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Enzymatic Probe Sonication treatment in Cadmium plants determination

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Enzymatic Probe Sonication (EPS), a new tool in analytical chemistry, combines enzymes plus probe sonication. EPS is an emerging technique that provides an effective environmentally sustainable method at low cost. It allows a sample treatment with speciation purposes in short times, with few chemical reagents (low concentration and low volume). In its first application, a quantitatively (100%) Selenium recovery from Se-enriched yeast sample, maintaining Se-chemical forms, was obtained in times as short as 15 s (1). Previous sample enzymatic treatments (enzymatic incubation or enzymatic bath sonication) needed times between 12-48 h. In addition, the speciation of other elements of relevant toxicological impact in human health (As, Hg, Cd, and Cr), are potentials targets of the EPS procedure. This new sample treatment is expected to change many sample treatments in environmental analysis, drugs or toxic metal ions control.

This work presents a new approach for the fast Cadmium determination in plants by Flame and/or furnace graphite Atomic Absorption after a small-scale solid-liquid extraction assisted by EPS. Different type of enzymes have been tried, such as cellulase, laccase and lignin peroxidase, as well as CelLytic P, a non-ionic reagent that enables extraction of proteins from fresh or frozen leaves keeping protein immuno-reactivity and biological activity. Sorghum, Brassica and Tobacco, grown in Cadmium contaminated solutions, as well as a certified reference material, NIST-SRM 1570 Spinach Leaves, were used as plant material. An attempt was made to discriminate the Cd-chemical forms using chromatographic separation (HPLC) coupled to Atomic Absorption.

1. J. L. Capelo, P. Ximenez-Embun, Y. Madrid-Albarrán, C. Camara., *Anal. Chem.*, 76 (2004) 233-237