

Trace element determination in human dental tissues by neutron activation analysis

M.A.B. Soares, E.M. Adachi, M. Saiki

Instituto de Pesquisas Energéticas e Nucleares, IPEN-CNEN, São Paulo, Brazil

The analyses of human teeth have been of great interest for the correlation studies between their element concentrations and the presence of dental caries, nutritional status and environmental exposure. The aim of this study was to define experimental conditions to determine trace elements in enamel and dentine tissues, separately, by applying neutron activation analysis. Enamel and dentine samples were separated from permanent whole teeth and they were cleaned using acetone and purified water and then dried and ground in an agate mortar to obtain a fine powder. Instrumental neutron activation analysis was applied to determine Ba, Ca, Na, Sr and Zn in the samples. Samples and synthetic elemental standards were irradiated under thermal neutron flux of the IEA-R1 nuclear reactor for short and long periods. The short irradiation procedure has the advantage of presenting a quick response for the analysis of Ba, Ca and Na. Even though there is no spectral interference of bremsstrahlung, this irradiation condition did not allow the determination of Sr and Zn. Comparisons were made between the results obtained for enamel samples and the literature values, as well as, between the results obtained for enamel and dentine samples. The certified reference materials NIST 1400 Bone Ash and NIST 1486 Bone Meal both from the National Institute of Standards and Technology, USA, were also analyzed to control the quality results.