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## **Silver's Importance to Health**

In a world concerned with the spreading of virus and disease, silver is increasingly being tapped for its bactericidal properties and used in treatments for conditions ranging from severe burns to Legionnaires Disease.

While silver's importance as a bactericide has been documented only since the late 1800s, its use in purification has been known throughout the ages. Early records indicate that the Phoenicians, for example, used silver vessels to keep water, wine and vinegar pure during their long voyages. In America, pioneers moving west put silver and copper coins in their water barrels to keep it clean.

In fact, "born with a silver spoon in his mouth" is not a reference to wealth, but to health. In the early 18th century, babies who were fed with silver spoons were healthier than those fed with spoons made from other metals, and silver pacifiers found wide use in America because of their beneficial health effects.

## **Helping to Stop Legionnaire's Disease**

In response to major outbreaks of Legionnaire's Disease in the United Kingdom during the 1980s, the British government has undertaken studies on the use of silver in water purification. The disease is named after Legionella pneumophila, an aquatic organism which is widespread in small quantities within natural water sources. The bacteria presents few problems in naturally-flowing water, but man-made environments such as cooling towers and hot and cold water services provide conditions for it to multiply and spread. Infection is caused by inhaling airborne droplets of particles containing viable legionella, small enough to travel deep into the lungs and be deposited in the alveoli.

Recent research compared silver-copper ionization with the use of high temperatures to destroy bacteria. Contaminated cold water re infected the hot water system even when temperatures in hot water heaters reached as high as 60 degrees Centigrade. But experiments showed that even at lower water temperatures, ionization of soft water with silver and copper ions was effective against the bacteria.

"Ionization showed better results." said Nigel Pavey principal research engineer for BSRIA Water Services Technology Centre in Berkshire. And to make certain its benefits are widespread, "there should be more emphasis on copper-silver ionization in Legislation," he said.

## **Eliminating Harmful Bacteria**

Tests by researchers at the University of Florida's Institute of Food and Agricultural Sciences show that silver and copper ions added to oyster tanks destroy harmful bacteria in the water without affecting the oysters. Once oysters are harvested from the ocean, they are cleaned in "deuration<sup>o</sup> tanks which are prone to bacteria infiltration. Silver ions added to the water destroy bacteria and copper ions kill fungus, making an inexpensive and environmentally friendly combination for keeping oyster tanks clean. "Silver and copper ionization is the perfect solution," says Richard Ganim, president of Superior Aqua Enterprises in Sarasota, Florida.

"The applications for ionization are almost endless," Ganim said. Currently ionization is used by chicken farmers to reduce bacteria and fungus without affecting the health of the chickens. 'We think this system will also work for citrus growers' who routinely spray their trees with chemicals.

### **Silver – Reliable Alternative to Chlorine**

Laguna Niguel, CA (March 25, 1997) - Silver based water purification systems offer the most reliable and cost effective alternative to chlorine, a chemical that is increasingly coming under fire for the carcinogenic by products it leaves in water, according to David Eaton, secretary of The Institute of Water Ionization Technologies in the United Kingdom and technical director of Roseland Hydronics PLC.

Speaking at the annual meeting of The Gold & Silver Institutes in Laguna, Niguel, CA. this week Eaton said progressively restrictive legislation is confronting the use of chemicals, especially chlorine, which for nearly a century has been the primary medium for water disinfection.

With increasing pollution, utilities are forced to put far more chlorine into the supply chain, Eaton explained. The chemical reaction that oxidizes impurities when chlorine is added also forms carcinogenic by-products. "Of course these same by-products have been generated by chlorination for a long time but never in the quantities that are now being seen," he said.

Silver offers a healthy alternative. The metal has long been known for its biocidal properties, Eaton noted. The Ancient Phoenicians who stored wine in silver urns to preserve it, provide one of the earliest recorded examples of the metal's use for water purification.

