Microcluster Mineral Technology

Bio-Electronics of Microhydrin®
By Dr. Patrick Flanagan

Microclusters are composed of 10-1000 atoms. In the molecular world there are numerous atoms, molecules, and colloids found throughout nature in the plant, animal and mineral kingdoms. Microcluster® silica in a nutritional form is a registered trademark owned by the author. Colloidal and microcluster particles have similar properties but there are finely differentiated variations in size, electron charge distribution and solvation properties. Nanotechnology is used to control particle size in order to maintain certain unique properties found in Microcluster® silica. Nanotechnology refers to the science that enables the creation of particle characteristics that perform at subcellular and submolecular dimensions. Nanotechnology will provide the next century with many productive uses involving environmental issues, biological transport, biological engineering and information transfer at the nanoscale level.

Microcluster® silica is a conglomerate mineral cluster formed with potassium and magnesium in addition to the mineral silica. Particles are stable, have a large surface/volume area and a potential that creates a cloud of electrons, enabling bonding properties of other ions and compounds. In most colloids, 99% of the atoms that make up the particles are on the inside. Less than 1% of the atoms in colloids exist on the surface of the particles. In Microcluster® silica, 99% of the atoms making up the particles are on the surface. The surface atoms exist in a flowing liquid energy state. These particles have a chemistry energy profile that is very different from ordinary silica. After examining Microcluster® silica, Dr. Bruce J. Marlow of the University of Massachusetts at Amherst said

Using electrophoretic and differential electrophoretic fingerprinting combined with photon correlation spectroscopy, it is shown that the silica particles in the Flanagan Microcluster colloids do not show the properties of other silica surfaces and are unique. (Marlow, 1989).

They uniformly bind water in a structured fashion, creating cages or spaces between surface atoms and water. Structured water at the interface can hold small ions also between the arranged water molecules. Hydrogen bonds formed between these water arrangements are fairly stable. These spaces have been shown to trap small ions, electrons or other water molecules. These properties occurring at the mineral microcluster interface give it unique functional properties.

Albert Szent-Gyorgyi and Linus Pauling also observed water cages in the 50™s and 60™s fascinated with how water oriented itself in biological systems between proteins in muscle tissue and albumin preparations. Water would form a structured lattice up to five molecules deep between muscle proteins. Protein structure also depends on the hydration status both in solution and within the cell.

Szent-Gyorgyi received the Nobel Prize in Biochemistry in 1937 for his work with metabolic chemistry. He also discovered vitamin C. He studied muscle tissue during a large part of his career. His investigations lead him to write numerous publications in several areas and for a period of time he wrote about his observations on the bioelectronics of living cells. Specific experiments completed by Szent-Gyorgyi and Hopkins showed that cells contained high

