Magnetic water treatment devices have been advertised for a number of years in the pool press. Many claims are made for these devises which generate questions from consumers, pool dealers and scientists.

## The Magnetic "Devices"

"Electromagnetic" refers to the broad spectrum of visible and invisible energy which is present all around us. Electromagnetic energy includes, among other things, X-rays, ultraviolet energy, visible light, and magnetic energy. An electromagnetic water treatment device is usually a magnet wrapped around a water pipe.

## The Claims

The most common claims made for these devices are reduced chemical usage, reduction of scale and corrosion, elimination of chemical tastes and odours, removal of pool stains, stabilisation of pH, and reduction of algae growth.

How can a magnet attached to a water line accomplish these potential benefits? One speculation, according to the manufacturers, is that this is done by "ionising" or changing the equilibrium of water. The equilibrium of water simply indicated that there is a balance between hydroxyl ions (OH-, alkaline) and hydronium or hydrogen ions (H+, acidic). At a pH of 7, these components are equal in concentration. Equilibrium in water is influenced by reactions which increase or decrease pH by removing or adding hydroxyl or hydrogen ions. Balancing chemicals have an effect on the water balance, but according to scientists and even the manufacturers of magnets, water balance changed attributed to exposure to a magnetic field are not analytically measurable.

Another idea is that magnetic fields have an effect on biological electrical field. This particular idea has been furthered by some evidence that animals and human beings experience certain effects from exposure to high voltage power wires. Although interesting, this has not been sustained. In this case, human exposure is long-term (months, not milliseconds) and these field can be stronger.

Magnetic water treatment is often substantiated by "scientific" research. A review of literature in this area revealed a number of problems including a lack of data, improper gathering of data, and a lack of "controls" (experiments set up with no treatment for comparison). It is important that all research data used to support sales claims is duplicated by other sources, interpreted correctly and "translated" into language easily understood by non-scientists.

Evidence Supporting No Water Treatment Properties from Magnets

Two independent studies by the Water Quality Association in conjunction with Purdue University failed to demonstrate any effect by these devices on treated water. Similar non-supporting results have been obtained by work done at Baylor University and John Hopkins University.

The Iowa Supreme Court also ruled in favour of consumers by application of Iowa's Consumer Fraud Act, Code Section 714.16 (1983) and forced a manufacturer to pay restitution to several consumers. The court stated that, "... (the defendant) designed, manufactured, and marketed the (brand name) devices with no related scientific expertise". The court also noted that "The manufacturer's claims were based solely on their personal opinions and speculation". "None of these advertising claims (softer water, clean pipes, better health, etc.) were sustained by scientific testing".

Two questions you need to ask when encountering any "miracle" treatment such as this are: "Can you measure claimed effects (chemical residuals, changes in water balance, etc)?", and "Have these effects been documented and reproduced?". These questions are basic to scientific method, often overlooked by overzealous sellers and excited consumers.

Magnets have failed to prove their purported effects on pool water treatment, beyond providing a sense of security to consumers who may ignore proper water treatment. The proven methods for water treatment should not be ignored nor substituted for unproven and unmeasurable magnet effects.

## Conclusions and Precautions

A search of the literature indicates that magnetic water treatment devices do not show scientifically verifiable effects on water balance, scale prevention, or other claims. Two hypotheses prevail; the first is that there exists and effect, but that it is either minuscule and therefore negligible or undetectable; or that the effect is produced through coordination with several iron species. This last hypothesis is intriguing because the premise behind it is that the magnet promotes corrosion, which creates different species of iron oxide. The iron oxide then has an effect on the crystallization of calcium carbonate and other compounds, preventing them from becoming very solid or forming at all in some cases. This hypothesis would suggest that users of this technology are trading minor influence over the rate of scale formation for much higher rates of corrosion of their pipes and equipment.

In general, the research suggests that there is no (or negligible) positive effect from the use of magnetic devices in water treatment. This research comes from Russia, the U.S., Israel, and Belgium. It is therefore a broad scope of scientific opinion that leads to this conclusion, not merely one or two sources.

It is suggested that caution be taken in the use of these items. There is no sound scientific data to support any of the claims made by the sellers and manufacturers of these devices. The only reported experimental, scientific observation of these effects showed high corrosion rates as a causal factor. These devices cannot replace a good program of maintenance of water balance parameters and cleaning. As always, sanitizer residuals and algaecide levels should be maintained. If excessive corrosion or metal levels are noticed, any magnetic device used should be discontinued immediately.

**Magnetic Water Treatment References**

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