

HYDROSMART – Dr Bob Moore

Controlling mineral deposition in mining operations



HYDROSMART – Track record

Mining and industrial operations

- Silver (Qld)



- Gold (NT)
- Removal of Struvite (TAS)
- Descaling of cooling tower (WA), etc

HYDROSMART – Track record

Scale removal from surfaces

Shipboard
heating
element



Before



After

HYDROSMART – Track record

Scale removal from filters

Cooling
tower



Before



After

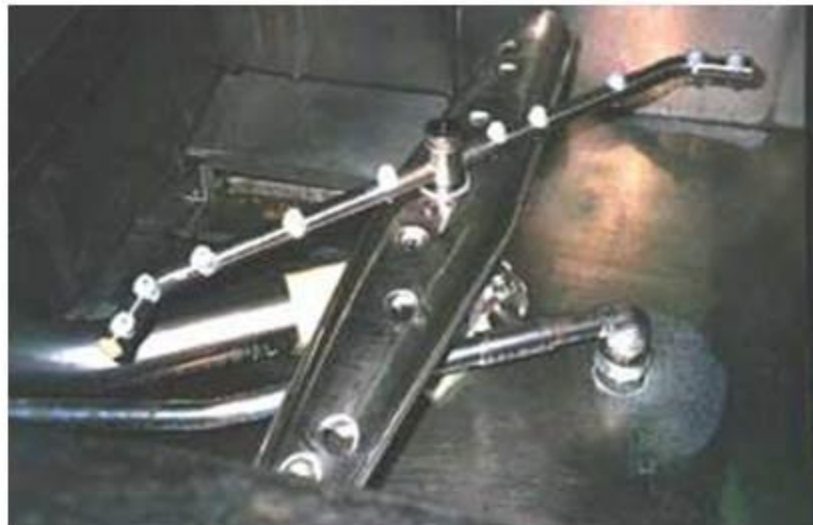
HYDROSMART – Track record

Scale removal from fine nozzles

Commercial
dishwasher



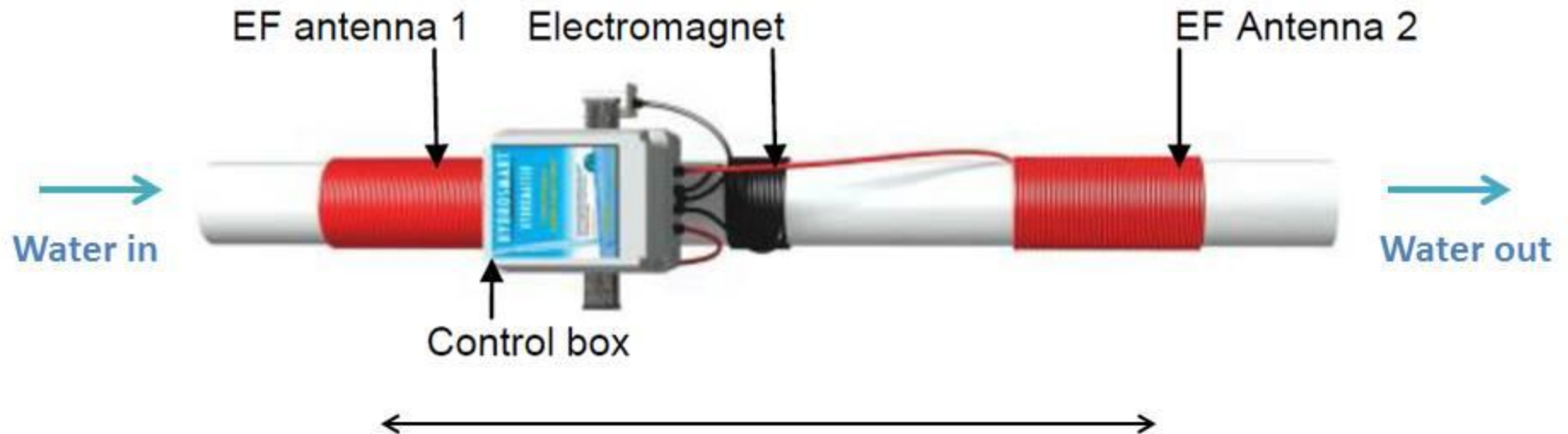
Before



After

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What is it?



**Electrical field produced as radio waves, between antennae.
Voltage is modulated at radio frequencies**

*Hydrosmart apparatus that emits an electric field (EF) in the ULF-VLF frequency range.
Water to be treated does not contact the apparatus*

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What does it do?



