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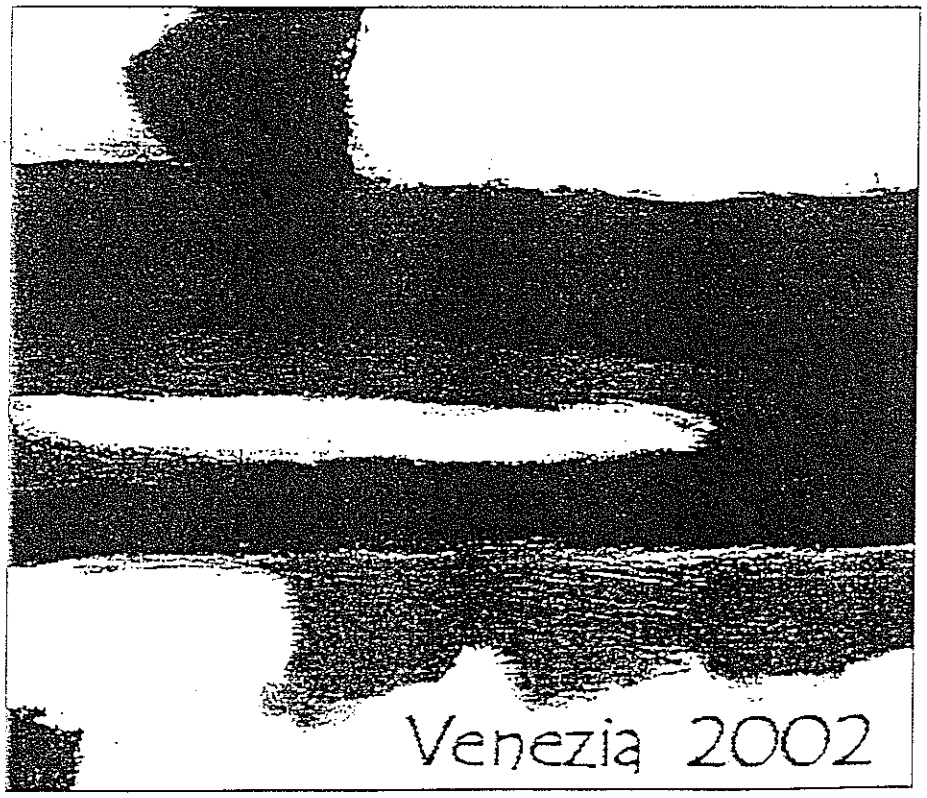

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DETERMINATION OF TOTAL THALLIUM IN ENVIRONMENTAL SOLID SAMPLES BY STRIPPING CHRONOPOTENTIOMETRY

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Determination of potentially toxic metals in environmental solid samples as sediments and soils is an important issue in the monitoring of environmental pollution[1].

Thallium is an almost ubiquitous element in nature but rare wich occurs in the earth's crust in an estimated abundance of 0.1 to 0.5 mg kg^{-1}. It is mainly associated with K(I) and Rb(I) mainly in sulphur containing ores and potassium minerals[2]. The extremely high contents of thallium in several regions were explained by the pedogeochemical origin[3].

Ores smelting, cement production, combustion of fossil fuels, etc. are the primary anthropogenic sources of thallium[1].

Thallium was found to be relatively mobile in soils. The phytoavailabilility of the element depend on plant species and plant parts[3]. Thallium can therefore enter the food chain. Both, mono and trivalent, thallium and their compounds are nonessential and they are toxic to all organism (plants, animals, humans)[2]. Thallium compounds in the monovalent state are highly toxic. Toxic effects of Tl^+ ions are probably in relation to its competition with K^+ ions due to similar ion radii values[2]. Thallous ions enter cells readily and inhibit biological functios dependent on potassium. Another mechanism of thallium toxicity is its interference with sulfur metabolism and sulfur containing enzymes[2]. In addition liver kidney and hearth damage occurs too. There is also evidence of teratogenic effects of thallium[2].

Sensitive and accurate methods for the determination of total thallium are increasingly in demand as a consequence of the intense toxic properties displayed by this metal, comparable to those of Pb and Hg[1].

Several analytical procedures can be used for the determination of thallium in environmental and biological samples. These include spectrophotometry[4], neutron activation analysis[5], laser- induced fluorescence[6], X-ray spectrometry[7], atomic emission spectrometry[8], atomic absorption spectrometry[9], anodic stripping voltammetry[10], inductively coupled plasma atomic emission spectrometry[11] and inductively coupled plasma mass spectrometry[1,12].

In this paper a method for the determination of total thallium by stripping chronopotentiometry (SCP) using a mercury film-plated electrode was set up for the possible application in different environmental solid samples. A certified sediment reference materials was used to demonstrate accuracy and precision data.

Sample processing include a microwave mineralization with concentrated HNO_3, a subsequent evaporation to dryness and then a treatement with dilute nitric acid. An

EDTA solution was utilized as background electrolyte to avoid coincidence of the stripping peaks for lead and thallium[10].

Quantitative analysis was carried out by the method of standard additions. A good linearity was obtained in the range of concentrations examined. The detection limit was 5.1 ng g^{-1}.

Key words: environmental solid sample, thallium, dPSA.

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