

Determination of Heavy Metals in Selected Bottled Drinking Water in Malaysian Market using Inductively Coupled Plasma – Optical Emission Spectroscopy

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Structured Abstract

Background: Water is crucial for human, animal, and plant life, directly impacting biological processes. Bottled drinking water's demand has risen due to water resource concerns and urbanization, offering perceived safety and accessibility. Some bottled waters, however, have breached regulations for harmful substances. Polluted water consumption leads to illnesses in underdeveloped nations. Thus, regular monitoring of drinking water quality is essential.

Methods: In this study, a standard solution was meticulously prepared to assess the presence of heavy metals, including Pb, Ni, Cd, Cr, Zn, Fe, and Mn. To facilitate proper sample preparation, the samples were effectively digested using Nitric acid (HNO₃). Once the samples were suitably prepared, they underwent analysis utilising the Inductively Coupled Plasma - Optical Emission Spectroscopy (ICP-OES) technique. This method allowed for precise and comprehensive examination of the heavy metal content in the samples.

Results: Significant findings came to light in this study concerning the water quality of the Brand X. It was observed that the concentration of lead (Pb) exceeded the permissible limits set by both the World Health Organization (WHO) and the Food and Drug Administration (FDA), raising concerns about potential health risks associated with lead contamination. Additionally, in four of the samples, the concentration of nickel (Ni) was found to be below the FDA guidelines, but it surpassed the allowable limit defined by WHO guidelines. The limits of detection (LOD) ranged from 0.19 to 1.04 $\mu\text{g/L}$, and the limits of quantification (LOQ) ranged from 0.59 to 3.16 $\mu\text{g/L}$, indicating the sensitivity of the analysis in detecting trace amounts of these metals in this study.

Conclusion: In conclusion, this study revealed that Brand X water sample exceeded allowable lead (Pb) levels set by WHO and FDA, while nickel (Ni) levels exceeded WHO guidelines in four of the samples analysed. Urgent actions are needed to address water quality concerns and protect public health and the environment through stringent monitoring and regulations.

Keywords: Heavy metals, Bottled drinking water, ICP-OES

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