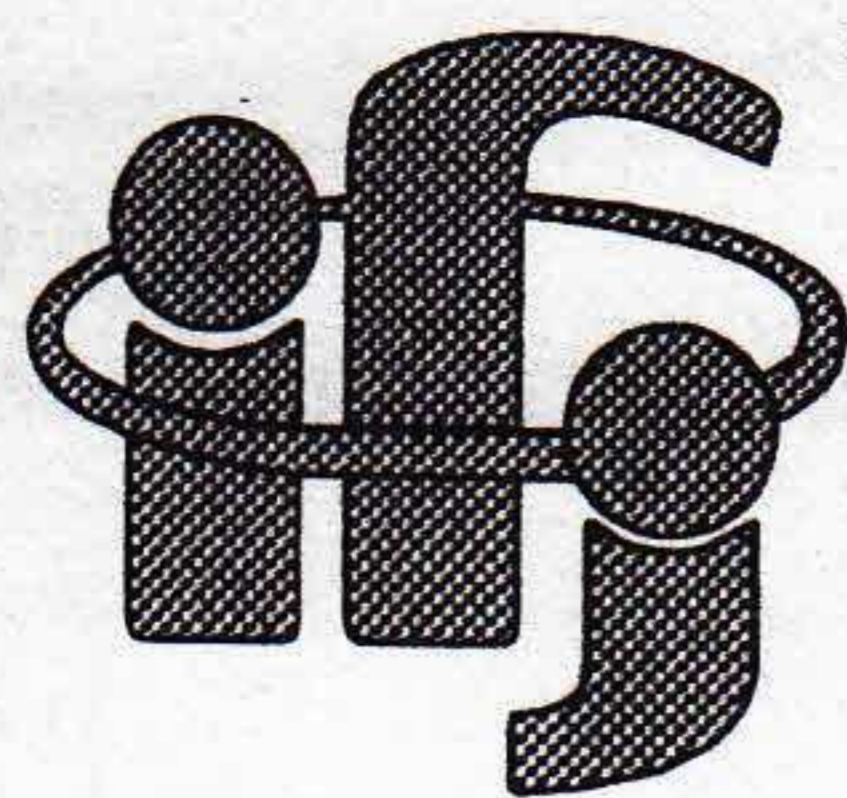


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**A n n u a l
R e p o r t
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ratio for plutonium isotopes (^{238}Pu to $^{239+240}\text{Pu}$) is close to 0.25. An example alpha spectrum of plutonium is displayed on Fig. 1.

The whole project is still in progress, the final conclusions will be drawn in the future article.

