The Scoop on Water Ionization

Ionization alters water in two significant and measurable ways: pH and ORP. These alterations to water are what make it very different from other waters you may drink.

pH

The pH stands for "potential hydrogen" and is a measurement that provides an indication of the level of hydrogen in a substance. It is measured by the pH scale. Proper body pH is an important factor in good health.

If any substance changes from pH 7 to pH 8, it has become ten times more alkaline. Conversely, if it has changes from neutral pH 7 to pH 6, it is 10 times more acidic.

As an example, a popular Cola, at pH 2.5 is almost 50,000 times more acidic than neutral water, and needs 32 glasses of neutral (pH 7) water to counteract the consumption of one glass of Cola. (Active ingredient: Phosphoric Acid) You can now see that a change from the normal level 7.365 to pH 7 would mean that your blood would suddenly be around 4 times more acid then it should be. You would die from poisoning by your own blood. This is why every body system is used to support the correct blood pH.

You can also understand from this that our blood pH can be affected at any time of the day by a myriad of events; food, drink, stress, pollution, exercise, or beneficially, by meditation, by drinking alkaline water, by deep breathing, even by being happy.

The other way an ionizer alters the water is in ORP. This stands for Oxidation Reduction Potential (also referred to as "Redox" - it's the same thing). Most leading water researchers from Asia agree that in ionized water the elevated pH is good, but that ORP is more important. Alteration to the ORP is what causes the microclustering, antioxidant or anti-acidic and oxygenating effects.

ORP

ORP is a "potential" energy that is stored and ready to be put to work. It's not necessarily working, but we know that the energy is there and we can measure it. Another way to look at this potential might be to look at pressure. If you blow up a balloon, and there is air pressure inside. As long as the balloon is closed, the pressure remains and can be measured. When released, this potential energy becomes kinetic energy.

In electrical terms, potential energy can be measured. When we use the term "potential" in describing ORP, we are actually talking about electrical potential as expressed in millivolts.

This potential is measured in water with an ORP or electron meter. What you measure is the very slight voltage in water. We are actually measuring the presence of oxidizing or reducing agents by their specific electrical charge, thus Oxidation Reduction "Potential". High pH water has more "reducing" agents (-ORP) and lower pH water has more oxidizing agents (+ORP).

Oxidation or fermentation is what turns an apple brown after it is cut or causes metal to rust. Rust weakens metal and signifies the deterioration of the apple. The process of oxidation "steals" electrons from the surface being oxidized. When we measure a something's oxidizing potential, it is expressed in +ORP or +mV and measures the concentration of OH+ ions or oxidizing agents.

A "reducing" agent is simply something that inhibits or slows the process of oxidation or fermentation. The reducing agent does this by "donating" an electron. When we measure a something's oxidation reduction potential, it is expressed in terms of -ORP or -mV and measures the concentration of OH- ions or reducing agents.

In its most basic form a reducing agent is an "antioxidant" ~ reducing oxidation. Follow this link to read more detailed info about the science of pH and ORP.

The ORP of most tap water in the USA is between +200 to +600mv and so it is an oxidizing agent. High pH ionized water demonstrates a -ORP or -mV and so is a reducing agent or "antioxidant". Most bottled waters are very acidic (low pH) and also have higher ORPs (over +400mv).

pH and ORP alteration is a highly variable and depends primarily on three factors:

1. The source water and its natural mineral content - water varies widely in this respect.

2. The voltage applied to the water during electrolysis.

3. The flow rate through the ionizer's water cell.

These variables have a dramatic effect on pH and ORP or mV.

An ionizer works primarily on the mineral content in the water. It is the dissolved mineral content (referred to as TDS) which creates the pathway for the "ionization" (or more correctly electrolysis) to occur. Water without mineral content or TDS, like reverse osmosis or distilled water, will not conduct the current and therefore can not be "ionized" and is therefore called"deionized" water. This first variable is the most crucial to performance. Tap waters vary widely in the dissolved mineral content. The higher the mineral content ("harder" water), the higher the levels of pH and ORP/mV alteration an ionizer can achieve; the lower the mineral content ("softer water"), the lower levels the of pH and ORP/mV alteration. The importance of this variable can not be emphasized enough.

