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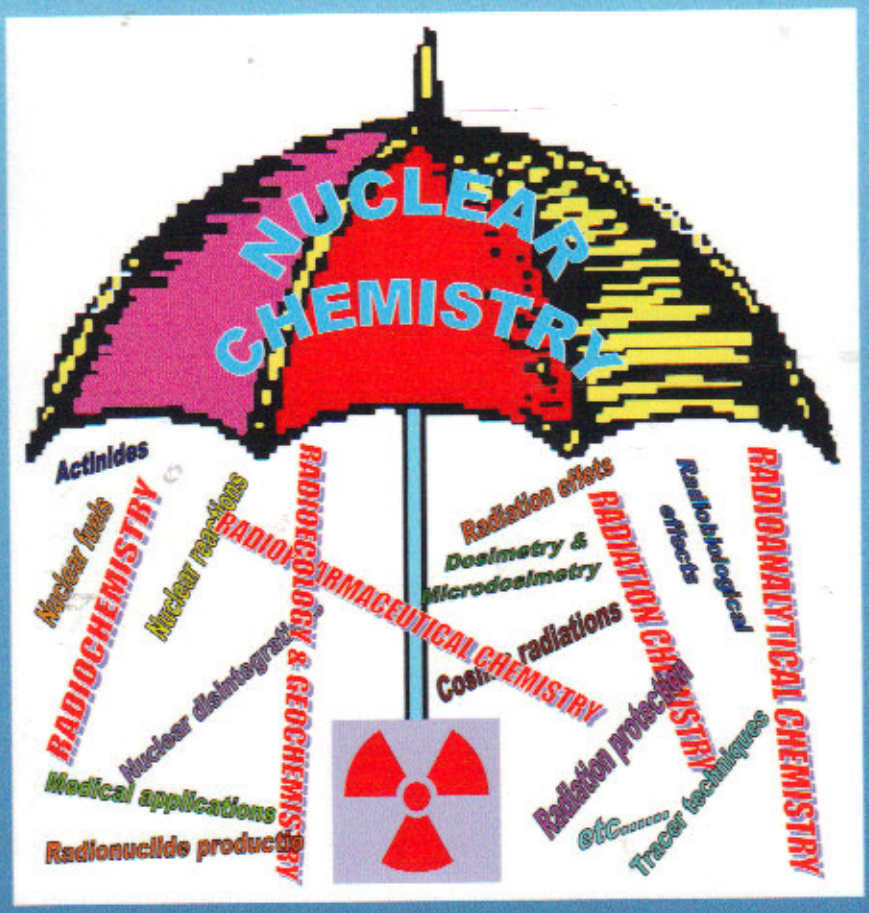

Program
Abstract Book

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THE INFLUENCE OF SAMPLE PROPERTIES AND SAMPLE GEOMETRY ON THE ACCURACY OF THE GAMMA-RAY SPECTROMETRY.

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The comparative method of Neutron Activation Analysis (NAA) has been widely applied to analyze several kinds of samples and, in order to avoid analytical errors, the sample and elemental standard must be identical or comparable in its dimensions and matrix composition. In order to improve analytical results, in this study the variations in counting rates due to the influence of sample property (density), sample geometry (dimensions), effect of dead-time and pile-up and the difference of the sample holder were investigated. These influences were studied using two simulated samples of ^{241}Am and ^{152}Eu which were prepared by pipetting these radioactive tracers on sheets of filter paper. The gamma ray measurements were carried out using a Digital Spectrum Analyzer coupled to a hyperpure Ge detector and the gamma spectra were processed using Genie 2000 software. The gamma ray energies, in keV, of each tracer utilized were the following: ^{241}Am (59.54) and ^{152}Eu (121.78, 344.29, 778.92, 964.11, and 1408.0). The absorption of gamma radiation was studied for the samples presenting different densities such as plant, lichen, brain tissue, filter paper, mineral supplement, shale, soil and metallic iron. Results obtained indicated the decrease of counting rates with the increase sample dimensions. As expected, this effect was more pronounced when the counting position was closer to the detector. The dead-time and pile-up effects led to a change in the counting efficiency and the results indicated that dead time has to be limited to 7.9% in order to avoid substantial errors. As expected the counting rates decreased with the density of sample due to gamma ray absorption and the effect was greater at low gamma energy. The simulated samples measured using nine sample holders presented counting rates ranging from 1.3% to 5.2%, depending on the gamma ray energy measured. From the results obtained one may conclude that sample geometry and sample properties should be considered to ensure a consistent high quality of the analysis and adequate conditions for gamma ray spectrometry were proposed in this study.