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X-Ray Absorption in PIXE Analysis of Nonuniform Samples

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In PIXE analysis of small nonuniform samples corrections for X-ray absorption and slowing-down of protons may be very large and difficult to estimate. Inspection of a sample by microscope gives information about the shape but not about the density. However good estimations of the corrections for selfabsorption and proton slowing-down are obtained from measurements of the transmission of a narrow beam of low energy X-rays at several positions of the sample.

This paper demonstrates a feasible way of using this method. Welding aerosol samples from stage 5 of a Battelle designed cascade impactor are used as examples. An intense source of 3 keV X-rays is obtained by bombarding a thick silver target with 2 MeV protons. A 0.1 mm diameter X-ray beam is obtained by a pinhole collimator and the transmission of this beam in different parts of the sample is measured with a Si(Li)-detector.