The heart of an ionizer is the water cell which contains the electrodes. The electrodes are what deliver the current and creates the "ionization". We control the voltage conducted through the electrodes and then to the water by selecting the different "alkaline" settings on an ionizer. The higher the alkaline setting (or voltage/mV), the more alteration you will achieve in pH and ORP/mV.

Effective conductivity is the primary determinant - not electrode size - of effective delivery of the current or voltage into the water needed to create electrolysis.

Do not be fooled by the claim some manufacturers make that larger electrodes will necessarily deliver better performance. Generally the larger electrodes have poorer conductivity - so they have to be larger.

The flow rate through the water machine determines how long the water is actually in contact with the electrodes receiving the voltage and the effects of electrolysis. If your flow is fast (say you could fill a quart or liter in 15 seconds) then the water is not processing very long and not receiving much alteration. Conversely, with a slow flow rate (say the same quart or liter took 60 seconds) the water is in the chamber in contact with the electrodes longer and will receive more alteration. You can always achieve higher pH and lower ORP/mV readings with reduced flow rates. So controlling the flow is an important variable in performance.

If your faucet or control dial on your ionizer is all the way "on", the water will process very fast through the machine. If your faucet or control dial is just barely "on", this reduces the flow and the water will process for much longer.

With a fast flow rate you may only achieve slight alteration in pH and ORP/mV, slow it down and you will get a higher pH and a lower ORP/mV. Simply put, speed it up, you get a less alteration; slow it down and you'll get more. This would therefore mean that less is more and more is less.

To illustrate this whole principle lets look at two very different tap waters and their effect on performance. Remember the crucial variable is the dissolved mineral content or TDS (total dissolved solids) which is measured in parts per million. This creates the pathway for the ionization to occur.

In Valley Center, California at the Rancho del Sol the tap water tests at 385 - 1001ppm of total dissolved solids. The tap water in Seattle, Washington tests at approximately 40 - 47 ppm. You could test water from an ionizer in Valley Center at a given setting and flow rate and you would get a certain result. You could test the exact same ionizer in Seattle without altering the setting or flow rate and you would get dramatically different results.

Is it the ionizer? No.

It is the water as the main variable in performance. There is much less pathway in Seattle's water. To further illustrate variability, you could alter the voltage or flow rates through the ionizer in either Valley Center or Seattle and you would get different results again.

Comparing ORP/mV

Lastly, comparing ORP/mV is a tricky business. Stating absolute values is impossible. Anyone who really knows and understands ionizers/pH/ORP/mV would agree. Anyone who states absolutes in performance proves their ignorance on the science behind it.

Further, pH and ORP/mV are not tied to one another. In other words you can measure ORP/mV in two pH 9 waters and get two very different readings.

Another factor to consider when comparing ORP/mV is the level of pH you will drink.

Water with a pH over about pH 11 does not taste good to the vast majority of people. Research states that the ideal range for drinking alkaline water is between pH 9.0 and 9.5. Given this, testing ORP/mV at those levels is where the real bang for the buck is; ORP/mv at a pH level one would actually drink.

Therefore, the only salient way to compare ORP/mV in ionizers is side-by-side, with the same source water and each machine set to achieve the same drinkable level of pH. If you drink pH 9.5 then the ORP/mV you get at pH 9.5 is the effective ORP/mV in the ionizer. Not some "absolute" or even extraordinarily low ORP/mV.

So understanding performance is like understanding a dance between the three variables. Understanding this dance is crucial to making an informed decision when purchasing bottled water, an ionizer, and also in getting the most out of your ionizer's performance.

Source – Dr. Robert O. Young