

PIXE Analysis of Trace Heavy-Metals in River Waters

Using an Ion-Exchange Filter Paper

Ts.Amartaivan, H.Yamazaki, K.Ishii, S.Matsuyama, Y.Takahashi, T.Satoh,
H.Orihara*, K.Sera**, S.Futatsugawa***

Dep. Of Quantum Science and Energy Engineering, Graduate School of Engineering, Tohoku University,
Aramaki-Aza-Aoba 01, Aobaku, Sendai 980-8579

*Cyclotron and Radioisotope Center, Tohoku University,
Aramaki-Aza-Aoba 01, Aobaku, Sendai 980-8579

**Cyclotron Center, Iwate Medical University,
Aza Tomegamori 348-58, Takezawa, Iwategun, Iwate 020-0173

***Nishina Memorial Cyclotron Center, Japan Radioisotope Association
Aza Tomegamori 348-58, Takezawa, Iwategun, Iwate 020-0173

Abstract

A simple but precise method for the PIXE analysis of trace heavy metals in aqueous samples was developed, in which the PIXE target were prepared by pre-concentrating heavy metals on a cellulose phosphate ion-exchange filter paper and no additional chemical treatment was required. Heavy metals in trace concentrations were quantitatively retained up to 16.7 μ -equivalent on a sheet of filter paper due to the excellent selectivity for heavy metals and ion-exchange kinetics of phosphate groups in cellulose matrix. Heavy metals of less than 1 μ g on one filter paper are precisely and rapidly determined by PIXE analysis using 3 MeV proton beams. The present method is compared with the method preparing a PIXE target for each dissolved species of an element contained in aqueous samples. It will be resulted that the newly developed method enables an on-line PIXE analysis for river water.