quantities of a reducing agent not attributed to more commonly investigated intracellular reducing agents, such as glutathione.
iiThere is in muscle an unknown reducing agent in quantities ten times greater than glutathione; this reducing agent is strongly bound to protein.In irThe observation of Hopkins indicates that tissues contain a rich store of electrons of high biopotentialln (Szent-Gyorgyi 1972).
Results using thiourea as the indicator of reduction (changes color when reduced) indicated that the quantity of H (hydrogen) electrons stored by tissue was considerable. Intracellular proteins were accumulating electrons for later use similar to a biochemical battery (Hopkins 1925, Szent-Gyorgyi 1972).
During cell division and other compromising cellular situations such as muscle exertion and cell damage; the cell reverts to fermentative conditions of energy production, utilizing the H pool, because O_2 is less available. He reasoned that the H pool contains enough H to cover the energy needs of the cell during one division, which would be replenished later in interphase (completed cellular division). In rapidly growing tissue there is no time to replenish the H pool so we can expect to find it depleted (Szent-Gyorgyi, 1972). Embryonic and severely compromised tissue could not reduce thiourea because they lacked sufficient amounts of hydrogen. This is contrary to other tissues which would reduce thiourea in the following order liver>intestine>kidney>heart>lung>spleen (Szent-Gyorgyi, 1972). Studies by L.C. Vincent have shown that rapidly dividing cancer cells are oxidized and acidic and that they contain no hydrogen ions (Morell, 1982).
Normal yeast cells when grown in culture were found to reduce thiourea. If the same cells were then incubated in saline without nutrients for a few hours starving them, no reducing potential was observed. Reduction could be restored by suspending the cells for a short while in a nutrient solution allowing the H pool to be filled up. This showed the H pool to be an active constituent of the living system, closely linked to metabolic activity (Szent-Gyorgyi, 1972).
Szent-Gyorgyi also knew that it was highly likely that proteins surrounded by structured water were passing hydride from one site to the next across water bridges. Szent-Gyorgyi and Klotz theorized that reducing equivalents in the form of H- could also be transferred across structured water bridges that surrounded ionic groups on proteins. In these studies the experimental evidence was showing more reducing potential than could be accounted for by reducing agents normally present in these tissues. Proteins could transfer hydrogen electrons in the form of H- across specifically formed water structures (Klotz 1958, Gascoyne et al., 1981, Szent-Gyorgyi 1971).
It was always regarded that hydrogen was the simplest transfer molecule available to the cell in providing protons, an electron or electron pair to numerous enzymes. Hydrogen tends to be the metabolic donor of electrons and O_2 the electron acceptor in biochemical pathways of the cell. Hydrogen or its electrons are constantly passed about in numerous reactions mainly attached to enzymes. It is probably best noticed in fat and carbohydrate metabolism through glycolysis, Kreb™s cycle, and the electron transport chain being exchanged in the form of NADH and FADH complexes (reduced nicotinamide adenine dinucleotide and flavin adenine dinucleotide). The production of reducing equivalents in the form of hydride is common in these biochemical pathways. Fermentation (anaerobic glycolysis) relies primarily on increased NADH production for energy as opposed to aerobic glycolysis whereby O_2 provides the final electron acceptor and produces more ATP.
We began applying the collective knowledge of our work with microcluster

technology and the bioelectronics of cells. It was a recurring theme in our studies and we realized the importance of the reducing potential in the form of hydride electrons that may have been slighted in nutrition. We studied Szent-Gyorgyi extensively reviewing these important concepts realizing that in the abnormal, damaged or dividing cell hydrogen stores were being used up. If there were as much as 10 times more hydrogen in healthy cells, then the bioelectronics of the cell and overall energy functions could also be affected. We were also noticing the reducing potential in other natural systems. We worked with electrolyzed reduced water systems and magnetized water realizing fundamental properties of these systems were that water could be activated to provide forms of hydrogen, which were biologically active. Microcluster® silicates also showed reducing potentials at their surfaces and some could be activated to hold additional electron potential. Hunza water, the mineral water that I particularly studied also had a fairly strong reducing (antioxidant) potential (-350 mV). The waters were also renowned for centuries to enhance the health and longevity of native inhabitants. L.C. Vincent, chief government hydrologist for France, found that the healthiest people in France consumed copious amounts of reduced water. He also discovered that the areas in the country that had the most disease statistics consumed water that contained no excess hydrogen (Roujon, 1977). We found that these drinking water sources were also abundant in numerous silicate minerals with traces of others such as quartz and microclustered silicate minerals. Silica in all of these forms naturally sets up electron reducing potentials especially around the smaller formations because of unique geo-physical properties. Microcluster™s in the range of 5-150 Angstroms are very stable compared with other shapes, are high in energy and can be formed into spherical units.

Our next challenge was to create a process whereby we could form the optimal microcluster mineral and activate it with electrons that would be at the correct energy level to be received by the body. Water microclusters or clathrate cages trap electrons of 1 eV (electron volt) and 6-10eV. These are known as solvated electrons. Life is energetically a very poor and modest phenomenon with actual energy changes below 1.5 eV (Szent-Gyorgyi 1968). The Microcluster® silica particles are able to release the hydride electrons at an energy level conducive to the cell proteins™ biopotential (1.5 eV).

