Pixe, a sensitive method for elemental analysis of vegetables

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In this paper we present the method - Particle Induced X-ray Emission (PIXE), a sensitive method for elemental analysis of samples from biology, especially in vegetal biology. Among the methods designed for the determination of the very low chemical concentrations, the Particle Induced X-ray Emission (PIXE) method is the best one specially for measuring the elements. This method is based on the fact that the bombardment of the sample with a charged particle beam causes the ionisation of the atomic inner shells followed by a subsequent of the characteristic X-rays. When the X-rays spectrum is detected by highresolution detector, the well-known Z-dependence of the X-rays energies, as well as the intensities of the individual X-rays line, allow a straightforward determination of the target element.
The detection limit of this method is very good because: I) intense fluxes of exciting radiation are available, ii) the X rays production yields for particles with energies in the MeV range are large and iii) the background associated with the exciting radiation is rather low. The sample preparation technique does not require a special chemical preparation, which may cause some losses in concentration or some contamination. A quantitative determination of an element content in a sample by PIXE method can be done both by absolute
or relative measurements. Using relative measurements the target samples for PIXE are doped with a standard solution for spectrum normalisation and systematical error elimination. Measurements of target elements are made using a proton beam extracted from the TANDEM accelerator. And passes through a collimator before reaching the target. The X-ray spectra are measure with a spectrometric chain having an semiconductor detector with a very good energetic resolution. The use of PIXE technique give possibility to determine the elemental composition of plants with a great sensivity - the limit detection is 1 μg/g, that is genuine trace-element analysis capability.