

Nuclear Spectroscopy Technique Applied in the Health Sciences

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In the last years, the crescent radiation utilization in the biological sciences requires nuclear techniques application which supply that demand. Considering this fact, nuclear spectroscopy technique can be useful in the analisys of biomaterials, biological tissues, organic materials, odontological mettalic alloys and others materials used in the health area.

This work presents a description of the beta and gamma spectroscopy experiment and some applications in odontological area.

The technique consists of the irradiation of the material to be investigated, using nuclear reactor and particle accelerators, to produce radioisotopes products that provides information about its chemical composition as well impurities present in the sample. The identification of the isotopes produced are perfomed by the determination of the beta and gamma-rays energies and their disintegration periods.

To the developement of this study, two independent spectrometers with Ge and scintillations (NaI(Tl), CsI(Tl) and Ne102) detectors, respectively, were used with a conventional eletronic system associated. The spectrometers were mounted inside a lead shielded hood in order to reduce the background radiation. The detectors were calibrated for energy and efficiency through the measurements of standard sources.

In order to demonstrated the validation of the method, the precision, the accuracy and the detection limit were evalueted. The precision was examined by analyzing replicate samples and the relatives erros were, generally, lower than 15%.

The method described presents high sensitivity allowing the identification of radioactive products with good accuracy without destruction of the samples. Simultaneously multielemental analysis by Scanning Electron Microscopy was carried out and a high grade of compatibility was obtained.