

Analysis of soil reference material using two neutron activation methods

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The concentration of the elements in the soil reference material (IAEA /SOIL-7) was obtained after been analyzed at IPEN/SP using nuclear data and neutron flux parameters. The Cd Ratio Technique was used for the measurement of thermal neutron flux distribution in the IEA-R1 nuclear reactor. The concentration of each element was then obtained by using an in-house software, which correlated the measured parameters, i. e., neutron flux, net area and efficiency of the selected gamma ray with the constants physics involved (the decay constant; the atomic mass, the Avogadro's number, the cross section for the selected capture reaction, the isotopic fraction and the intensity of the gamma ray). In a running of this software the user needs to input data about irradiation time, counting time and waiting time (the time elapsed between the end of the irradiation and the start of the counting) and the sample mass.

The performance of this procedure is compared to results obtained in the same reference material using the k_0 -standardization method, applying the commercial KayWin software package. This k_0 -standardization method was applied at CDTN/CNEN, Belo Horizonte, using the TRIGA MARK I IPR-R1 nuclear reactor. The advantages and disadvantages of each method and sources of errors are discussed.