

## **Validation of Techniques for Elemental Analysis in a Zoo Nutrition Lab**

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Quantities of minerals in samples such as diets, excreta, and water are a key factor in identifying nutritional needs and thus are an important aspect of laboratory analyses. Perchloric acid digestion with atomic absorption spectrophotometry (AAS) has been a useful and valid method for quantification of physiological levels of minerals. However, recent technology has brought into consideration techniques such as microwave digestion and inductively coupled plasma atomic emission spectrophotometry (ICP-AES). In this experiment, the calcium and potassium content of five National Institute of Standards & Technology Standard Reference Materials (NBS) and seven plant species were compared using perchloric acid and microwave digestion, analyzed using AAS and ICP-AES techniques. By comparing and contrasting the results of our analysis we have validated each of the tested techniques for precision and accuracy.

Microwave accelerated reactions have the potential to control 'digestion' by the way the energy is delivered to the sample and by the electronic control of the parameters. Microwave digestions reduce the complexity of perchloric digestion and improves analytical precision by avoiding temperature gradients and increasing repeatability.

Although AAS is a single-element technique, samples can be accurately quantified for numerous elements. This coupled with a high degree of sensitivity for several elements makes the AAS a valid tool for the investigation of the nutritional importance of elements. The use of inductively coupled plasma generators as an atomization source for optical emission spectrometry has lowered the limits of detection, increased sensitivity and allowed the analysis of multiple elements at one time. However, the requirements of the lab will dictate whether the investment in a more expensive ICP equipment purchase outweighs the cost of an AAS.

**Key Words:** mineral, perchloric, microwave, atomic absorption, ICP