- It maintains the dissolved state of minerals, such as calcium, that are present in the water
- It removes calcium, iron and other mineral scale deposits from pipes, equipment, filters, and surfaces
- Hydrosmart frequencies selectively target charged ions (minerals) that are near to water molecules

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Scientific Trial – calcium particle size

(Flinders University, published online at Hydrosmart.com.au)



ELECTROMAGNETIC EFFECT ON CALCIUM CARBONATE PRECIPITATION FROM AN AQUEOUS SOLUTION

Robert B. Moore^{1,2}, Ramya Thangarajan¹, Nahid Shokri¹, Andrew S. Ball¹

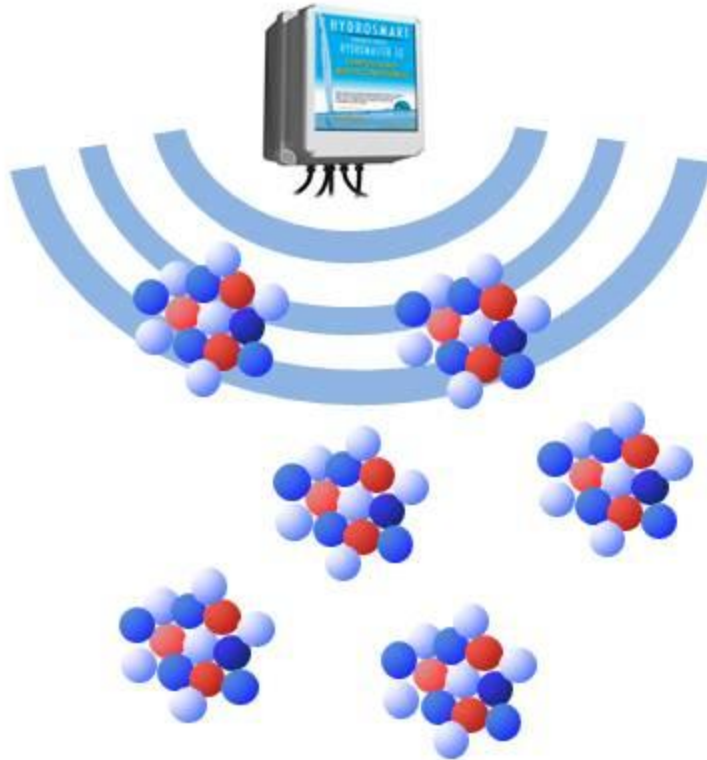
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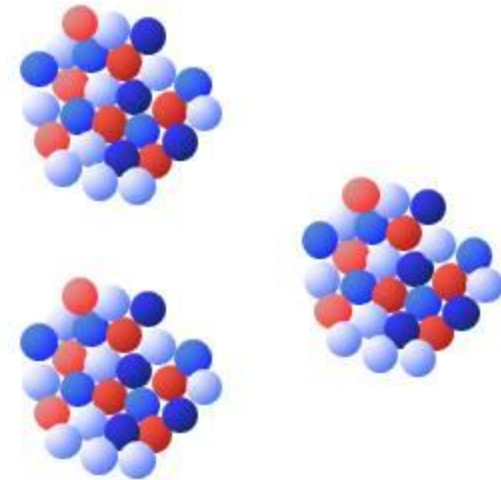
“The technology “Hydrosmart” has here been shown to have physical effects on the kinetics of mineral precipitation from an aqueous solution. Under the influence of ULF and VLF electromagnetic field modulation, calcium carbonate nuclei were greater in number (showing as a turbidity increase), and lesser in size, than in untreated control systems.”

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In simple terms



Hydrosmart



Control (No Hydrosmart)

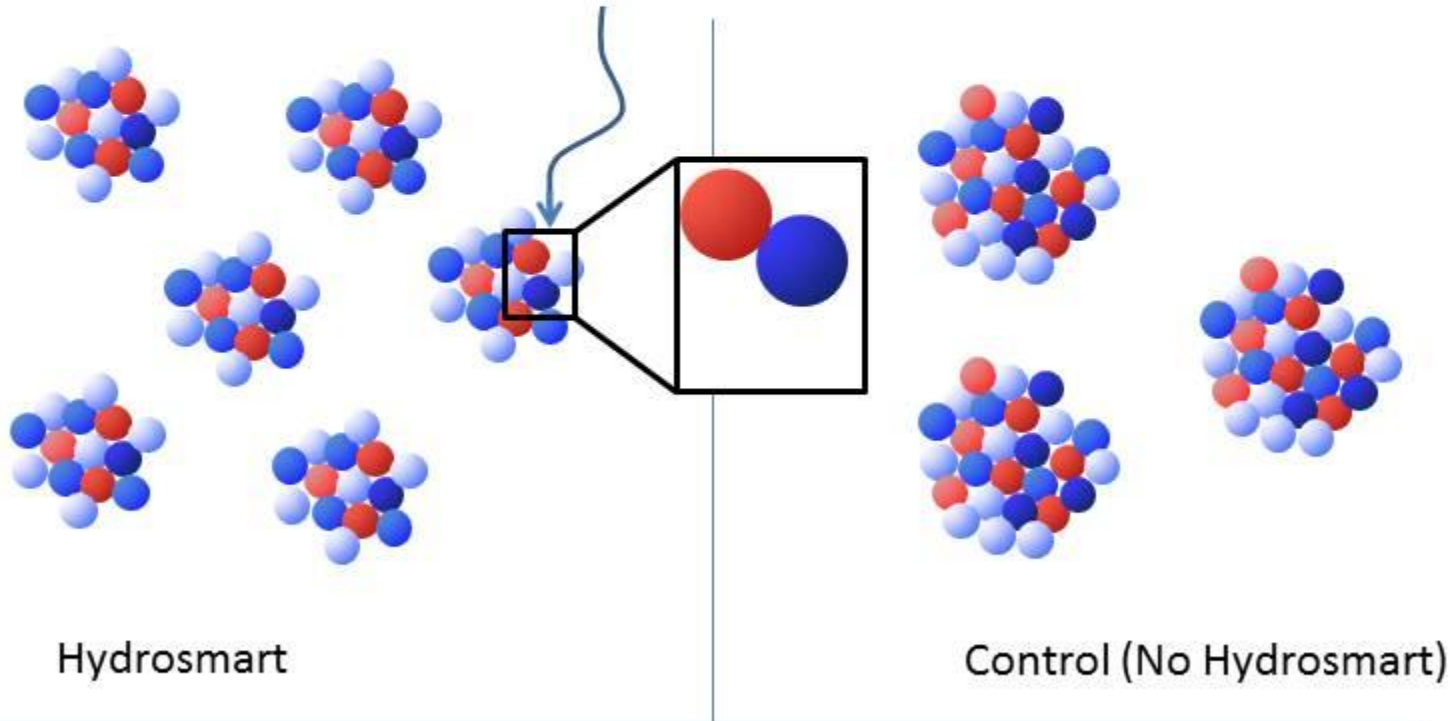
Same amount of mineral atoms in total, but different particle size and number

