DETERMINATION OF SELENIUM IN ENVIRONMENTAL SAMPLES USING A MULTICOMMUTED FLOW INJECTION SYSTEM WITH HGAAS

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Selenium occurs naturally in the environment. Although it has been recognised as an essential trace mineral, with antioxidant and anticarcinogenic properties, its environmental importance is related to its potential toxicity to animals and humans. A flow system based on multicommuted flow injection analysis (MCFIA) was developed for the determination of total selenium by hydride generation atomic absorption spectrophotometry (HGAAS) (Fig. 1).

One advantage of the developed MCFIA system is the reduction of waste production (less than 6.4 ml/assay) and reagent consumption which contribute to a greener chemistry. A linear calibration curve was established up to 10 $\mu g l^{-1}$, the sample throughput was 116 h^{-1} and the detection limit was 0.8 $\mu g l^{-1}$. The repeatability was better than 3% (RSD, n=10 for a sample with 2.8 $\mu g l^{-1}$). The developed system was applied to the analysis of environmental samples. Accuracy of the method was assessed using the certified reference materials CRM 279 (sea lettuce), SPS-SW2 (surface water) and Tr-218 water from the interlaboratory proficiency tests. The average of the results obtained for each reference material for total selenium showed no statistical difference from the certified value.

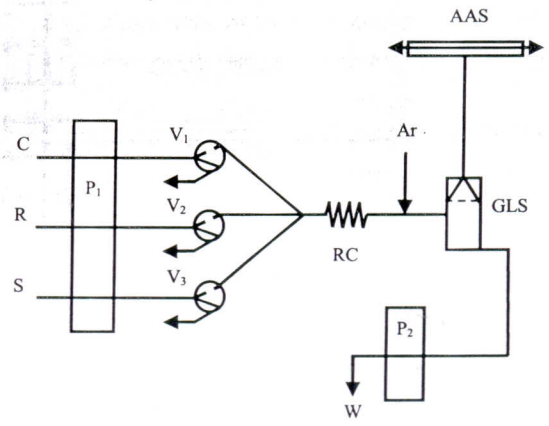

Figure 1. Manifold of the MCFIA system for the determination of selenium by HGAAS; C, carrier; R, reducing reagent; S, sample; RC, reaction coil; V1 - V3, solenoid valves; P1 and P2, peristaltic pumps; GLS, gas-liquid separator; Ar, Argon; AAS, atomic absorption spectrometer quartz cell; W, waste.

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