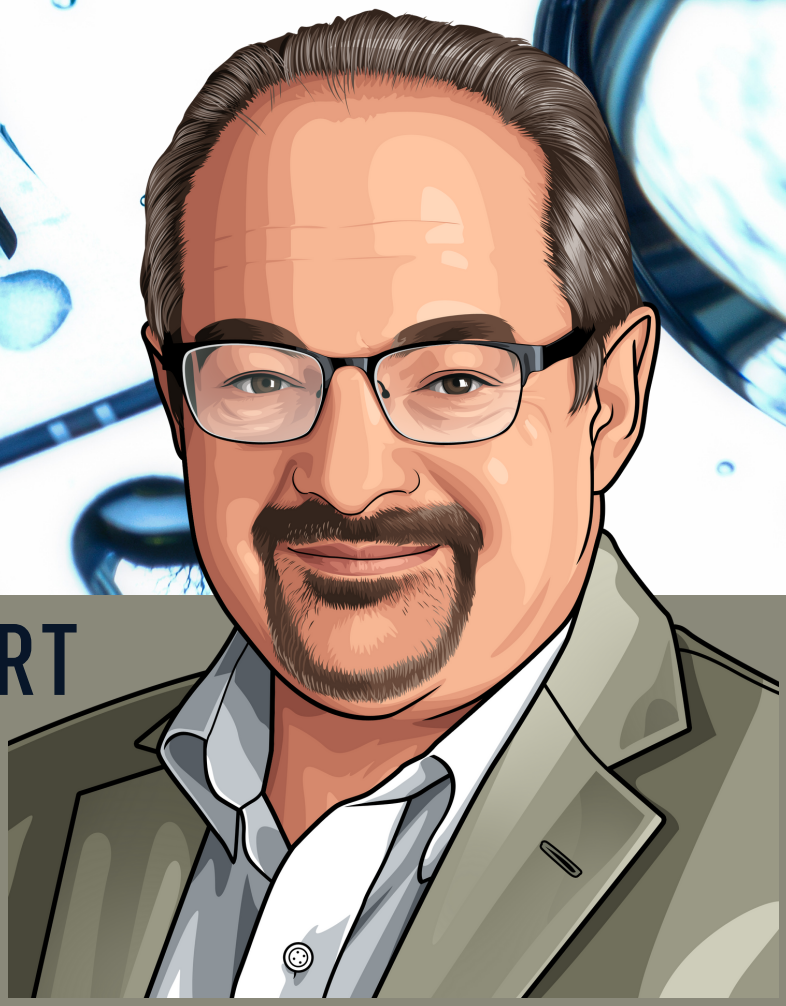
CHLORIDE

THE ENEMY OF STAINLESS STEEL



WATER QUALITY EXPERT

BEYOND CLEAN

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Beyond Clean Water Quality Expert:

CHLORIDE: THE ENEMY OF STAINLESS STEEL

Jonathan Wilder, Ph.D. | Quality Processing Resource Group, LLC

One of the first things I learned in this business was that stainless steel isn't "stainless", at least not under the wrong conditions. Why is it called "stainless steel" and under what circumstances is it not "stainless"? It is called stainless steel because the chemical makeup of the alloy. Like all steel, stainless steel is an alloy that is primarily composed of iron. But then there's the secret sauce that makes it stronger, better able be formed, or, in certain cases, stainless. I.e., very resistant to corrosion compared to normal steels and iron. The secret sauce in 304 and 316 stainless steel is mostly chromium. Other important additives are Silicon, Manganese, Phosphorus, Sulfur, and, in 316 grade, Molybdenum.

For those of us who aren't metallurgists, it's a strange brew of elements. But the Manganese and Chromium react with atmospheric oxygen to form a passive layer. This is the layer that you've heard about. It forms by itself. It forms better in an acid bath. Many instrument manufacturers subject their stainless-steel instruments to acid treatment to minimize the possibility of oxidation/corrosion and to make sure the passive layer is completely formed without any defects.

So, it's perfect. Right? Sadly, no. Chloride ions, like in saline solutions or over-chlorinated water, can rip through the passive layer and created pores in which oxidation/corrosion/RUST can form.

What to do to avoid this? The upcoming AAMI ST108, "Water for the processing of medical devices," has set an acceptance level of 100 ppm (or mg/l) for chloride ion concentration in utility water. You can test your water with test strips available for a reasonable price (less than $100 for at least 25 tests) from your facility's favorite industrial supply house. If your chloride level is close to 100 ppm, you need to talk to your water treatment supplier to get it knocked down, which may require implementing RO water treatment, or mixing the tap water with RO to make utility water. This has a cost, but it costs less than stopping procedures because of corroded instruments. See you next month!

Have more water quality questions? Contact Jonathan at: jwilder@qprgllc.com

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Dr. Wilder joined MDT Corporation in 1990 as Staff R&D Scientist, tasked with executing process and product development in sterilization, disinfection and cleaning of reusable medical devices. He started H & W Technology in 1997 and allied with SMP Laboratories from Tübingen, Germany to form Quality Processing Resource Group (QPRG) in 2016. QPRG provides clients with operational, regulatory, and technical consulting in the area of sterile processing. Its services include accreditation readiness audits, technical deep dives into the issues causing wet loads and staining, and 510(k) filing support for manufacturers. He has a Ph.D. in physical chemistry from NYU and an MBA from Rochester Institute of Technology. He is a New Yorker by birth but escaped in 1986 to a postdoctoral fellowship at the Max Planck Institute for Surface Physics, the Fritz Haber Institute, in West Berlin, Germany. He is currently happily living near his children in Philadelphia, PA.

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