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Comments on the effectiveness of electronic water conditioning

Our laboratory at Penn State is collaborating with $H_2O$ Elite Labs to investigate the mechanism by which their electronic water conditioner results in a decrease in calcium carbonate scale deposits in home and industrial water systems. The effectiveness of the units has been clearly demonstrated in numerous field applications, case studies, and laboratory investigations. The focus of our work is to quantitatively identify the chemical mechanisms by which the units work.

In situ applications and case studies have shown that scale deposits are removed from cooling towers and from boiler and other hot water systems by passing the water through pipes that are wrapped with these electronic devices, without the need for any chemical or physical manipulations. Field studies have also documented improved agricultural yields and increases in the concentration of calcium and magnesium base cations on cation exchange sites in soils receiving treated irrigation water.

There are hundreds of peer-reviewed scientific publications that support the field and case study observations. As examples, the peer-reviewed literature has documented decreases in scale formation, reduced fouling of reverse osmosis membranes, and improvements in agricultural production. Several explanations have been advanced to explain these results, especially induced formation of calcium carbonate nano-particles in the water passing through the electromagnetic fields. There have also been multiple observations showing changes in water viscosity and surface tension, effects that seem to persist for hours to days after passing through the units.

Our work so far has shown that the $H_2O$ Elite water conditioning units enhance transport of carbon dioxide from water into nano-bubbles. Increased removal of carbon dioxide with the $H_2O$-Elite units results in an increase in pH, increased super-saturation of calcium carbonate solids, and precipitation of nano-particles of calcium carbonate in suspension. Neither the precipitated calcium carbonate nor the nano-bubbles are removed from the stream of water, but those constituents are no longer dissolved. This removes the thermodynamic driving force for growth of scales on heating surfaces and on cooling tower surfaces. It can also explain the increased retention of base cations in soils.

We plan to publish detailed results of our studies in 2019. At this point we can confirm that the $H_2O$ Elite Labs electronic water conditioners has a positive effect on preventing scale formation and removing existing scale in hard waters.

Sincerely,

Brian A. Dempsey
Emeritus Professor of Environmental Engineering