.

**PERMEANCE:** A property of a metal to carry magnetic lines of flux.

**WATER'S pH:** Parts Hydrogen. At a pH of 7, water is considered neutral, below 7 acidic and above 7 alkaline or basic.

**PICO, PICOMETER:** A meter used to measure quantities of  $10^{-1}$

**QUANTUM:** Mostly used to describe a quanta or photon of light, but other quanta such as discrete forms of energy can also be used

**QUANTUM ENTANGLEMENT:** A theory becoming a reality that entangled nuclear particles such as electrons, can communicate instantaneous and thus violating the Speed of Light. Einstein lamented at this as "spooky action at a distance"

**QUANTUM PHYSICS:** The physics of the very small at an atomic and sub-atomic level as compared to Classical Physics which is the realm of macro-physics, i.e. our daily physical world.

**QUANTUM REALM:** The existence of very small time and dimension scales starting at 10nm and below, the realm also of atoms. In fact everything inside an atoms is considered quantum physics. Nothing is certain! Electrons can only be deduced from being in a certain space where observation is likely to influence what is being observed. Photons can be identified as a particle or having wavelike properties and literally nothing appears as it seems, yet quantum physics and the realm in which it forms part is all pervasive throughout the entire universe and those tiniest building blocks of energy and particles that we are made of.

**REACTANCE (SYMBOL-X):** Capacitive reactance (XC) and inductive reactance (XL) are opposed to current through capacitors and coils respectively. It is directly related to the frequency of an alternating current. The reactance of a capacitor decreases with increasing frequency, but the reactance of an inductance increases with frequency.

**REDUCTION:** The result of ionic matter returning to a neutral state with a full complement of electrons.

**REFLECTION:** A bouncing back of a visible electromagnetic wave as it strikes a surface different from which it originated. The angle of reflection is identical to the angle of incidence

**REFRACTIVE INDEX:** A ratio between the wavelength travelling in free space and a medium other than free space, causing such a wave to bend. A familiar sight is the seemingly bend pencil in a glass of water or the break-up of white light into its spectral colours. Refraction can also be explained as the bending of electro-magnetic waves through media of different densities. The angle of refraction is that compared to a line perpendicular to the surface of a medium.

**RELUCTANCE:** 1. Resistance to the flow of magnetic lines of force.2. The resistance of a magnetic path to the flow of magnetic lines of force through it. (It is the reciprocal of permeance and is equal to the magneto-motive force divided by the magnetic flux).

**1. Electricity Electronics Dictionary by Howard H Gerrish.2. Modern Dictionary of ELECTRONICS by Rudolf F. Graf 3.**

**RESISTIVITY SPECIFIC:** 1.The resistance offered by one cubic centimetre of material to the flow of an electric current, expressed in Ohms/centimetre.2. Resistivity: A measure of a material to an electric current either through its volume or on a surface. The unit of volume resistivity is the Ohm/centimetre; the unit of surface resistivity is the Ohm. The ability to resist current: the reciprocal of conductivity.

**RESISTANCE (SYMBOL- OHM):** 1.The quality of an electric circuit that opposes the flow of current through it.2. It is defined as the resistance through which a difference of potential of one volt will produce a current of one ampere.

**ROTATIONAL ENERGY:** The thermal energy created inside a Microwave Oven at frequencies of several Giga Hertz and otherwise by lower radiofrequencies.

**SAM:** Scanning acoustic Microscope

**SCANNING ELECRON MICROSCOPE:** An electron microscope with a scanning facility to enable to see depth and associated dimension and as such more detail.

**SCM:** Scanning confocal microscope

**SIEMENS:** A measure of conductivity (current) as opposed to resistance, an increase of which will result in a lesser current flow. In the case of pure and ultra-pure water the values of the Siemens will be 1 micro Siemens for 1 million Ohm, 0.1 micro Siemens for 10 million Ohm and 0.01 micro Siemens for 100 million Ohm

**SILVER HALIDE OR SILVER SALT:** Formed between silver and the following halogens: Bromine, chlorine, Iodine and Fluorine, resulting in silver bromide, silver chloride, silver iodide and silver fluoride respectively. It is the silver chloride that is often found in questionable colloidal silver products when salt is added during electrochemical production in the mistaken belief that it would increase the production yield. Instead it formed an almost insoluble silver chloride. The reason is that ionic silver is charged positively and chlorine has a negative charge. All the halides are light sensitive and were used in Black & White photography.

**STREAMING CURRENT AND POTENTIAL:** Streaming potential and current are a combined electrokinetic phenomena related to Interfacial charges, electro-chemistry and a Zeta potential. This claimed to occur when a liquid electrolyte is pressure forced through a narrow tube or porous media under a static electric charge. A variation of this can be envisaged by using gravity as the pressure component and a vertically placed tube or porous medium. Some acceleration can be gained when the tube is constructed as a spiral, such as a double walled water distilling tube

**SUSCEPTANCE (SYMBOL- B):** 1.The reciprocal of reactance.2. The reciprocal of Reactance, and the imaginary part of admittance. (It is measured in Mhos).

**SPEED OF LIGHT:** 299,792 kilometres per second.

**STM:** Scanning tunneling microscope.

**STERN LAYER AND POTENTIAL:** Due to the hydrophobic properties of silver when immersed in water

**SUPRA-MOLECULAR ASSEMBLIES:** Collections of many molecules organised in a well organised manner.

**SUSPENSION (CHEMISTRY):** A heterogeneous mixture of particles, generally at micron size with the ability to sedimentation.