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Mechanism: getting down to the atomic level. This field is called Physical Chemistry



Zooming in on just a couple of atoms

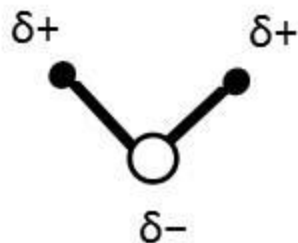
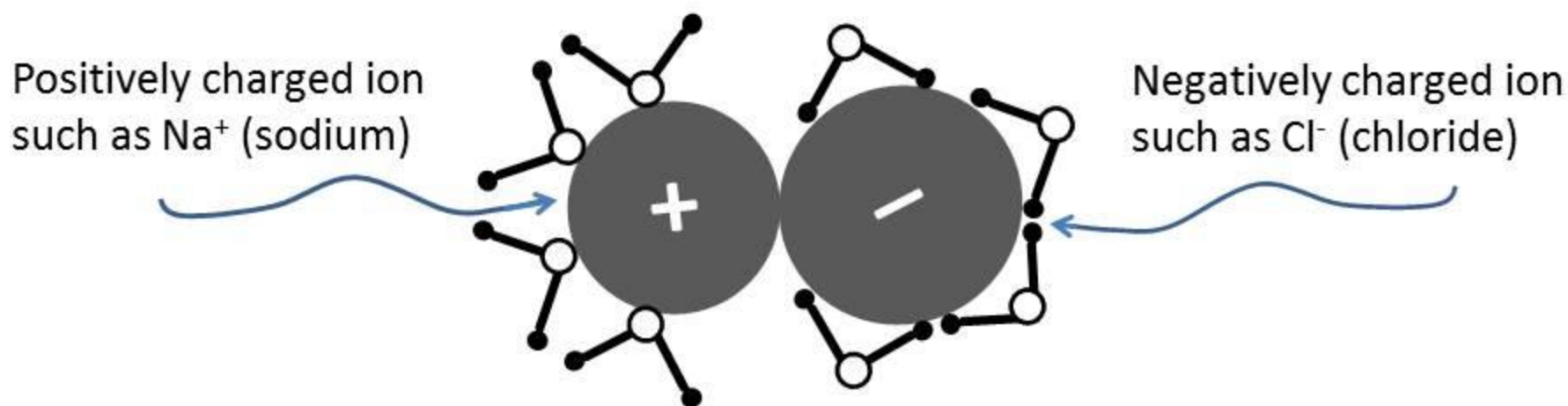


