

WaterSOLV™ and Pivots

May 11, 2021



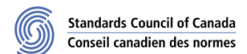
7032 East Cortez Road
Scottsdale, AZ 85254
(888) 788-5807
info@hctllc.com
www.hctllc.com

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We're going to take liberty here in our knowledge about chemistry and corrosion. My background is diverse but what leads us here is the history in which I have in chemistry, corrosion and biology. I've dealt with cooling towers, evaporative condensers, heat exchangers, injection molding water systems, thermal storage, forced evaporation and closed loops. In each of these modalities were trying to maintain process efficiency battling the characteristics of water.

Namely those characteristics are to utilize the beneficial properties of water while overcoming its negative aspects; scale, corrosion and biology.

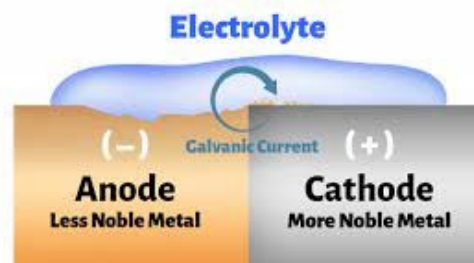
Scale is caused by the use of water, leaving behind the minerals and metals. As the minerals and metals concentrate, they nucleate and grow crystals. This is usually caused by minerals complexing with bicarbonate (the gas that you see bubble when dissolving carbonate bound minerals), the binding of minerals and metals to chlorides (calcium magnesium, ferric, zinc, sodium and for some reason boron), and the natural attraction of the electrons, like protons to electrons, like calcium to potassium and phosphate.

Problems Scale Cause:

Hinders heat transfer – Under deposit corrosion – Microbiologically Induced Corrosion (aka MIC) – Restricted Flow – Scale is the first thing to precipitate onto a heat transfer surface and thereby creates hot spots in injecting molding equipment causing product failure. Most commercial buildings are cooled using water to cool down freon gas back to a compressible liquid. If the water is not evaporated with fans to be cool, the heat transfer cannot exist. And as the water evaporates the minerals concentrate and want to precipitate, just like what happens when we water the soils! But in the cooling industry, they treat the water to get a little more mileage, then dump it in the sewer before it forms scale (or at least that what's they try to do with fairly good results). They use corrosion inhibitors as well, usually zinc or azoles and also biocides (not disinfectants).

Yet in the agronomy world, scale is a nutrient, but when bound in our soils it's a problem. Just like everywhere else, you get biology that lives under scale that can hinder crop health and vitality – you get iron bacteria in water wells that plague pipe lines and emitters.

If you were in the water treatment industry, you'd see this image all the time;



Galvanic/Bimetallic Corrosion of Dissimilar Metals.

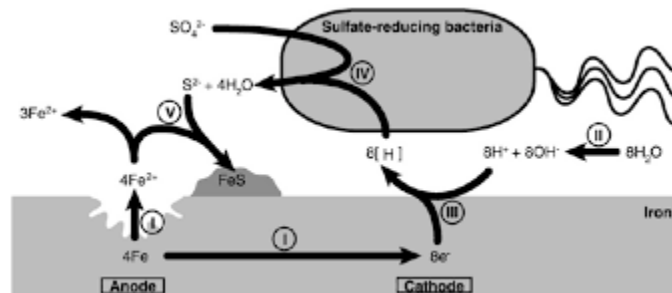
Consider the electrolyte water, or even scale, or perhaps another metal.

Other images you would see;



Microbiologically Induced Corrosion;

The organism can actually pit 304 and 316 stainless steel. It can degrade C1010 mild steel at the rate of ¼ inch each 10 years. Did you know a bacterial infection can reduce bone within your body?



We're in favor on principal of most of these images.

What causes the two pipes to be so radically different?



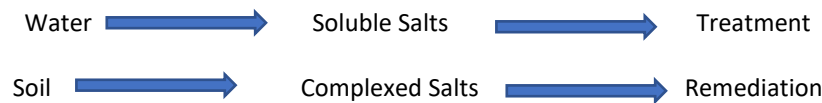
What's important is we think pH causes corrosion and it can, yet orange juice will not reduce steel, but it will attack galvanization.

What if I told you galvanization was designed for aromatic corrosion prevention (air), not aqueous (water). That's a fact. Case and point, what do we use on ships and evaporative coolers to help prevent metal deterioration? Zinc anodes. What is the major component of galvanization? Zinc.

So why do the pivot manufacturers offer re-galvanization services, or rubber lined systems? Because corrosion is inevitable.

Is a pH of 2 with sulfuric or hydrochloric acid, as aggressive as a pH of 2 with Coca-Cola or Orange juice or vinegar? Each solution is a pH of 2! No, the weak acids are not as aggressive as the strong acids and therefore the corrosion rates are much greater from the stronger acids.

But the weak acids will not do the heavy lifting needed to make our soils better or make our water work better. But that's not accurate either. You can use weak acids for the soluble water salts, but you need the strong acids for remediating your soils because your soils contain crystals that can't break down without the strongest of acids. And a whole other topic is the fate of the acidified salts which is a IP of HCT and WaterSOLV.



How do we Remediate Soils Through Pivots?

1. Purchase acid proof lined pivots
2. Run separate acid lines down your pivots to apply acid along with water (and nutrition) \$0.42 / ft.
3. Apply the acid diluted with copious amounts of water (diluted).
4. Apply the acid with fertilizer (avoid doing with N). Fertilizer will reduce the acids corrosion potential
 - a. Measure by pH or by ORP and apply acid to less than +200 mV.
 - b. Every fertilizer and volume will be different.
5. Neutralize any acid in the lines with soda water, after applying acid.

Is it worth the work? When you see how the crops respond, the yield improvement and the cost reductions it will be financially well worth it. You'll be mining soil nutrition you've bought and paid for and never used. You'll be creating the soil the plants stive to produce in, and at a cost less than what you could do any other way.

Corrosion Potential, pH, Ionization Potential, all different modalities, unique to each and every condition. Pure water is ideal as a product of water, it's pH near 5.8, and aggressively corrosive due to its ionization potential. Salt water, extremely alkali, and one of the most corrosive solutions due to the sodium chloride, perhaps worse than sulfuric or hydrochloric. Did you know you have hydrochloric acid in your stomach? Is it burning you?

It is inhibited, just like HCT's WaterSOLV™ Curative;

[HCT, LLC - YouTube](#)



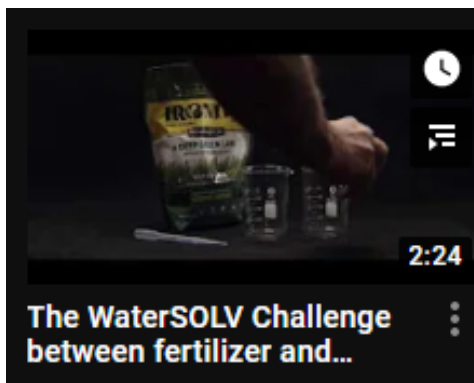
And yet look at the difference between deionized water to scale, versus WaterSOLV™ Curative.

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Albert Einstein said, "No problem can be solved from the same consciousness that created it. We must learn to see the world anew."

Sequester is to form a stable compound with an ion, atom or molecule so that it is no longer available for reactions.

Don't guess, test – Prescription without diagnosis is malpractice.

HIS plan is always perfect and we choose to follow HIS lead.