Applying modern technology to this old fashioned principle, The Institute of Water Ionization Technologies has developed silver ion generators for municipal water supplies. The market for silver ionized swimming pool systems has expanded significantly in the US and overseas, Eaton said. But in Britain, silver ionization is being developed for mainstream water systems. Machines used to clean primary water must be much larger and more powerful than small swimming pool units, and require accurate control mechanisms to ensure that levels of silver are maintained and kept within drinking water standards.

Eaton discussed a recent project funded by the UK Department of the Environment to study the control of Legionnaires disease by using silver ions. The disease is named after *Legionella pneumophila*, an organism that is widespread in small quantities within natural water sources. The bacteria becomes lethal at a water temperature of 95 degrees F and can be killed at temperatures between 135 and 140 degrees F.

Of three tests, silver/copper ions in soft water produced the best results. The copper ion disrupted the enzyme structures of the cell allowing the silver ion to penetrate inside where it rapidly killed the cell's life support system. US regulations allow a silver level of 100 ppb in drinking water, but a silver level of only 20 ppb kills *Legionella*.

A new European Union Drinking Water Standard in draft form has removed any upper limit for silver in drinking water following the World Health Organization's Guidelines for Drinking Water Quality which States, "It is unnecessary to recommend any health-based guideline for silver as it is not hazardous to human health.

For the complete text of Eaton's speech, contact The Silver Institute, (202) 835-0185

## Research Quotes:

Thanks to eye-opening research, silver is emerging as a wonder of modern medicine. An antibiotic kills perhaps a half dozen different disease organisms but silver kills some 650. Moreover, silver is virtually non-toxic. Dr. Harry Margraf of St. Louis, a pioneering silver researcher, says: "Silver is the best all around germ fighter we have."<sup>[1]</sup>

The value of silver in medicine, and as a purifier has been acknowledged for centuries. Egyptians implanted silver plates into skulls with surgery. In Ancient Greece and Rome, people used silver containers to keep liquids fresh. When settlers moved across the American West, they would purify a container of water by putting a silver dollar in it overnight. Towards the end of the 19th century, other medicinal uses for silver were developed including the use of silver and mercury in filling cavities, and the dropping of a silver filtrate solution into the eyes of newborn babies to prevent blindness due to infection.<sup>[2]</sup>

Scores of independent tests have shown that silver promptly kills bacteria in water and maintains water purity over long periods of time.<sup>[3]</sup>

Russian scientists working on water recycling and purification problems for the Soviet space program have decided on silver as the best long term sanitation agent. Researching the problems of water shortage over periods of several months, as well as purification for immediate use, they determined that ionized silver provides the safest and longest lasting method of transforming polluted waste into potable water.<sup>[4]</sup>

After testing 23 methods of purifying water, NASA has also chosen silver as the purifying agent on the Space Shuttle program.<sup>[5][6]</sup>

Silver was used to provide shuttle crews with pure water for drinking, air conditioning, food preparation and other operations. By establishing 100 parts of silver per billion parts of water NASA will totally eliminate the need for chlorine! The most dramatic purification tests occurred in 1976 in a 20,000 gallon swimming pool in Nebraska. There was no disinfectant of any kind in the water. Fifty gallons of municipal sewage waste water was put into the pool. That produced a dangerous concentration of 7,000 E coli cells per 100 millilitre [half a cup] of water. Contents of the pool were then pumped through a tank containing alternating anodic and cathodic silver electrodes for disinfection. Within three hours the pool was entirely free of E. coli and the water contained only 3.2 parts of silver per billion parts of water.<sup>[7]</sup>

The Allegheny County Health Department in Pennsylvania conducted tests in a 152,000 gallon pool which previously had been disinfected by a 50 pounds per day chlorinator. The system was replaced by a silver system for the swimming pool season of 1974 and 1975. The County Health Department took up to 50 daily samples and found that silver ions remained in the pool at the low steady rate of 20 parts per billion. The water remained free of bacteria throughout the two seasons. In contrast, 65 water samples from 30 other pools having a concentration of 700 parts per billion of available chlorine showed a mean of 1.3 pseudomonas and 7.3 staph cells per millilitre of water.<sup>[8]</sup>

The impact of silver technology continues to grow. More than half of the American soft drink bottling companies, numerous shipping lines and a host of other enterprises in 70 countries, use silver to sterilize water. These and many other examples of the expanding use of silver in water purification have been documented by Dr. Fred Zobist and presented to the Silver Institute in Washington, D.C.