Mechanism

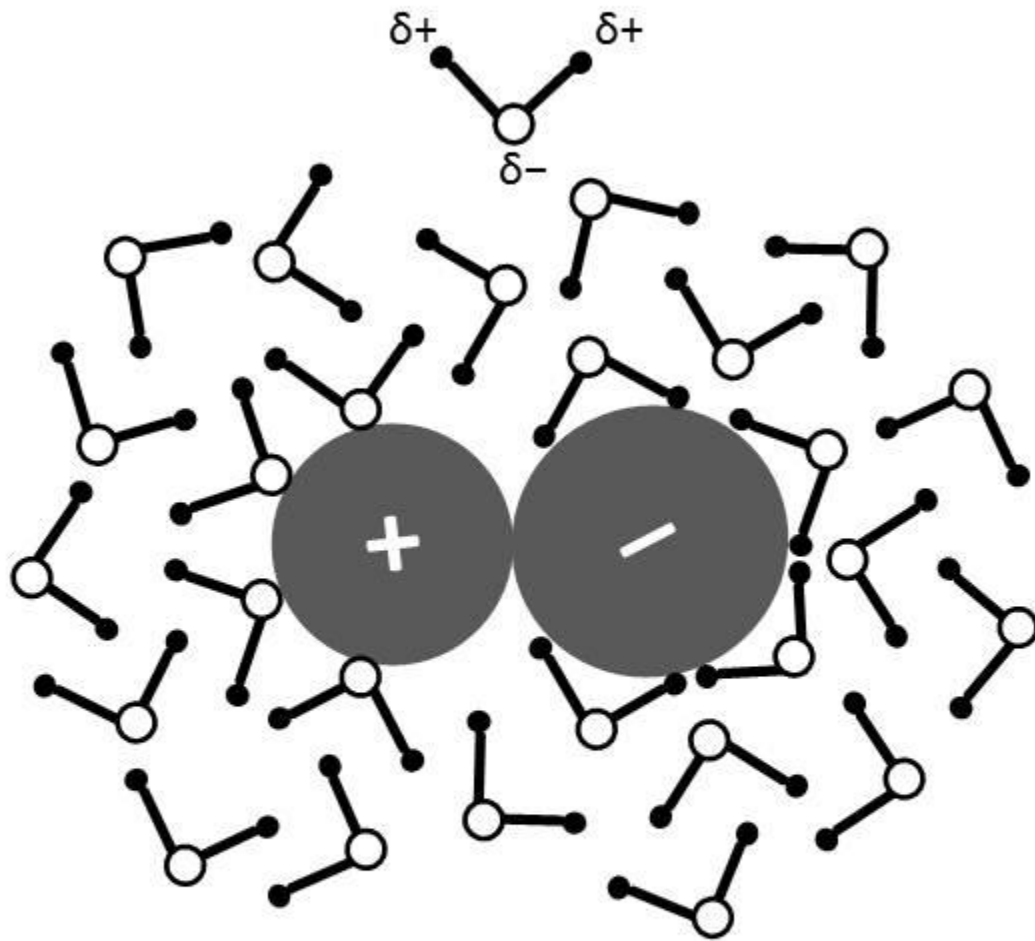
Stage 1: Happens naturally.

Water molecules surround and “hydrate” mineral ions.

Hydrosmart further favours this dissolving process



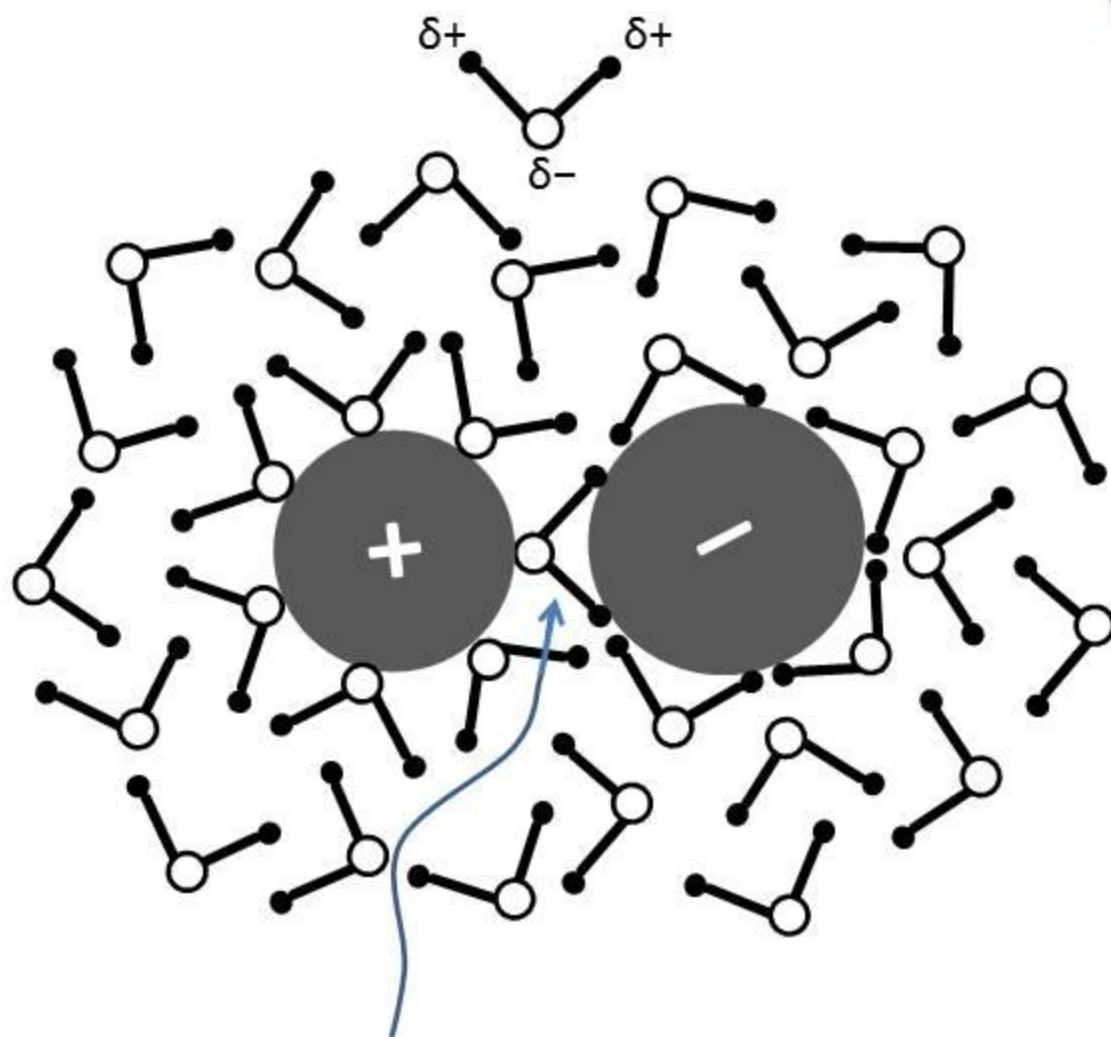
Water molecule, has a dipole (i.e. oxygen atom is negatively charged and hydrogen atoms are positively charged. Charges on water balance the charges on mineral ions, by physically attaching to them. Hydration is the process we all call “dissolving”



Stage 2: Happens naturally.

