It was possible to assign values to 20 elements with their respective uncertainties, being 9 certified values (As, Cu, Fe, K, Mg, Mn, Na, Se and Zn), 10 indicative values (Br, Ca, Cd, Cl, Co, Cs, Hf, Mo, P and Rb) and 1 as additional information (Hg). All the three reference material production projects took advantage of the unique metrological properties of Instrumental Activation Analysis (INAA) not only in the certification process but also in the homogeneity and stability assessment following ISO Guide 30 series recommendations.

AIR POLLUTION ASSESSMENT USING TREE BARKS AS BIOMONITORS P27

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Tree barks are considered to be a promising indicator of air pollution monitoring, because of its accumulation of aerosol particles, simplicity of arboreal species identification and its wide geographical distribution. In this study, barks from Sibipiruna (Caesalpinia peltophoroides) and Tipuana (Tipuana tipu) tree species were collected in different sites in the Metropolitan Region of São Paulo (MRSP) and from two small cities considered as control sites located far from MRSP. The bark samples collected were cleaned and ground for the element analyses. Neutron activation analysis (NAA) was applied for the determination of As, Br, Ca, Cd, Cl, Co, Cr, Cs, Fe, K, La, Mg, Mn, Ni, Rb, Sb, Sc, V and Zn and graphite furnace atomic absorption spectrometry (GF AAS) for Cd, Cu and Pb determinations. Results obtained for samples collected in different sampling sites in the MRSP presented wide variability due to the different pollutants levels that each tree was exposed to. In general, barks from trees located close to high vehicular traffic presented high As, Cd, Pb, Sb and Zn concentrations. The principal components analysis (PCA) was applied to identify sources associated with tree bark element concentrations and according to PCA, 80.97% of the results variance could be explained by four components. The possible origins of these elements were soil resuspension plus vehicular emission, industry, marine aerosols and the tree bark structure itself. The calculated enrichment factors indicated that all the elements originated from anthropic sources, with the exception of Cs. In addition, the enrichment of the elements in tree barks was higher in the MRSP than that from enrichment of barks collected from control sampling sites, indicating that the different levels of vehicular traffic may influence the enrichment of the elements. Despite the different pollution levels, the PCA indicated that there are no significant differences between MRSP and control sites with regards to emission characteristics, probably due to the control sites being located in urban areas. The analytical control of the results was checked by analyzing certified reference materials and the results indicated that NAA and GF AAS provided reliable data for element concentrations with standardized differences, $|Z\ \text{score}| < 2$.

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