In the 1920™s Langmuir referred to active hydrogen in his studies with gaseous hydrogen under extreme heats of dissociation combining with various metals. Hydrogen, which had been in contact with a heated filament, acquired entirely new chemical properties, and they were in accord with properties expected of an atomic form of the element. When H_2 is dissociated one atom gets the two electrons and the other proton has none: $H_2 \rightleftharpoons H^+ + H^-$ which is similar to the dissociation of water: $H_2O \rightleftharpoons OH^- + H^+$. This atomic hydrogen from a filament, in hydrogen gas, at a low pressure, even after diffusing through several feet of glass tubing at room temperature, can manifest itself by reducing such metallic oxides as WO_3, CuO, Fe_2O_3, ZnO, or PtO_3 (Langmuir 1927). Oxygen and moisture tend to prevent the recombination of hydrogen atoms on a tungstun surface. Langmuir had observed the blackening of these metals (becoming reduced) due to the active form of hydrogen that had been created by higher heats (Langmuir 1927). By tailoring the composition of the silica clusters and varying the number of water molecules, the effects of caging and their influence on the energy surface can be achieved. The clathrate cages at the surface and the high dielectric constant of water keeps the H^- at the surface from combining excessively to create H_2 gas. Chemical reactions that proceed following either a photophysical or ionizing event, are directly influenced by the mechanisms of energy transfer and dissipation away from the primary site of absorption.

Neighboring solvent or solute molecules can affect these processes by collisional deactivation (removal of energy) and also through caging and solvation effects. Proton and hydrogen atom transfer reactions that are important in virtually all reactions which occur in aqueous phases including biological systems continue to be studied extensively by physical chemists (Castleman 1996).
In order to measure H- in a gas an electrode is inserted into the chamber. A Yag laser sends a burst of light into the chamber and the energy (1.2 eV = wavelength of 1 micron) causes the electron to detach from the H: -. The probe has a +20 Volt charge on it. It attracts the electrons and a current is generated (Rev. Sci. Instrum. 55:3 March 1984, 338-341).
It is these unique structures that have the ability to carry electrons, ions, form or carry water molecules, and provide conductance and antioxidant potential to biological systems in the form of a slight biopotential to cellular proteins and for reduction (antioxidant potential) in general reactions. Extensive literature research into geochemistry, nanotechnology and bioelectronics including numerous professional studies, has shown Microhydrin® to be highly beneficial as a nutritional supplement.
Several recent research projects conducted in 1999 have shown specific biological functions of Microhydrin® at the cellular level or in clinical trials. In a double blind crossover trial, seven normal subjects took 4 Microhydrin® capsules per day with one the morning, 2 at noon and one in the evening for 2 weeks. During the alternate two weeks subjects consumed a placebo of rice bran flour. Subjects were tested 3 times per week prior to the trial to establish baseline variance and 3 times per week during the study using the RJL (Rudy J. Leidtke) Bioelectrical Impedance Analyzer (BIA). The BIA measures the resistance and reactance of an electrical current conducted through the body. Electrodes are placed on the wrist and ankle. The current experiences a slight delay (phase angle) due to living cells and water resistance. The phase angle is compared to a reference signal, causing the reactance reading to change and indicates a cell volume increase or decrease. Total Body Water (Sum of Intracellular and Extra-cellular Water) showed a statistically significant ($p < 0.05$) increase of 2.7% during supplementation with Microhydrin as compared to consuming the placebo. Extra-cellular water was shown to increase by 3%, also statistically significant ($p < 0.05$), during Microhydrin supplementation. Other hydration parameters showed increases such as Body Cell Mass (2%), Extra-cellular Tissue (1.5%), and Extra-cellular Water (3%).
Microhydrin is helping the body retain and utilize a significant amount of necessary water. Water participates in all cellular functions of the body, both within and surrounding the cells. It provides the cytoplasmic matrix, predicted to be a highly organized system by many researchers. It lubricates joints, and muscle contraction depends on hydration states of the fibers. The eye functions due to the fluid matrix of its structure. Many people, especially the elderly, can be affected by even mild states of dehydration. Dehydration is one of the most important indicators of the aging process. Slight dehydration (1-2% decrease in body weight) can affect cellular function, kidney function, blood volume, nutrient and waste transport, thermoregulation and many other processes. Lack of proper hydration in body tissues is realized to be a substantial factor in the aging process. Microhydrin® effectively helped the body circulate, absorb and utilize consumed water for its maximal cellular and extra cellular physiological benefits.
As prior in vitro studies had shown free radical scavenging in standard assays against hydroxyl and superoxide free radicals another study was undertaken to observe Microhydrin™s reducing (antioxidant effects) potential in mitochondria. Metabolically active and viable liver cells were suspended for up to twenty minutes with Microhydrin in the cell suspension. The cells were observed with confocal