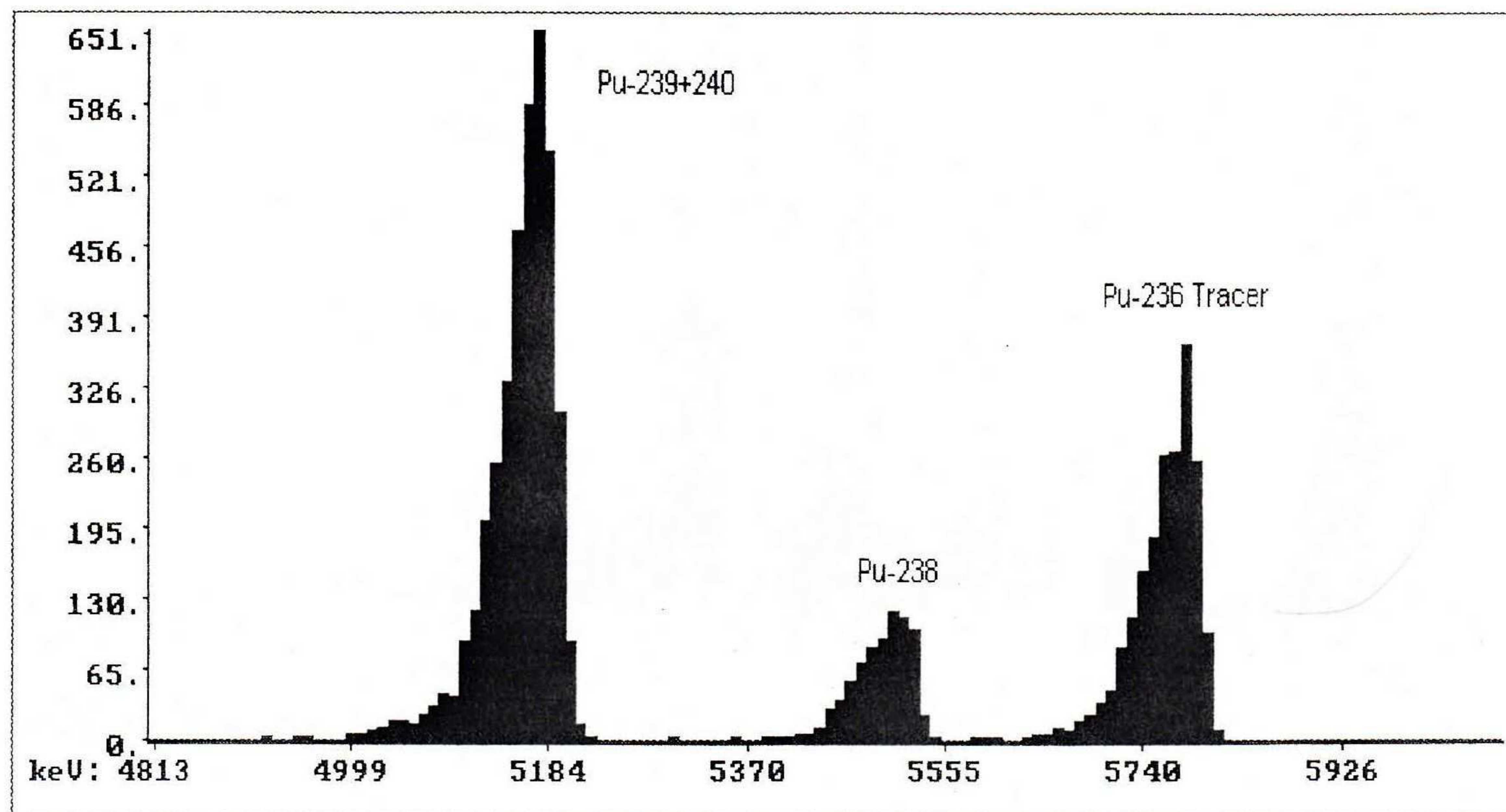


Fig. 1. Example of plutonium alpha-spectrum of lichen *Usnea aurantiaco-atra* (Jacq.) Bory sample collected at King George Island in 1988. Sample mass: 22.3 g of dry weight, measurement time: 183616 s, detector Canberra PIPS 450 mm², source preparation: NdF₃ co-precipitation; measured activity: 2.75 ± 0.16 Bq/kg for $^{239+240}\text{Pu}$, 0.56 ± 0.04 Bq/kg for ^{238}Pu .

Radium Isotopes in Upper Vistula River and its Tributary

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The coal mines of Upper Silesia pump up salty waters and dump them into rivers. In our previous piloting work [1] we have studied radium activity in Vistula river sediments. The aim of the present work was to find out the proportion between radium content in soluble and not soluble forms in river waters and to determine the range of total radium activity in waters.

The samples, of two litre volume each, were collected in May 1997 from Vistula river at 7 different locations. At the same time other water samples were collected, one from each of the 6 other rivers: Chechło, Przemsza, Bieruń, Gostynia, Pszczyńska and Dunajec. Each sample was put into a plastic vessel. Immediately after arriving to the laboratory the samples were acidified and then filtrated, firstly on a paper filter and secondly on a membrane filter (pore diameter 0.7 μm). The dried membrane filters were measured on a gamma-rays spectrometer for ^{226}Ra and ^{228}Ra (^{228}Ac). The residues from paper filters were ashed in 600°C. The ashes and 0.5 dm³ of filtrated water from each sample were taken separately for radiochemical analyses. The Pb and Ba carriers were added to the filtrate along with a radiochemical tracer (^{133}Ba , 55 Bq/sample). Ashes were wet mineralised using concentrated acid solutions (HF, HNO₃, HCl) and then transferred into diluted HNO₃ solution. Separation of radium for both kinds of samples was done by co-precipitation with PbCrO₄. Centrifuged residues were dissolved with hot 0.1 M DTPA solution and co-precipitated with ca 100 micrograms of barium sulphate to obtain thin alpha spectrometric sources. Each source was measured on the gamma-spectrometer for the determination of chemical yield (recovery of ^{133}Ba activity) and for the determination of ^{228}Ra content (via ^{228}Ac measurement). Then the samples were measured on the alpha-spectrometer. An example alpha spectrum of radium is displayed on Fig. 1. A complete analysis of results is now in progress.