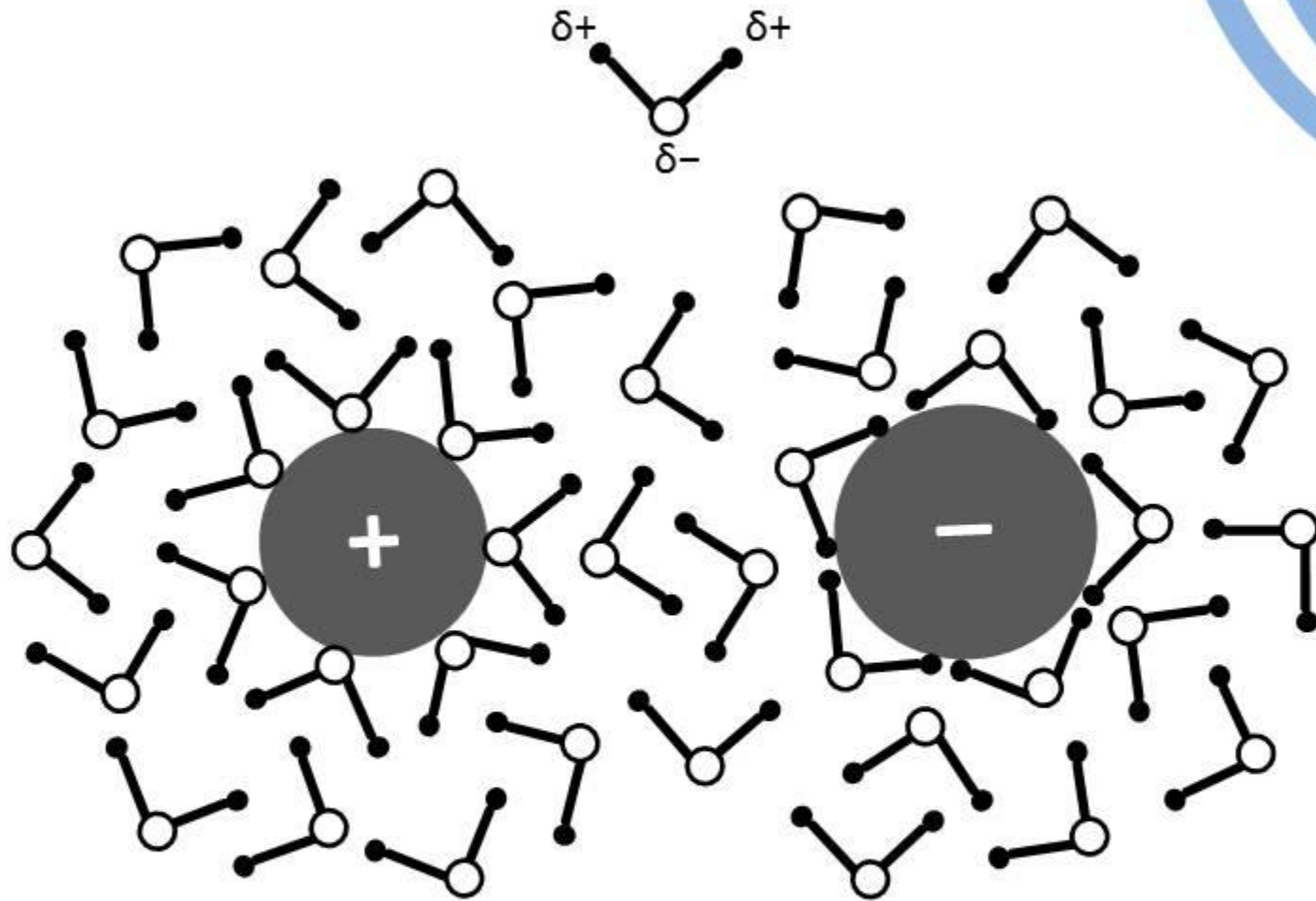
Additional water molecules surround mineral ions.

