

Simultaneous Determination of Main, Minor and Trace Elements in Fertilizers by Total Reflection X-Ray Fluorescence

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TXRF was applied to determine main, minor and trace elements in the following type of fertilizers: phosphoric rock, monoammonium phosphate, diammonium phosphate, potassium chloride, calcium carbonate, potassium sulphate, ammonium sulphate and mixtures of such raw materials. The following elements were analyzed simultaneously after dissolution of the sample in water or acid digestion and the appropriate dilution: P, S, Cl, K, Ca, Cr, Mn, Fe, Cu, Zn, As, Br, Se and Pb.

A critical step in the analysis of the fertilizers is the adequate dilution of the sample once it is dissolved in water or after acid digestion. It is demonstrated that erroneous analytical data arise when the sample dried onto the quartz reflector it is not thin. X-Ray transmission calculations were made in order to estimate the amount of sample to be deposited onto the quartz sample carrier which would give a transmission of 95% or higher for the less energetic characteristic fluorescence line in each type of fertilizer.

The samples were also analyzed by ICP emission spectroscopy. In this contribution the results are presented and compared, and the advantages and disadvantages of both methods are listed and discussed. The TXRF spectrometer used was a benchtop system equipped with a planar x-ray waveguide resonator. The detection limits for the trace elements found in the samples analyzed are also presented and discussed.

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