APPLICATION OF PIXE METHOD IN OCCUPATIONAL HEALTH RESEARCH*

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It is the purpose of this work to apply a nuclear measuring technique in the occupational health research.

According to the IAEA report (1) nuclear and nuclear related techniques may have an important role to play in the occupational health problematics. For this purpose long-term and routine requirements are proposed. Those included in our research are development of the analysis method for recognition of chemical hazard by measuring air samples and biological materials.

In our laboratory proton induced X-ray emission (PIXE) spectroscopy is used (2). Method is fast, cheap, nondestructive and multielemental and can be used as a tool for routine analysis. The Van de Graaff accelerator is used as the source of 1.7 MeV protons. Characteristic X-rays of the elements present in the sample are detected by semiconductor detector and their spectra analysed with a small size computer.

Development of the PIXE method for analysis of the human urine of people working in the toxic environment was done. To evaluate the method the urine of unexposed man was dopped with some toxic metals (Pb, Cd) in concentrations down to 0.1 ppm. In order to obtain better sensitivity preconcentration with chemical agens APDC and MIBK was done. The measured concentrations of Pb and Cd using this procedure are in agreement with the concentrations in the dopped samples in the limits of 30 %. Measurement of the dopped urine shows that PIXE method can be used for analysis of urine with respect to the toxic metal contents.

1. Report of Consultants' Meeting on Nuclear and Nuclear-Related Techniques in Occupational Health, Vienna 1980
2. M.Budnar, et al., Nucl. Instr. Meth. 179 (1981) 249

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