Hydrosmart favours this process by targeting the ions



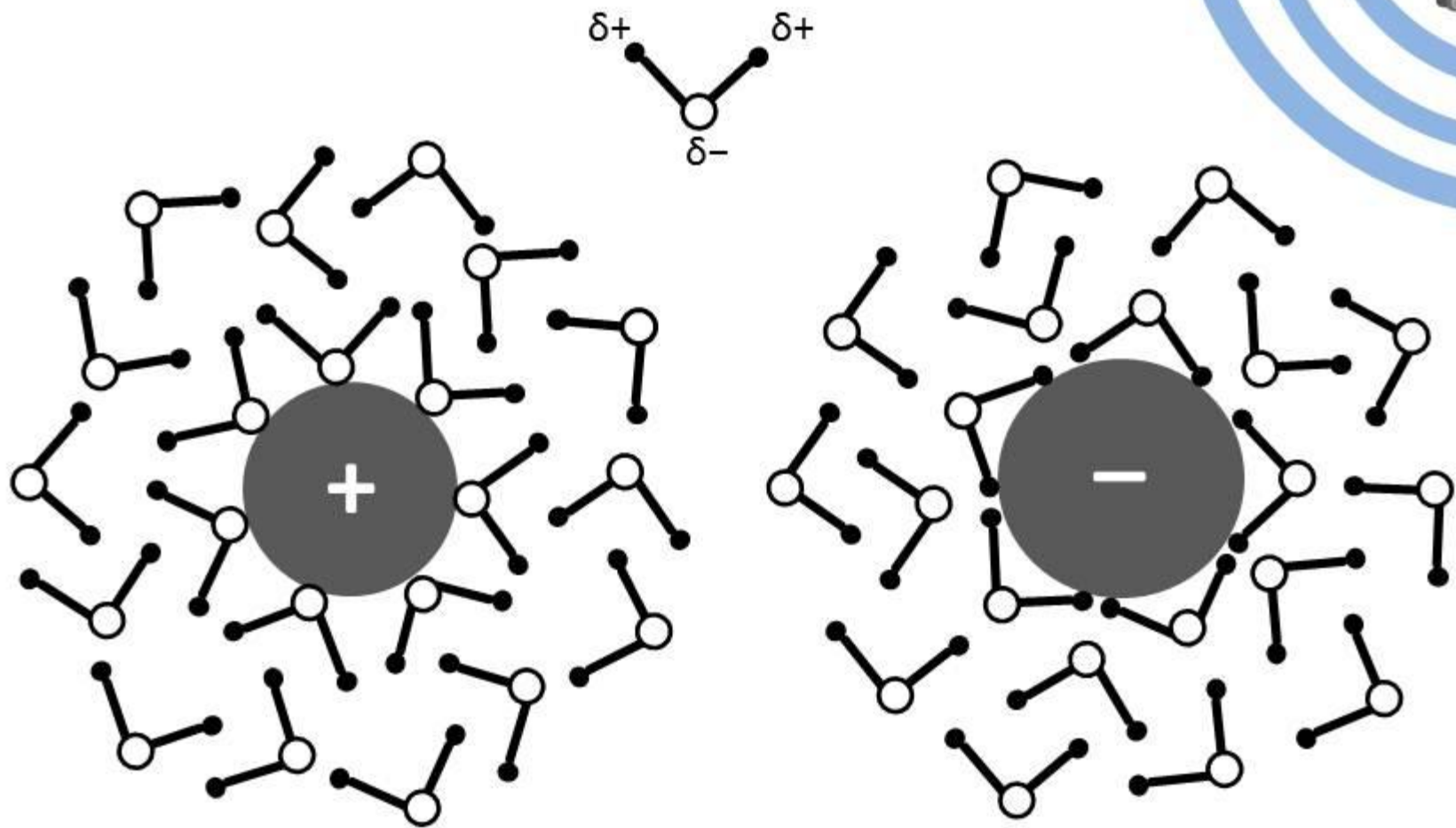
Stage 3:

A single water molecules comes between the mineral ions. Hydro-smart favours this process, accelerating it beyond the natural rate.