microscopy for NADH (reduced nicotinamide adenine dinucleotide) flourescence within the cells. Cells showed approximately 30 % increase in NADH production and showed less bleaching (oxidizing) than control assays.
A similar assay using a membrane marker (tetramethylrhodamine methylester) also showed cells suspended in Microhydrin solution increasing their membrane potential (more negative membrane potential) by approximately 25%, as compared to the vehicle controls. Both of these assays indicate a bio-energetic effect of Microhydrin® at the mitochondrial level. This is an additional piece of important research information showing that the hydrided microcluster (Microhydrin®) is delivering the electrons directly to the cell for its bioenergetic assembly. It protected NADH against reverse oxidative damage, as is typical in assays of this type (see vehicle control where NADH concentration declines over time).
In normal aerobic metabolism NADH is one of the primary cofactors that runs the mitochondrial electron transport chain and delivers electrons in the form of hydride (H-) for the formation of ATP (adenosine triphosphate) (Leninger, 1993). ATP stores valuable energy in the phosphate bonds that participate in numerous reactions throughout the cell. ATP and water are liberated with oxygen as the final electron acceptor in the transport chain. These results indicate an ergogenic function of Microhydrin, enhancing intracellular energy without providing additional carbohydrates.
Another recent study performed by an exercise physiology department showed that Microhydrin® significantly decreased the lactic acid buildup during strenuous exercise. Six athletically fit males participated in a double blind crossover study whereby the subjects consumed either Microhydrin® or placebo one week prior to a 40 Km (24.8 mi) bicycling timed trial. Subjects took 4 capsules daily and then 2 mixed with water 30 min. prior to the exercise trial. Subjects were monitored for heart rate, blood pressure, EKG (electrocardiogram monitoring), maximum oxygen consumption, work output, perceived exertion and peripheral blood lactic acid concentration. Other measured physiological parameters remained the same. Blood lactic acid values showed a statistically significant ($p<0.05$) decrease by approximately 50% during Microhydrin® use as compared to placebo use during the same workout regime. Recent research in lactic acid utilization is revealing that lactic acid receptors exist within the cell and also the mitochondria. This research has indicated that the cell utilizes lactic acid as an energy source during intense exercise as it changes to alternative pathways of anaerobic glycolysis (Brooks 1999). Since Microhydrin® enhanced utilization of lactic acid by muscle cells, it again indicated an ergogenic energy function. This condition is also related to Szent-Gyorgyi™s observations that anaerobic glycolysis depends on the hydrogen pool to restore energy. The experimental observations of both increased hydration and lowered lactic acid values during exercise were two important physiological benefits to athletes.
Numerous research projects are in progress this year [2000] testing Microhydrin®. It has been shown to provide electrons to important energetic cofactors through the cell membrane in living cells and to provide similar potential in physiological studies by reducing lactic acid in humans. Prior research showed beneficial effects towards improving Biological Terrain values. Research continues to show numerous physiological and cellular effects. We look forward to the next phase of research with Microhydrin, learning about its many healthful benefits, which are proving it to be an amazing and unique dietary supplement.

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