



With quality chemicals, at the right dose, even the smallest water treatment plant can deliver high quality water.

Water quality is essential for healthy living, as recent outbreaks of water-related diseases in Mpumalanga and Gauteng illustrate. Every day more innovative chemical blends are found to disinfect drinking water. "With the right blend of quality chemicals, correctly dosed, even the smallest water treatment plant can produce good potable water from almost any source," reports Dr Gerhard Offringa,

research manager at the Water Research Commission (WRC). However, quite the opposite can be said from substandard products.

According to the World Health Organisation (WHO), chemical contaminants in drinking water originate from a variety of sources, including treatment chemicals used in the production of drinking water. Processes used for manufacturing of

What's That in Your Water?

Chemicals such as chlorine have been used to treat our drinking water for more than a hundred years. Today, chemical disinfection is considered the essential and most direct way to inactivate or destroy pathogenic and other microbes in drinking water. However, it is equally important to ensure the quality of the chemicals used for this task.

Lani Holtzhausen reports.

water treatment chemicals may result in the presence of impurities that are of potential health concern. Some of the trace impurities that may end up in drinking water include formaldehyde, ethylene dichloride, ammonia, carbon tetrachloride, mercury, and aluminium, to name a few.

In small dosages these substances might not be immediately toxic, but may cause severe damage to health

over time. Water users might have an increased risk to cancer, Alzheimer's disease, liver and kidney damage, among others. These products may also accumulate in the environment.

"Chemicals are best controlled by the application of national regulations governing the quality of the products themselves rather than the quality of the water," states the WHO in its Guidelines for Drinking Water Quality. "It is important that water supply agencies properly manage any chemicals that they use. In many cases, the best control is through management practices, such as optimisation of the treatment process, and regulation of materials and chemicals that come into contact with drinking water, rather than through monitoring and chemical analysis."

However, while South Africa has laws regulating drinking water quality there are no regulations for the chemicals used to provide that water. The problem is compounded by the fact that, in a recent survey by the Department of Water Affairs & Forestry, it was found that only 58% of Water Services Authorities (WSAs) actually regularly monitor their drinking water quality.

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OUTDATED STANDARDS

The WRC is funding a two-year project, undertaken by Umgeni Water, to rectify the situation. The project is aimed at compiling a report containing recommendations regarding standards and standard procedures for the control and evaluation of the process chemicals used in this



The recent typhoid fever outbreak in Delmas, Mpumalanga, has stressed again the importance of clean water to protect human health. However, ensuring the safety of the product the water is treated with is just as important.

country. It is hoped that this report will serve as the basis for the updating and re-issuing of present standards governing these products and the creation of new standards where these do not currently exist.

Dr Offringa tells *the Water Wheel* that initial investigations have found existing standards for water treatment chemicals to be extremely outdated, with several standards issued more than 20 years ago. In addition, there are many treatment chemicals for which no national standards exist, in spite of the fact that some of these are used extensively in the water and wastewater treatment industry. For example, ferric sulphate, ferric chloride, bentonite and activated silica.

Other examples of treatment chemicals that are widely used are coagulants and flocculants. Traditionally inorganic chemicals such as aluminium sulphate were used for primary coagulation of potable water, but over the last few decades polymeric coagulants have become more widely used. These polymeric coagulants are at present not subject to any type

of formal legislation in South Africa despite the potential for adverse health effects (some commercially available polyamine flocculants may contain chloropropanol isomers which may be carcinogenic).

UNSCRUPULOUS PLAYERS

With no local regulatory process, it has been left largely to manufacturers to police themselves regarding the contaminant levels in their products. Companies such as Süd-Chemie and Zetachem have sought registration at the US Food and Drug Administration for some of its products, while others such as NCP Chlorchem are ISO 9002 compliant and rely heavily on on-site quality and safety testing.

When purchasing products large WSAs review chemical formulations and conduct complex product testing, but there are numerous smaller local authorities who are in no position to conduct such a sophisticated review and analysis of products, and who do not have the resources for such an evaluation. It is on these

WSAs that unscrupulous treatment chemical suppliers prey.

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The lack of regulation has left the door open to numerous fly-by-night operators who undermine the industry by supplying products that have undergone no assessment, notes Susan Cole, strategic business unit team leader – Specialities, at NCP Chlorchem, the country’s only producer of commercial chlorine for water treatment. “These products might seem cheaper, but without analysis there is no telling where they come from or what they contain. Some are imported and packaged in someone’s backyard.” The company has even found a foreign product being stored in its labelled drums in an attempt to make it seem more credible.

The seriousness of the problem can be seen in cases such as in Kwa-Zulu-Natal where small towns were found to be supplied with chemicals made for industrial use, i.e. not for human consumption. Products have also been found to be diluted so as to supply them more cheaply. This means it will not be effective when using general dosing guidelines. “Apart from the serious danger to consumers, these operators place the entire industry in disrepute while underscoring our product,” comments NCP Chlorchem marketing director Ed Robinson.

EXAMPLES OF DRINKING WATER CHEMICALS

Coagulation and flocculation: Acrylamide copolymers, aluminium chloride, aluminium sulphate, bentonite, ferric chloride, ferric and ferrous sulphate, kaolinite, polyaluminium chloride, polyamines, starch, polyethyleneamines, resin amines, sodium aluminate.

pH adjustment: Calcium carbonate, calcium hydroxide, calcium oxide, carbon dioxide, magnesium oxide, potassium hydroxide, sodium bicarbonate, sodium bisulphate, sodium carbonate, sodium hydroxide, sulphuric acid.

Corrosion control: Dipotassium orthophosphate, disodium orthophosphate, monopotassium orthophosphate, phosphoric acid, polyphosphoric acid, potassium triphosphate, sodium calcium magnesium polyphosphate, sodium polyphosphate, sodium zinc polyphosphate, zinc orthophosphate.

Corrosion inhibitor: Sodium silicate.

Sequestering: Ethylenediamine tetraacetic acid (EDTA), tetrasodium EDTA.

Disinfection and oxidation products: Anhydrous ammonia, ammonium hydroxide, calcium hypochlorite, chlorine, iodine, potassium permanganate, sodium chlorate, sodium chlorite, sodium hypochlorite.

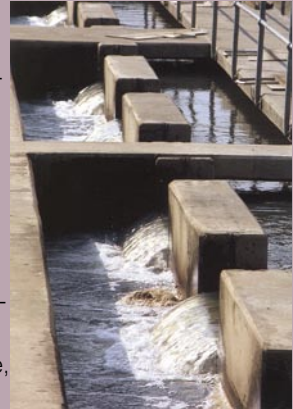
Algicide: Copper sulphate, copper triethanolamine complexes.

Softening: Calcium hydroxide, calcium oxide, sodium carbonate, sodium chloride.

Taste and odour control: Activated carbon, chlorine, chlorine dioxide, copper sulphate, ozone, potassium permanganate.

Dechlorinator and antioxidant: Sodium metabisulphite, sodium sulphite, sulphur dioxide.

Source: WHO



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The industry has welcomed the WRC project in the hope that it will purge the sector of these unscrupulous players that play so callously with people’s lives. Robinson hopes that the guidelines for new standards will also provide terms of

reference for the development of further standards for future substitute products. “We see the industry evolving and new products being introduced all the time, we do not want to be in the same situation 20 years from now.” 