

Abstract

This work is focused on the determination of selected (chemical) elements (Fe, Mn, Zn, Cr, Na, K, Mg and Ca) in a potential ecological burden area using flame atomic absorption spectrometry as a detection technique. A potential ecological burden is represented by tires which are used as a construction material or as an environment surrounding for growing decorative and consumable plants. Analytes were determined in plant origin samples.

Firstly, the samples were dried in a laboratory electric dryer. The weighted amount of a dried sample (approximately 0.2 g) was digested inside a microwave decomposition device with an addition of nitric acid and hydrogen peroxide.

An optimization of experimental parameters was done for each of the elements before sample measuring. A burner height was optimized and 8 mm height was chosen as a optimum for most elements. Under the optimum condition basic characteristics were measured for each element separately. These characteristics included limits of detection that were: 0.05; 0.01; 0.08; 0.21; 0.02; 0.01; 0.01; 0.01 mg L⁻¹ for the following elements: Fe, Mn, Zn, Cr, K, Ca, Mg and Na, respectively. The limits of quantification, sensitivity and repeatability were determined for each element as well.

A significant attention was paid to the content of zinc in the studied materials due to the possible contamination from the surrounding environment. A higher content of zinc was determined (between 150-200 mg kg⁻¹). Although, the results of further analysis showed no connection between high content of zinc in tires (about 1%) and the determined amount of zinc in the samples. A high concentration of zinc in the analyzed samples is probably related to the overall high concentration of this element in the surrounding environment, such as soil.