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Selenium and selenium species in environmental samples obtained in the neighbourhood of an old mining area. Methodological aspects and comparison of analytical procedures

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Selenium is an essential trace element, for which very small differences exist between essential and toxic levels, depending on the chemical form in which it is present. The levels of this element in soils are highly variable, mainly reflecting the weathering of parent materials, although anthropogenic contributions may also be of importance. The mean level in soils has been reported to be about 0.3 mg/kg. It is important to note that this indicates the total amount of the element, which consists mainly of inorganic selenium forms, although it is also possible to find some organic selenium compounds. Inorganic species can be transformed into volatile compounds such as dimethylselenide (DMSe) and dimethyldiselenide (DMDSe) due to biological processes. The incorporation of the element in the trophic chain produces a number of organoselenium compounds due to a variety of chemical reactions.

A considerable number of selenium determinations have been carried out in our Departments during the last decade, most of the samples analyzed having been obtained in the neighbourhood of a sulphide-rich area in which intensive mining has been carried out for centuries, and where selenium levels are predictably high. The samples analyzed included soil, plants, seawater and surface waters obtained after torrential rains. To this effect, several analytical methodologies have been used, including slurry-based

electrothermal atomic absorption spectrometry, which allows total selenium level in soils to be obtained without the need to dissolve the sample (1), and atomic fluorescence spectrometry after a total dissolution stage by means of a microwave oven. Furthermore, gas chromatographic procedures with specific detection by means of a miniaturised microwave-induced plasma detector have been used to measure small amounts of volatile organoselenium compounds (2,3). This communication reports some of the results obtained and shows some peculiarities of the analytical procedures used.

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