

Does Chlorine Get a Bad Rap?

When it comes to disinfection at treatment plants, chlorine has quite the reputation. To some, it's known as a reliable and trusted solution. To many others, especially among the public at large, it's looked at with skepticism and concern – but that may be simply a matter of not knowing the facts. Either way, it's one of the ubiquitous aspects of water and wastewater disinfection... and for good reason.

To separate fact from fiction and clear up exactly how chlorine should be utilized at treatment plants, we spoke with [Evoqua Water Technologies'](#) Daryl Weatherup, director of marketing for the company's Wallace & Tiernan brand. He walked us through the different forms chlorine can take, its reputation among the industry and ratepayers, and how to determine its best use at a given plant.

How is chlorine utilized at treatment plants?

Chlorine is used in many water and wastewater applications, not only in the U.S. but around the world. It really has been the most predominant method of disinfection for the past century.

What's different about chlorination, though, is that it's not just available in one format. There are several formats that it is available in: gaseous chlorine, liquid sodium hypochlorite (bleach being the common household name), dry or solid form tablets or pellets of calcium hypochlorite, and then the fourth main way to apply chlorine in water and wastewater systems is actually generated onsite through the electrochlorination of brine or saltwater solutions.

Do you think that chlorine has the reputation that it deserves?

I think there are two sides to the reputation of chlorine and chlorination. On the one hand, chlorine has a great reputation as being a widely used disinfectant that has really transformed the water industry and improved human health, environmental water quality, and sanitation over the last 100 years.

But there's also a negative side to it. When chlorine's applied in the right amount to the controlled process, it is a good

disinfectant. But if it is released in a spill or leak in higher doses, it can be harmful. I think that is where some of the negative connotation comes about and the reputation it has as being potentially unsafe.

Do you think that reputation it has as a dangerous chemical is more prevalent among ratepayers or with the professionals who are actually disinfecting water?



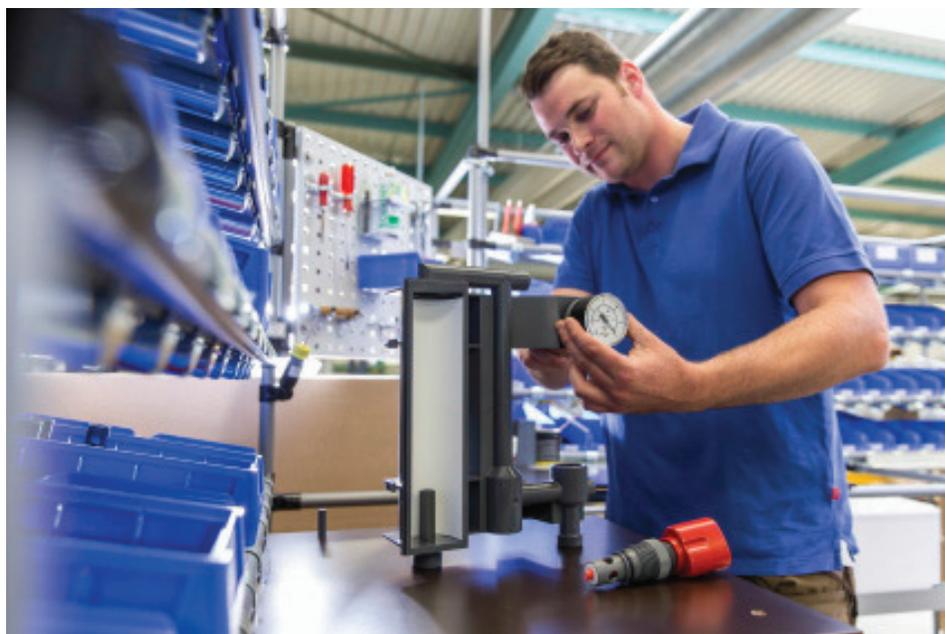
I think it's a little bit of both. At the consumer ratepayer level, they get a lot of their information through the media, and the media doesn't always report safety incidents in the right way. Oftentimes there are accidents that happen that are not caused by chlorine but get reported as involving chlorine. At least in the U.S., there are a higher number of safety incidents with other liquid chemicals and other dangerous substances in treatment plants than there are with chlorine gas.

On the professional level, there is competition with other methods of disinfection. Some are chemical-free but provide no residual disinfectant, which is required in municipal water distribution. Those that offer chemical-free solutions might add to the negative reputation that chlorine can have.

What advances in process and technology are making chlorine safer today?

There are quite a few things that have changed over the last 100 years with the way chlorination is done today. It started out in 1913 with the first commercial chlorinator, and the technology has improved quite a bit since. The main things that have changed are the engineering methods available, the materials of construction available — metal alloys, engineered plastics, and so forth — that have really allowed us to improve the quality of the actual chlorine dosing systems themselves, the chlorinators. We've engineered chlorinators to be more durable, have fewer moving parts, and be inherently safe.

Aside from that, there are additional devices that help make the overall chlorination systems safer, such as double-check valves and seals, safety shut-off valves, or emergency vapor scrubbers — also manufactured by Evoqua — which can scrub all of the chlorine gas out of a room even in the event of a full-scale release. We've manufactured this for our systems as a secondary safety system. There are other ancillary items, like gas detection systems and fire safety doors,



that can go towards making the overall system very, very safe.

What alternatives to chlorination are out there?

There are no other alternative methods that provide the same cost-effective benefits as chlorination or are as widely used as chlorination. There are other methods that are called "alternate disinfectants," including UV and ozone, as well as various other types of disinfectants that are innovative but not as widely used.

How should a treatment plant assess the different forms of chlorine that exist and make a selection on which one is the best for them?

This is probably the question I receive the most. The best answer that I can give is that it's really a local decision that needs to take into account several factors. It is not just about capital costs or operating costs alone.

We work with the water utility and ask them what their decision-making factors and drivers are. Are there any environmental concerns? Is the facility in a rural area or an urban area? What's the distance away from the nearest chemical supplier?

Beyond that, we look at their water-quality

goals and disinfection targets, along with the capacity and treated flow rate. That will determine what the total chlorine demand is. We also take into consideration, from that, how often they might need to order chemicals.

As a manufacturer of all four types of chlorination systems, not to mention UV, we offer expertise on which format of chlorine is best for the given application. I think it's important to have a well-balanced view of what is available and not be pushed towards one method or another. Additionally, there are consultants we work with who also specialize in this selection process. The U.S. EPA and AWWA both offer information about selecting disinfectants and have published resource manuals on those as well.

If someone tells you they believe using chlorine as a disinfectant is dangerous, how do you respond?

Anything can be dangerous when it's mishandled, and that chlorine is by far the safest, most widely used, and most reliable form of disinfection. One of the things that works against switching away from chlorination to other methods is typically the cost, the reliability, and the availability to the general public. That's why, after a century, it's still the most widely used form of disinfection in the world today. ■