Particle Elastic Scattering Analysis of Thin Samples with Protons ad He-ions from a 3 MV Electrostatic Accelerator

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PARTICLE ELASTIC SCATTERING ANALYSIS OF THIN SAMPLES WITH PROTONS AND He-IONS FROM A 3 MV ELECTROSTATIC ACCELERATOR

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Particle Elastic Scattering Analysis (PESA) is an attractive complement to PIXE for analysis of light elements. It is, however, difficult to find an optimum set of analysis parameters for a wide range of sample types. The elemental resolution is strongly dependent on the mass of the projectile particle, the particle energy, the sample thickness, the scattering angle and the solid angle. The sensitivity of a certain element for a given set of parameters, when using particle energies higher than the Coulomb barrier, can seldom be predicted by theoretical calculations or from published experimental data of scattering yields.

To find optimal conditions for thin aerosol samples and for calibration purpose, we are using polystyrene films, homogeneously doped with different elements to known concentrations. By using cobalt as one of the elements, the simultaneous analysis of the metal by PIXE facilitates the determination of the amount of polystyrene irradiated. Each calibration includes irradiations of polystyrene films with various thickness, which makes it possible to study matrix effects.

The advantages and limitations of PESA with particles from a 3 MV electrostatic accelerator is discussed and the calibration procedure used is described.