

Optimization of extraction methods and detectors for heavy metal analysis in sediment

ABSTRACT

The optimization analysis, extractions of metals (Zinc, Cadmium, Lead, and Copper) content in Certified Reference Material, BCR ®-667 of estuarine sediment was carried out by different procedures of acid digestion such hydrochloric acid-nitric acid-hydrofluoric acid, nitric acid-perchloric acid, and sulphuric acid-hydrogen peroxide mixtures. These metals concentrations were determined by using Differential Pulse Stripping Voltammetry (DPSV) and Inductive Coupled Plasma-Mass Spectrometry (ICP-MS). The purpose was to determine these metals (Zn, Cd, Pb, Cu) concentration in sediment samples simultaneously in good precision and accuracy measurement. The results showed both have small standard deviation indicates good precision of metals determinations in both detectors. The accuracy for DPSV ranged from 18.85-154.38% and ICP-MS ranged from 75.28-90.13%. Zn, Cd, Pb, and Cu were simultaneously measured in BCR ®-667. When the optimized method was applied into real sediment samples, both determinations showed a good precision in analysis but ICP-MS was selected as the detector. It measured all the metals of interest (Zn, Cd, Pb, Cu) in the real sediment sample simultaneously.

Keyword: Sediment; Heavy metals; Digestion method; ICP-MS; Voltammetry