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Publisher *Taylor & Francis*

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Phosphorus, Sulfur, and Silicon and the Related Elements

Publication details, including instructions for authors and subscription information:

<http://www.informaworld.com/smpp/title~content=t713618290>

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To cite this Article Kovács, Béla , Prokisch, Jozsef , Loch, Jaka and Gyori, Zoltá(1996) 'Optimization of Plant Sample Preparation and ICP Parameters for Analysis of Phosphorus', *Phosphorus, Sulfur, and Silicon and the Related Elements*, 111: 1, 11

To link to this Article: DOI: 10.1080/10426509608054640

URL: <http://dx.doi.org/10.1080/10426509608054640>

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OPTIMIZATION OF PLANT SAMPLE PREPARATION AND ICP PARAMETERS FOR ANALYSIS OF PHOSPHORUS

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Abstract Parameters of $\text{HNO}_3\text{-H}_2\text{O}_2$ wet digestion sample preparation method and inductively coupled plasma atomic emission spectrometer (ICP) are discussed for phosphorus analysis.

A LABTAM 8440M type inductively coupled plasma atomic emission spectrometer (ICP) and one of the wet digestion methods for plant sample preparation was tested. As phosphorus is one of the most important element of the periodic table and an ICP instrument is able to measure in UV range where the wavelength of phosphorus is, we can measure its content in plant samples with this instrument by emission spectroscopy. If we want to get acceptable results then the parameters of ICP and sample preparation are very important. The effect of ICP adjustable parameters has been investigated on the signal to background ratios of elements. The ICP parameters investigated in details included the next ones: viewing height, forward power, sample gas, coolant gas, auxiliary gas and flushing gas flow rate and sample uptake flow rate.

A simple, fast and relatively inexpensive sample preparation method with satisfactory accuracy and precision has been developed for a LABOR MIM OE-718/A electronic block digest apparatus with 15000 samples/year effectiveness. Therefore the effects of wet digestion parameters on the effectiveness of sample preparation have been investigated. These parameters were the next ones: quantity of dry weight, quality of digestion acid (HNO_3 , HCl , H_2SO_4 , HClO_4), quantity of cc. HNO_3 , quantity of H_2O_2 , duration of predigestion and digestion, the temperature of predigestion and digestion and the final filtration. The optimal parameters have been determined for $\text{HNO}_3\text{-H}_2\text{O}_2$ wet digestion method and ICP instrument:

Optimal parameters of $\text{HNO}_3\text{-H}_2\text{O}_2$ wet digestion sample preparation method:

Dry weight, generally 2 g; digestion acid, 10 cm³ HNO_3 ; 3 cm³ 30% H_2O_2 ; duration and temperature of predigestion: 30 min. and 60 °C, for final digestion: 45 min. and 120 °C.

Optimal parameters of the ICP instrument:	Parameters:	Optimal value:
	Viewing height	6 mm
	Forward power	1000 W
	Sample gas flow rate	1.14 dm ³ /min.
	Coolant gas flow rate	10 dm ³ /min.
	Auxiliary gas flow rate	0.1 dm ³ /min.
	Flushing gas flow rate	0.13 dm ³ /min.
	Sample uptake rate	4 cm ³ /min.