Hroncová E.: **Possibilities of X-ray fluorescence spectrometry in analysing environmental samples**

X-ray fluorescence spectrometry (XRF) belongs to the most universal analytic methods. We can use it to analyse nearly all elements in solid and liquid samples. The possibility of analysing solid samples in compact shape, in powder, or with fine layers shortens appreciably the total time of analysis, that is in addition to its non-destructiveness, which is the main reason XRF is a favored method.

X-ray fluorescence spectrometry is based in the fact that the wavelength of characteristic roentgen radiation is constant for atoms of a given element. By its discernment it is thus possible to determine the presence of a given element in the sample – that is, to determine the quality. The intensity of characteristic radiation is proportional to the concentration of a given element in the sample. By measuring it is then possible to determine the quantity. To analyse samples, two types of XRF spectrometers have been used:

1. The wave dispersed spectrometer XRF SPECTROSCAN MAKC-G, used for qualitative and as quantitative analysis of elements in the range of $_{20}$Ca to $_{92}$U. The range of concentration of determinability is 0.1 % – 0.001 % up to 100% without concentrating and after previous concentrating up to 10^{-6} – 10^{-7} %.

2. The energy dispersed spectrometer XRF ELVA X is used for qualitative and also quantitative analysis of elements in the range of $_{11}$Na to $_{94}$Pu. The detection limit of determination is 5×10^{-5} %.

The above instrument technique has been used to analyse contaminated waste wood, historic wood, oil sludge and sludge from wastewater treatment plants, contaminated soil, river sediments and benthos, fly ash. It has been also used in research on possibilities of application to special waste for obtaining rare metals and in research on application of wastes in cast iron production.

Results confirmed the advantages of using the XRF technique for rapid analysis of a great number of environmental samples. In general, for light matrixes of samples, the energy dispersed XRF ELVA X method is considered more advantageous, and for heavy matrixes of samples, the wave dispersed XRF method is most advantageous.

The accuracy of quantitative analysis is influenced firstly by the quality and number of reference materials, and secondly by matrix similarity of the sample and reference materials.

Key words: XRF, qualitative analysis, quantitative analysis, environmental samples

Author's address: Department of Environmental Engineering, Faculty of Ecology and Environmental Sciences, Technical University in Zvolen, Kolpašská 9/B, SK-969 01 Banská Štiavnica, Slovakia, e-mail: hroncova@fee.tuzvo.sk