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Finding the Common Recipe for Treating Problem Water

By Glenn Gruett, Founder and President of Water-Right

While the recipe for treating problem water can be a quick fix at times, it can also require trial and error on the part of a water specialist who may need to find the ideal combination of treatments to fix the problem.

The successes and failures of water treatment methods depend upon a variety of factors, including water chemistry (pH levels), amount of ferrous and ferric iron, amount of manganese, water temperature, amount of dissolved oxygen, and well pump capacity. Any one of these factors, or any combination of them, can influence the effectiveness of the water treatment chosen.

The water treatment specialist may find the recipe for successfully treating manganese and iron, but the same recipe may fail in another region of the United States, or even the next well on the street. Water chemistry can vary from one area to another – even from well to well in the same area. Each may require a new combination of treatments to achieve quality water.

The need for a more consistent way to treat problem water was even surfacing through industry research conducted from 1980 through 1992 by Fleck Controls of Brookfield, Wis., a major supplier of control valves for water softeners. According to Mike Hamberger, executive vice president for Fleck at that time, an outside research firm conducted the study for the purpose of guiding company image and new product development.

The surveys always ended with the same question, “What new products would you like to see come to market that would help improve your business in water treatment?” Forty percent, approximately 350 companies in the United States, stated, “We need a system that treats *problem* water consistently -- the same way a water softener treats hard water.”

The dealers described problem water as water with iron, manganese, iron and sulfur bacteria, and hydrogen sulfide. These dealers were struggling with the traditional treatments available trying to find a combination that would work in every situation.

Traditional Treatments Have Limitations

Green sand filtration requires high water pressure and filter beds are easily fouled and must be regenerated with potassium permanganate. Today’s educated consumers prefer a non-chemical approach and many dealers shy away from handling this dangerous chemical. This method is not successful on water with low pH.

Ozone usually has excellent results with proper post filtration. Properly designed systems can be very expensive and do require periodic maintenance because precipitated iron and manganese tend to foul air off tanks and plumbing lines to the filter.

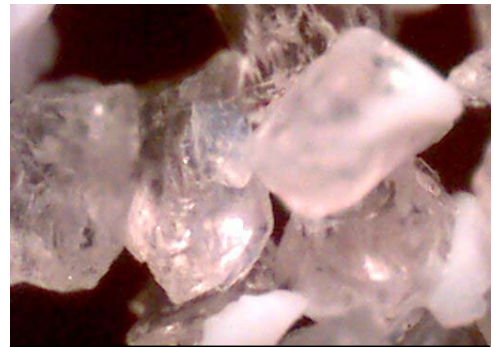
Aeration with filter systems has long been used by cities in municipal water treatment facilities. This method is successful only when there is a long contact time with aeration and slow filtration. The water treatment specialist must find the correct air volume control and bleed-off release valves to use this method successfully. This method requires frequent maintenance since the precipitated iron and manganese caused from air contact must be cleaned out of the system. Aeration works better in regions with warm climates because higher temperature speeds the reaction. Aeration also works better with higher pH levels. This also tends to speed the reaction.

Birm® filtration acts as a catalyst to unite dissolved oxygen with the iron and manganese, causing it to precipitate into the material of the filter. Many wells do not have enough dissolved oxygen for this method to work effectively and require an air injector. Periodic maintenance is required to remove the precipitate. If iron or sulfur bacteria are present, the media will become fouled from the biological reaction with the oxygen and the bacteria. Additional chemical treatments would then be needed.

Pyrolox generally has good results. The weight of the media requires high backwash rates, a good distributor and gravel underbedding. Fouling of the media can occur if the well pump does not provide enough flow for the backwash.

Water softeners yield good results, but often depend upon the geographical area. Iron and sulfur bacteria tend to foul resins over a period of time. Loss of water pressure and bacteria growth requires cleaning with dangerous chemicals.

Chemical feed systems with filtration require the consumer to maintain proper chemical mixes, which can involve dangerous chemicals and weekly service by the customer.



A microscopic view of Crystal-Right, a crystalline filter media used exclusively in the Sanitizer from Water-Right, has an irregular shape and porous surface which offers an ideal bond with regenerating ions.

During Hamberger's continued exploration of ideal water treatment solutions, he took notice of work being performed at Water-Right, Inc. The company was working to design a system that consistently treated problem water through the use of a unique crystalline filter media called Crystal-Right™ and a self-chlorinating process. In 1999 Hamberger joined Water-Right as national sales manager to help market the new Water-Right water conditioners as the ideal solution in treating problem water.