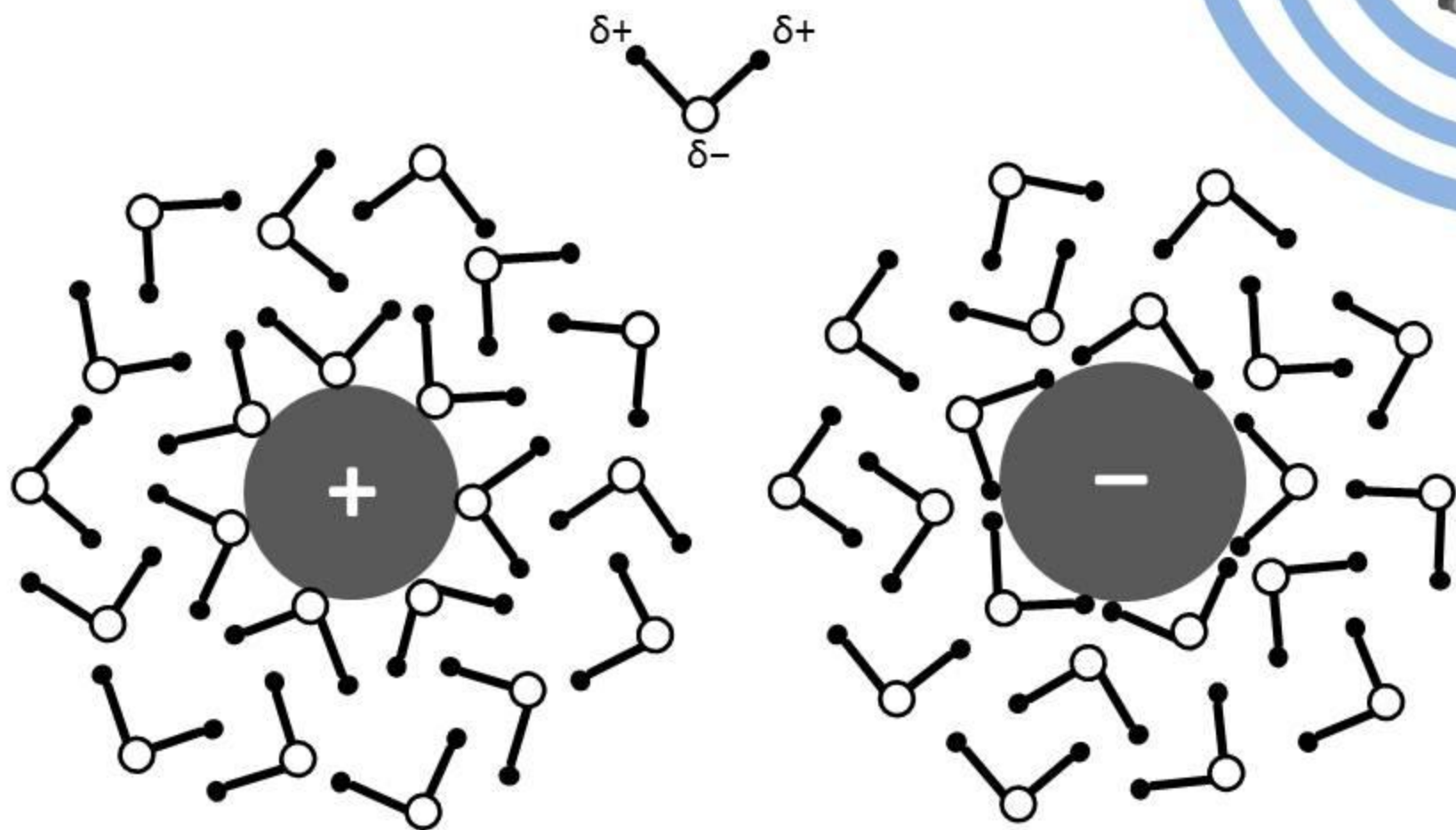
Stage 4:

Water molecules fully dissolve the mineral, but the mineral ions share some water molecules. Hydrosmart favours this process.



Stage 5:

Each mineral ion is independent of others and is now a free agent. Hydrosmart favours this process.

