

# Water Treatment Using Resins with Bromine and Iodine



**Summary:** By using polybromide and iodide resins, dealers can promote an effective water treatment over a wide range of different water chemistries while maintaining safety. Here, we look at key components such as pH that make these halogenated resins so attractive to water treatment professionals.

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Can you imagine turning on your tap and worrying about whether the water that fills your glass would make you ill? Having convenient access to safe potable drinking water is something most people in the industrialized world now take for granted. No American today remembers 1908, which heralded a revolution in water treatment that advanced public health and increased life expectancy by 50 percent. That year, chlorine was introduced to U.S. water supplies, effectively reducing the number of deaths caused by waterborne diseases to virtually zero from levels comparable to today's automobile fatality rates. Even today's era of 24-hour news that generates alarming headlines out of contaminants du jour and rare catastrophic failures, such as Milwaukee's *Cryptosporidium* outbreak, has failed to erode the public's confidence in municipal water treatment systems.

Today, chlorine remains the disinfectant of choice with over 98 percent of U.S. water treatment systems relying on it to kill various bacteria and viruses. As pervasive as the use of chlorine is, though, it's just one of several water treatment options available to professionals for the prevention of microbial contamination.

Ultraviolet (UV) light and ozone are often used when it's impractical or hazardous to store and handle chlorine. Electrical power, however, isn't always

readily available or sufficiently reliable for the continuous powering of UV and ozone equipment. In these cases, disposable cartridges that contain resin impregnated with iodine or bromine may be the answer.

## Halogens

As is chlorine, iodine and bromine are halogens with disinfectant properties that kill waterborne pathogens.

## Iodine

Iodine is a black crystalline solid that sublimates to deep violet vapors at 184°C. It's element No. 53 on the periodic table and has an atomic weight of 126.9, a melting point of 236.7°F, and a boiling point of 363.9°F. Like other halogens, iodine is manufactured commercially by electrolyzing seawater or processing brine from wells. For years, backpackers have used iodine to disinfect drinking water because it's not only economical and easy to use, it's light weight makes it very portable. Iodine also has its drawbacks as a disinfectant. Most people dislike its unpleasant taste; and while it's an effective disinfectant for bacteria and viruses, iodine—like other halogens—has been proven to be ineffective in killing *Cryptosporidium*, a protozoan that backpackers encounter in their water supplies on an increasing basis.

Iodine isn't more widely applied because concerns associated with ingestion

of iodine and thyroid disorders led the U.S. Environmental Protection Agency (USEPA) to limit use of iodine in water treatment. The USEPA, however, has approved iodinated resins for emergency use and long-term purposes when employed in conjunction with appropriate scavenger systems to remove iodine residuals that may leach from the resin. As a result, iodine is typically used in temporary purification situations such as disaster relief and military operations.

Since the 1970s, iodine resins have been used on manned space flights to help disinfect and maintain purity of water consumed during missions. In fact, crews of both the space shuttle and new International Space Station rely on iodinated resins to treat their water. On the shuttle, the resin is incorporated into a microbial check valve (MCV) designed into the port from which astronauts draw water for drinking. The resin acts as a "check valve" to prevent microbial contamination from entering the water system from this point. The International Space Station has a more complex water system in which the iodinated resin is positioned at multiple treatment ports—and various other areas for recirculation within the water system—to provide safe water for the astronauts on a continuous basis.

## Bromine

Bromine is another halogen used