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# MAGNETIC WATER TREATMENT TECHNOLOGIES

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**W**ater treatment products based on magnets are widespread and have been on the market in various forms for a long time. Vendors of various types of magnetic products claim that they can alleviate pain, cure illness, improve engine power and fuel efficiency and – relevant to this article – have all manner of positive effects on water and water quality.

Often at CAT we get enquiries about different water treatment systems, including those for reducing scaling caused by hard water and improving water taste. In part due to aggressive advertising on the part of companies and agents, magnetic water treatment devices have attracted much interest from both individuals and community groups.

Companies that sell these products rely heavily on testimonials from customers and whilst much advertising literature features scientific-sounding explanations, many statements are ambiguous, redundant or false. The journal articles offered by these products' advertising literature as objective proof are often from trade journals, not peer-reviewed scientific journals.

Whilst much of the research comes up with inconclusive results (and calls for further research), it is important to remember that the products are sold on the premise of sound scientific evidence, which to date does not exist. Clearly though, the vendors of these products understand the science of selling.

## If it sounds too good to be true ...

Previous studies have observed that very strong magnetic fields may cause changes in chemical and physical characteristics of water, although these tests were under very different conditions to those produced by current magnetic devices on the market. The tests exposed water samples to a much stronger magnetic field for a much longer period of time than what is experienced in the products available on the market (Gehr et al. 1995). In addition, the effect on the water recorded is far more modest than what is claimed by manufacturers of magnetic water treatment products.

It is worth noting that manufacturers of some products claim to only have an effect on single aspects of water behaviour (such as its tendency to form scale), whilst other manufacturers claim many other benefits from using their product with even the worst case source water. These benefits include eliminating algae, enhancing plant growth and human health benefits. As magnetic water treatment products have been making claims about their performance since the 1950s and potentially as early as the late 19th century (Welder 1954) it does seem strange that in this time the industry has not been able to fund conclusive scientific research to prove beyond doubt that their products provide the benefits they claim. In addition, it deserves mention that these devices are today not used as a component in municipal water treatment plants, despite their purported benefits and cost advantages.

## Opportunism and evidence

One reason that these products can claim so much success preventing common problems with water quality is that the problems typically take considerable time to present themselves, especially in a domestic setting. This is particularly true of scaling, where symptoms may take years to present themselves. Salt-related plant damage is another where symptoms or improvements may take some time and this has also received advertising attention from manufacturers of late. Both of these problems are also affected by environmental conditions (such as temperature and rainfall) and are difficult to verify in an objective manner outside of a laboratory where these conditions can be controlled.

Regardless of the lack of scientific rigour vendors still claim scientific basis for the success of their products represented in photos and testimonials without objective proof. Controlled trials of the sort necessary to test the claims of manufacturers are expensive in terms of both capital expenditure and labour, and this may be the reason that not every item on the ever-expanding list of possible applications for these technologies has yet been addressed. The more common claims, such as the prevention and removal of scale caused by hard water have been investigated by independent laboratories.

Powell (1998) refers to one study conducted by reputable U.S. customer advocacy magazine, Consumer Reports. In 1996 a two year trial was undertaken with two hot water heaters at the same residence. One water heater had its inlet water magnetically “treated” and the other received no treatment. At the conclusion of the two years each hot water system was cut in half. No appreciable difference in scale quantity or texture was recorded and the product was deemed ineffective. This particular product is still advertised for sale today (including in Australia).

In a 1996 trial of scale prevention techniques by the Lawrence Livermore National Laboratories in the United States, the performance of a magnetic scale prevention device was compared to that of a more conventional chemical-based polyphosphate scale inhibitor. The conventional treatment (using a chemical scale inhibitor) almost completely eliminated scale formation whereas the magnetic scale prevention device did not prevent scale formation, and actually increased it slightly (Krauter et al. 1996).

Another controlled trial evaluating three different magnetic water treatment products were run with much input from the manufacturers at the experimental design stage. The trials were run to examine scale formation and corrosion in simulated hot water heaters. The trial was monitored very closely over 60 days using magnetically treated and untreated water. The findings of the trial did not indicate any clear advantage over the untreated tap water in terms of either scale formation or copper corrosion by using any of the magnetically treated water (Smothers et al. 2001).

Clearly, regardless of what is stated in advertising material, systems do not prevent scale in all cases and appear to perform worse in controlled trials that can be verified.

## Alternatives

So what options are there for water that has undesirable effects? Whilst there are no “silver bullet” solutions for all water problems, there are things that can be done to deal with different water quality issues.

Rainwater tastes good, and almost all houses can catch enough for drinking purposes, even in the desert (Grey-Gardner et al. 2006). In an area where there is a lot of rainfall, rainwater can be collected and used for other purposes, such as for the supply of hot water (preventing scaling).

The effects of scale build up on appliances can be addressed by simple periodic maintenance to clean off scale build up. Hot water heaters can have their temperature set lower, which will reduce scaling on

the element. CAT has information available to help you do this (See below).

## Conclusion

Magnetic Water Treatment products claim to be able to correct a range of issues that relate to water quality, but fail to offer objective evidence to support these claims. Scientific sounding statements made in advertising literature to explain their devices is often misleading or demonstrates a lack of understanding of basic scientific principles by the manufacturers. Objective, controlled studies carried out by reputable institutions has found these products to not perform as advertised, in some cases not providing any benefit whatsoever.

Whilst no magic solution exists to cure water of foul tastes or the effects of excessive hardness, alternative sources (such as rainwater for drinking) and periodic maintenance (cleaning taps, appliances and hot water heaters) can go a long way to reducing the need for treatment systems.

### FURTHER READING:

BUSH TECH #39 - Removal of scale from household fittings and appliances

<http://www.icat.org.au/media/OurPlace/bushtech39-web.pdf>

Harvesting Water that Falls on Country. Centre for Appropriate Technology, CRC Water Quality and Treatment. 2006.

<http://www.icat.org.au/media/Resources/water/CAT-CRCWQT2006-Harvesting-water-that-falls-on-country-Guidance%20Manual.pdf>

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