### Footnotes:

1. Jim Powell, "Our Mightiest Germ Fighter"; Science Digest, March 1978
2. Dr. Harry Margraf, "The Story of Silver in Medicine"; Gold & Silver Newsletter, September 1974
3. "Tests Show Silver Best Water Purifier"; The Silver Institute Letter, December 1976
4. "Silver Clears Up Polluted Water"; The Silver Institute Letter, July/August, 1973
5. Jim Powell, "Our Mightiest Germ Fighter"; Science Digest, March 1978
6. "Winged-Ferry to Shuttle Between Earth and Space"; The Silver Institute Letter March 1976
7. "Silver Guards Good Health: "; The Silver Institute Letter, May 1975
8. "Silver Carbon Filter Purifies Swimming Pool"; The Silver Institute Letter, May 1973

### Links to Silver Institute News Letters:

1. <http://www.silverinstitute.org/pr10jun03.php> Centers for Disease Control Warning on Swimming Pools: Swim at Your Own Risk - Silver-Based Sanitation Systems the Answer June 10, 2003
2. [http://www.silverinstitute.org/water\\_purification.php](http://www.silverinstitute.org/water_purification.php) Silver Cleans Up Polluted Water

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## Chlorine, Pollution and the Environment

Chlorine is a naturally occurring substance. Its manipulation and use in forming artificial chemical products has had devastating effects on the environment which we are only now beginning to understand.

In its various artificial forms, chlorine plays a major role in the most pressing environmental problems which we face today; depletions of the ozone layer, global warming and acid rain. The pollution caused by its widespread use has been linked to a variety of serious health effects such as cancer, organ damage and respiratory problems. Chlorine can exist safely, in the form of common salt (sodium chloride), for example, but the process of splitting common salt into caustic soda and chlorine gas makes it become dangerously toxic. [1]

## Chlorine, Swimming Pools and Breathing Problems in Swimmers

Even athletes with no history of ailment show signs of breathing trouble after swimming in chlorinated water. Chlorine in pools leads to breathing trouble in trained swimmers, regardless of past history of such problems, and the likelihood increases with the amount of chlorine used in the water. A study presented today at the 51st Annual Meeting of the American College of Sports Medicine (ACSM) showed an incidence rate of over 60 percent for Exercise Induced Bronchoconstriction (EIB) after several minutes of swimming in water chlorinated at a concentration commonly found in home and public pools. [2]

### Research Quotes:

"We've long suspected that chlorine has an adverse effect on the respiratory health of swimmers," said lead researcher Arthur J. Williams, M.D., of the Sport Science Institute of South Africa. "Now we know the likelihood increases significantly with the concentration of chlorine used. Swimmers should be aware of the concentration of chlorine exposure they receive, and those who care for pools should closely monitor chlorine levels." [3]

“It has been known for a long time that chlorine can trigger asthma symptoms in some people with asthma. But now it is being suspected of actually causing asthma in some children.” National Asthma Society of Canada [4]

Swimming in a chlorinated pool may increase your risk of developing cancer, suggests a new suite of studies, which identified more than 100 chemical by-products in pools that use chlorine as a disinfectant. The most striking results came from the part of the research that looked at markers for cancer. After 40 minutes of swimming, the study found, people showed a large rise in markers of DNA damage that can lead to cancer. Concentrations of four of the most common byproducts were seven times higher after people swam. Chlorine's chemical byproducts can get into our bodies through the skin. Exposure also comes from breathing air at the surface of the water, where chemicals become volatile. When exercisers swim hard, they breathe faster and end up with even more exposure. [5]