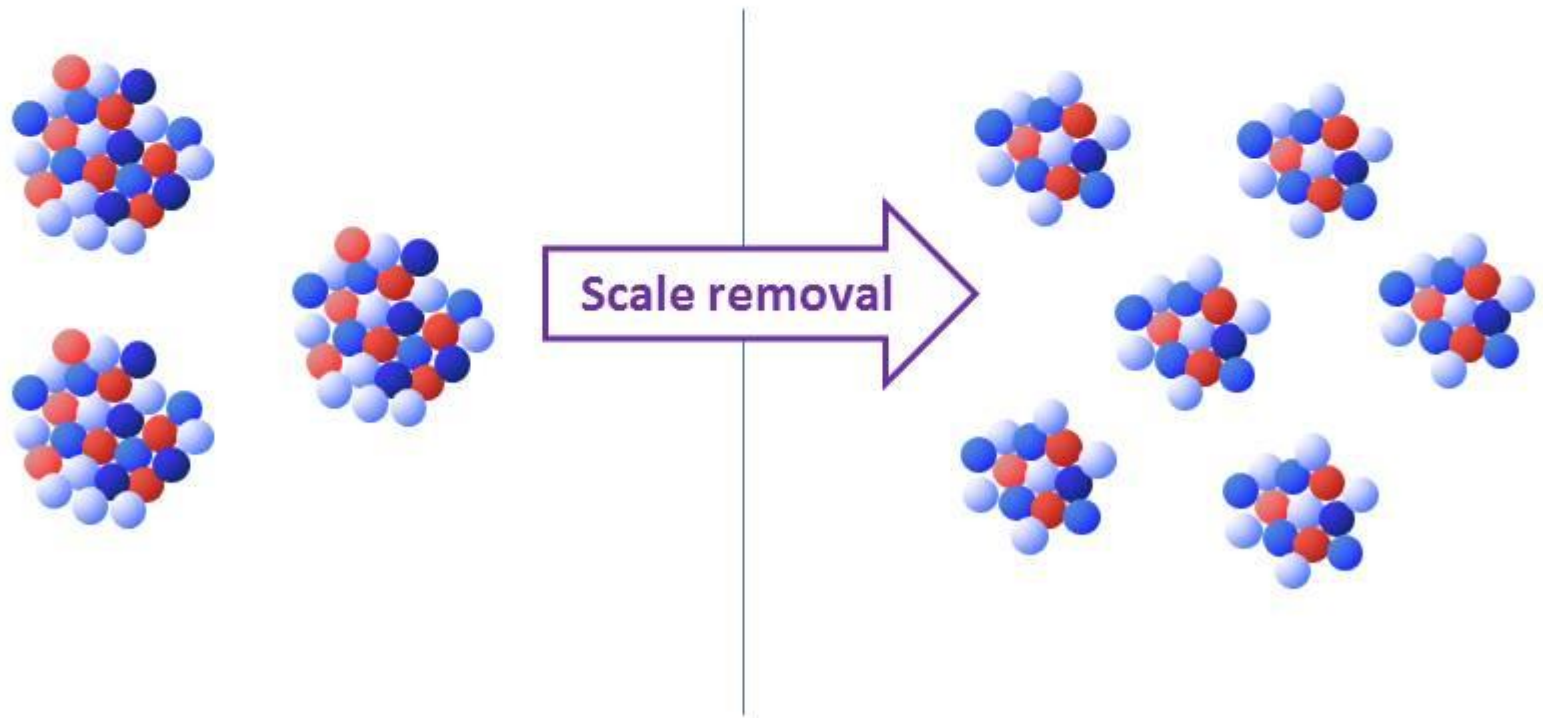


HydroSMART favours the entire “dissolving” process

Each freed ion can scavenge unfreed ions from a mineral compound or mineral layer, in turn freeing them

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Historical perspective
and other benefits



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How and why the 'physical water treatment' field emerged

Calcium precipitates at high temperatures, rather than dissolving at high temperatures. Pulsed magnetic or electric fields will counter this tendency, and keep calcium in solution. Physical Water Treatment was born sometime post-WW2, influenced by ion cyclotron resonance theory which itself was formulated in the 1920s. The other application of the principle is in nuclear accelerators but unlike in the nuclear application where a strong magnetic field is provided, physical water treatment uses the earth's magnetic field. Some fixed-magnet technologies rely on high velocity water flow whereas Hydrosmart is independent of water flow speed. The technology for Hydrosmart arose out of aerospace technicians teaming up with nautical engineers, physics meets water.

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How Hydrosmart interacts with the earth's magnetic field to influence minerals (ions)



Hydrosmart provides



E

o
q



- ve

+ ve

Earth provides



B



Under the influence of **B** and **E**, particles of opposite charge move in opposite directions!
Teasing them apart

E = Electrical field

B = Magnetic field

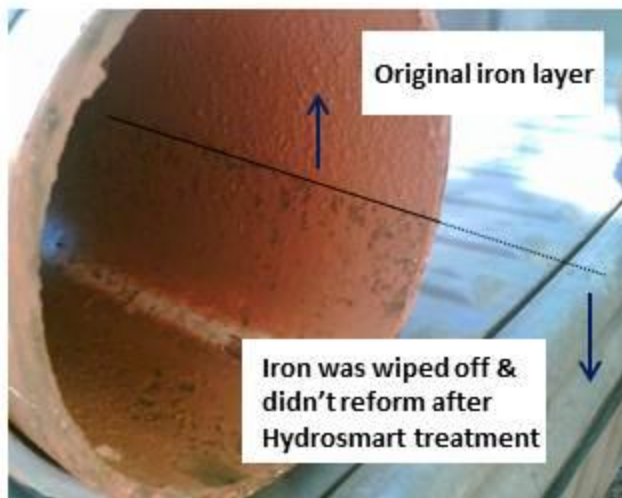
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**The first point of difference
between Hydrosmart and others**



calcium



iron

Unlike other technologies on the market, Hydrosmart was specifically developed to be used to slow down corrosion, and remove iron buildup. It also continues to treat calcium scale.

The applications for Hydrosmart are divided into 8 areas

DOMESTIC



AQUATIC



COMMERCIAL



INDUSTRIAL/MINING



AGRICULTURE



VITICULTURE



COUNCIL/MUNICIPALITY



TURF/IRRIGATION

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How is Hydrosmart applicable to Mining?



Many mining towns and camps are being Hydrosmart-treated for calcium, and similarly, mine dewatering operations are being successfully treated. There is also significant potential for improving the extraction of minerals from ores in leaching operations.

Testimonial - Silver Mine (QLD)



- Heap leach mining operation
- Irrigated with a cyanide solution to leach silver into solution.
- The process recycles bore water in the silver leaching circuit
- Constant consumption and application of anti-scaling chemicals
- Hydrosmart produced no conflicts in the process
- Scale build-up monitored by a scale probe)in the 250 mm HDPE leach supply pipe.
- Scale reduced due to treatment.
- No solid scale formed on the coupon,
- 2,000 ppm TDS water being pumped was now milky in colour,
- No longer the build up and blockage issues that were experienced before
- Hydrosmart units are in constant operation.

Rob Gobert -Principal Metallurgist- Red Earth Group – Mineral Processing Services

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Installation:

Electromagnetic interference issue



Since Hydrosmart works by setting up an electrical field, it has been found that the effect is cancelled if any other AC high-current electrical fields are present in the vicinity of the Hydrosmart, or if the treated water contacts an AC high-current electrical field anywhere along its path to the point of use.

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Running cost



Power: Hydrosmart can run off mains, or off a solar panel. We sell solar systems, or the customer can source their own.

Ongoing cost:

Each Hydrosmart processor uses 5 Watts of power (roughly the same amount of power as a light bulb). Each Hydrosmart large-pipe-diameter system (300, 250, 200 mm diameter) uses 3 processors, so 15 Watts of draw in total.

Each Hydrosmart 150, and 100 mm system uses 2 processors so 10 Watts of draw in total. Each Hydrosmart 80, and 60 mm system uses 1 processor so 5 Watts of draw.