**SUSPENSION (PHYSICS):** An electro-static suspension usually involving interfacial electrical charges such as a Zeta potential. Nano metre sized atomic silver clusters develop such an electrical suspension which has a mutually repelling action.

**TEM:** Transmission electron microscope.

**THERMAL ENERGY:** Thermal energy is heat, derived from the Sun's rays, electricity, and combustion.

**TYNDALL EFFECT:** A form of reflected and scattered light on water taking on the shape of a cone of light. If the incident light covers a large area the cone is wide and narrows to a point. If however the incident light is projected through a small opening, i.e. a pin hole it forms the tip of the cone and spreads out.

**TURBIDITY:** Visible turbidity is caused by contamination in a liquid such as water. Light travelling through the liquid presents a level of obscurity that can be measured by a photocell and quantified. It is organic and inorganic material that should not be there in the case of pure and ultrapure water.

**ULTRAMICROSCOPE:** The modification of operation of an optical microscope to view objects smaller than those sized smaller than the wavelength of visible light, i.e. at 400nm and below using scattered light at an angle against a dark background. Particles as small as 4nm have been recorded

**ULTRAVIOLET:** Part of the electromagnetic spectrum that starts at 399nm and extends down to 100nm. Any shorter wavelengths are called X-rays.

**VIOLET:** There is some confusion as to what constitutes spectral violet light ordinarily located between 400 and 425nm where it borders indigo at the lower end and ultraviolet on the high side. Officially the visible spectral colours range from 400nm to 700nm, but some people claim to be able to see beyond red and also claim to be able to see light waves as short as 380nm identified as near ultraviolet. For silver, 420nm Violet is significant as an absorbed wavelength. It is curious that at around that same wavelength, water becomes substantially more transparent. At 420nm Violet light which equates to a frequency of 713.790 Tera Hertz (THz), its electron volt energy is 2.95eV.

**VIBRATIONAL ENERGY:** This is caused by the lower wavelengths of visible light other than indigo and violet. Reds, orange, yellow and even green incident light causes jostling of electrons in an atom and cause vibrational thermal energy

**VISIBLE SPECTRUM:** Officially ranges from 400nm to 700nm.

**VTVM:** Vacuum Tube Voltmeter used by many technicians in the early television and audio industry in the 1900s due to its superior high input resistance of 1,000 Million Ohm and able to measure that. In comparison the best digital multimeter can only reach 200 million Ohm.

**WATER:** Water, far from being of a static nature, can instead be considered chaotic when taking a closer look under high magnification, although some of the events inherent in water happen at time scales of  $10^{-18}$  seconds.

**WATER'S SELF-IONISATION:** Water is endowed with a volatile nature, constantly making and breaking the bonding between the Oxygen and Hydrogen as well as constantly also forming local molecular structures, in an attempt to adapt to matter other than water or even the material of the container it is in. In addition to such changes, water also has the ability to self-ionisation by forming Hydronium ( $H_3O^+$ ) and Hydroxide ( $OH^-$ ). The ratio between Hydronium and Hydroxide will determine the water to be either acidic or alkaline. When the two states balance out, water has a neutral pH of 7. This occurs at a temperature of 25<sup>0</sup> Centigrade.

**WAVELENGTH VS FREQUENCY:** For the longer wavelengths starting at 1Hz (1 cycle per second) and all the way up to microwaves (Giga Hertz), convention has been using frequency as an indicator. Even higher toward Tera Hz, frequency appears easier to relate to. Wave length does become the norm from far Infrared and visible red at around 700nm and all the way in the visible range at 400nm (violet) and beyond well

into the Ultraviolet. Wavelength in relation to frequency has as a common denominator **the speed of light** at 292,792 kilometres per second. Divide this figure by the wavelength in nanometres and get the frequency, or divide by the frequency and arrive at the wavelength, i.e. 292,792 divided by 420nm (violet light) and obtain the corresponding frequency at 713.790 Tera Hz

**WET CHEMISTRY:** Chemicals dissolved in an aqueous solution like water, mostly within the scope of molecular chemistry.

**WET PHYSICS:** Reconstituting metals by firstly removing one or more electrons from a metal atom (oxidation) and then returning these electrons (reduction by photon electron transfer), hereby creating either a single or clusters of multiple atoms that are considered neutral whilst immersed in the water.

**YELLOW TINGED SILVER SUSPENSION:** So called “colloidal silver” which scientifically is best referred to as nano/pico sized atomic silver clusters in an electrical suspension in water, would like the bulk metallic silver absorb the spectral colour violet (spoken off as being blue) at around 420nm, depending on its purity. Having absorbed this so-called “blue”, there remains the spectral colour yellow and hence a yellowish tinge when the absorption becomes visible due to the atomic clusters having sizes at 20nm or more or a very high concentration of relatively small nm clusters. Something in the opposite direction is Raleigh Scattering, the blue sky away from where the sun is shining and the atmosphere has absorbed the yellow, except toward the sun

**ZETA POTENTIAL: (1)** The Zeta potential static electric charge is one of a few electrical charges formed between a metal and the water it is immersed in. It is an interfacial charge and in the case of silver clusters that have valence (electron) bonded and are Hydrophobic (water hating), it is thought that the Zeta potential of silver always displays a negative static electrical charge that is repulsive and its value related to the surface area, i.e. the smaller the cluster and the larger the ratio of surface area to volume, the higher the cluster’s repulsion with other clusters and the higher the Zeta potential. **(2)** A Zeta potential charge is exclusively between a cluster of silver atoms and the water it is contained in. Each cluster may be slightly different in size, i.e. contain more or less silver atoms.