The Importance of Advances in Analytical Chemistry for the Quality Control of Water and Chemicals used in the Water Treatment Process

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The analytical chemistry is inserted in all stages of the water production process, that is, in the characterization of the water of the lake from where it will be collected, in the characterization of the chemicals that will be applied in the process, in the quality control laboratory and in the monitoring the quality of the drinking water distributed to the population. There are thousands of analytical tests performed in sanitation companies daily.

In order to produce water for human consumption, processes must be used to allow the removal of impurities present in the water to be treated. The conventional process of water treatment is divided into phases, such as: pre-chlorination, pre-alkalinisation, coagulation, flocculation, decantation, filtration, post-alkalization, disinfection and fluorination. In each of them there is a strict dosage control of the chemicals, which must be within the technical specifications required by the sanitation companies.

Therefore, all technological evolution in chemical analysis is important in order to optimize the processes of monitoring drinking water quality. Whether for field, inline or bench-top equipments.

For example, the quantitative elemental measurements in drinking water are a very important task since Brazilian legislation establishes the threshold limit value for each element. Besides Atomic Absorption Spectrometry (AAS) and Inductively Coupled Plasma Optical Emission Spectrometry (ICP OES) have been routinely used for this purpose, Total Reflection X-ray Fluorescence spectrometry (TXRF) shows to be very interesting alternative. It provides a fast and easy sample preparation, low analytical operation and maintenance costs. This technique allows monitoring simultaneously the presence of arsenic, barium, lead, copper, chromium, nickel, selenium, uranium, iron, manganese and zinc in drinking water samples.

This technique was so certain that, nowadays, Sabesp performs all the monitoring of the toxicity of the chemicals used in the treatment of water by TXRF. Since any product used in the treatment must promote the potability of water unconditionally, without the risk of transferring any contaminant to the process.

All this control is not an easy task, the sanitation company chemists must be always up to date and seeking technical cooperation agreements with universities. This partnership will promote the evolution of the analytical methodologies used to control the quality of the water we drink.