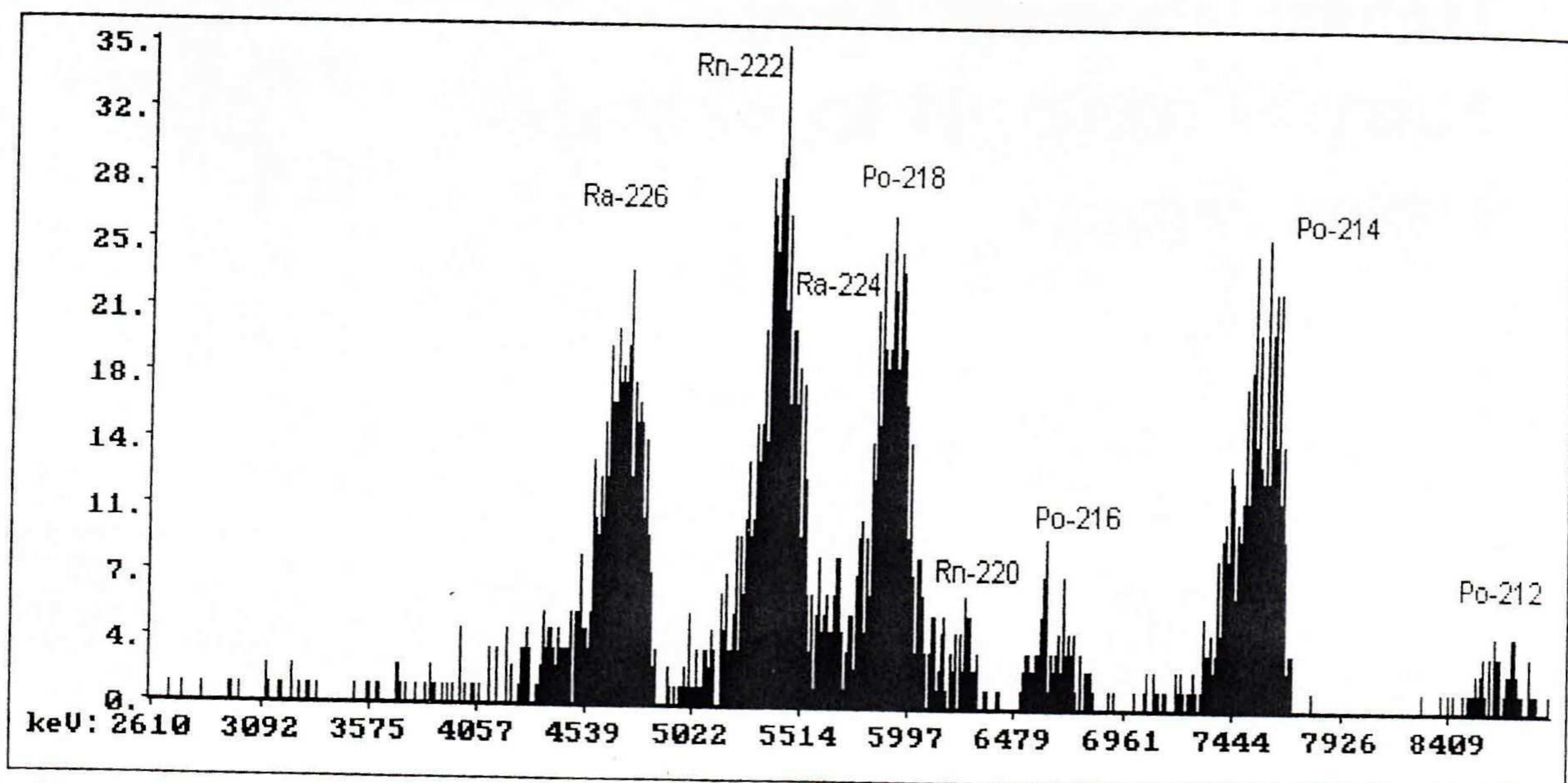


Fig. 1. Example of alpha spectrum for a sample of Vistula river water (0.5 dm^3 of volume), measurement time 421631 s, detector SBSi 300 mm^2 (INP manufactured), source preparation: co-precipitation with BaSO_4 ; measured ^{226}Ra activity $0.071 \pm 0.003 \text{ Bq/dm}^3$.

Reference:

1. J. Pociask-Karteczka, M. Jasińska, and J.W. Mietelski, Proceedings of the Rabat Symposium S4, April-May 1997, in B. Webb: (editor); Freshwater Contamination, p. 103-108, International Association of Hydrological Science Publication No 243, Exeter 1997.

Sorption Behaviour of Rutherfordium and Thorium from Cl/HF Containing Aqueous Solution

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The subject of study was sorption of element 104 (rutherfordium, Rf) and thorium on the strongly acid cation exchanger DOWEX 50x8. The experiments were carried out on-line. Rf from diluted HCl/HF solutions is strongly retained on cation exchange resin in the HCl concentration range of 0.05 to 0.1 M and at HF concentrations up to 0.01 M. This behaviour of Rf is similar to that of its pseudo-homolog thorium and very different from that of its lighter homolog hafnium which is desorbed from DOWEX 50x8 at HF concentrations above 10^{-3} M. The tested ion exchange system is suitable for fast on-line separation of element 106 (seaborgium, Sg) from all other contaminations and from its decay product Rf. This, therefore, allows the indirect identification of Sg [1, 2, 3].

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