The crystalline filter media used in Water-Right's new self-chlorinating Sanitizer™ systems had already been used exclusively by Water-Right for some time. The zeolite crystals come from a sodium aluminosilicate that is processed using proprietary technology to create different grades of finished media. The irregular shape and porous surface of this unique crystalline media offers an ideal bond with regenerating ions. Plus, the higher density of this media (higher than synthetic resin media), acts much like a sand-type filter capturing insoluble contaminant through a graduated media.

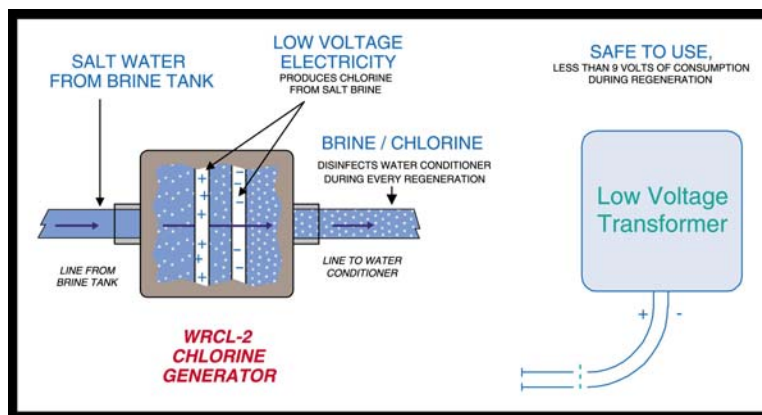
Used on typical well systems where hardness, iron and manganese are present, the crystalline media proves highly effective in treating these unwanted elements with a single pass. The crystal media also readily absorbs CO₂ and releases it during regeneration to help increase acidic pH levels.

This multipurpose crystal media, now marketed under the name Crystal-Right™, not only removes high amounts of iron and manganese while softening water; it is impervious to chlorine. In fact, it readily absorbs free chlorine during the regeneration cycle and washes clean during backwashing. Thus, chlorination of a water softener media bed containing the Crystal-Right media would be a viable solution in elimination of iron and/or sulfur bacteria contamination commonly found in water treatment equipment.

The symptoms of bacteria contamination are well known by plumbing professionals and homeowners alike -- a foul smell from the taps that lasts for a minute or two, or a slimy coating on the inside of toilet tanks and plumbing fixtures.

Though this condition can occur in any system where bacteria has been introduced into the plumbing, it is considerably more common with well systems where water is vulnerable to contamination at several points, including the ground or the well itself. Unlike municipal settings, the water has not been treated prior to entering the home.

Based on some of the same technology used today in Europe, Water-Right designed a device that uses an electrolysis process to produce chlorine directly from the brine solution. The device, known as the chlorine generator, utilizes a set of anode and cathode rods charged by a low voltage current. Testing showed the distance between the rods directly affected the amount of chlorine generated. Once the ideal position of the rods was determined, it remained a constant.



The Sanitizer's chlorine generator uses an electrolysis process to produce chlorine directly from the brine solution using a set of anode and cathode rods charged by a low-voltage current.

During testing, the product development team also discovered that “free” chlorine generated in-line from the brine solution was more effective than other types of added chlorine. Not only did the free chlorine sanitize the bed, but the Crystal-Right™ media also held the excess chlorine molecules to extend the oxidation period long after regeneration and is extremely successful in removing low level sulfur, or H₂S, levels below .5PPM. Consequently, the ability to effectively introduce free chlorine

into the media bed from the brine would eliminate another treatment variable that most consumers wanted to avoid—the use of toxic chemicals such as potassium permanganate, KMnO_4 , and iron cleaners and mechanical feed pumps.

In the end, the final self-chlorinating system, now named The Sanitizer Series™ exhibited a unique combination of technology and design. The chlorine generator was activated only during regeneration and monitored through a microprocessor-based control. As a safety precaution, a 20-minute timer limited generator operation regardless of softener status. Warning lights and audible alarms were added to indicate possible malfunctions, such as no chlorination due to low/no salt.

The unique crystalline media achieves outstanding performance in treating problem water with a single pass—eliminating iron, hardness and manganese while balancing acidic pH levels. And at the same time, the self-chlorinating feature reduces iron and sulfur bacteria — the only other unwanted element remaining that could impact final water quality.

There are approximately 23 million U.S. citizens relying on their own private drinking water supplies, according to the U.S. Environmental Protection Agency – most of them drawing from groundwater wells where both natural and manmade contaminants continue to threaten water quality. Thus, the need for a proven solution that effectively treats a broad variety of problem water conditions...that is easy to use and operate...that eliminates the risks and hazards associated with consumer handling of dangerous chemicals...represents a significant industry opportunity.

A proven solution, such as this one, offers a great benefit to the consumer. It also eliminates the costly and time-consuming trial-and-error approach to system specification that water treatment professionals are challenged with every day, whenever they need to treat problem water.