RADIOACTIVITY OF POWDERED MILK PRODUCED AT LONDRINA, PR, BRAZIL

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The measurement of radioactive lines in the environment and in food is of fundamental importance for controlling the radiation levels which one man is exposed direct or indirectly. This work deals with the measurement of radioactive lines in powdered milk, with high resolution gamma spectrometry, using a HPGe detector with relative efficiency of 10%, coupled to a standard electronic nuclear chain and a multichannel card of 8192 channels. Preliminary measurements were accomplished to define the kind of the system shield, the geometry of the sample recipient, the size of the sampling and the correction of self absorption. Two kinds of powdered milk produced at Londrina, state of Paraná, southern of Brazil, were analyzed: Integral Powdered Milk Cativa and the Integral Powdered Milk Polly. The samples were properly accommodated in a Marinelli beaker of 2,1 l, sealed and kept by 40 days. The counting time of each measurement was two days. It was possible to identify the radionuclides 40K, 137Cs and 232Th (from 208Tl), whose activities were calculated according to the International Atomic Energy Agency norms. The detector efficiency was measured employing calibrated samples, prepared with IAEA certificated standards mixed with powdered milk, with same geometry of the samples. The results are presented in the Table 1. Tukey's average comparison test was used to check the repeatability of the measurements and the absence of significant systematic deviation. It can be concluded that, in general, the implemented technique showed good results when compared with other works (Table 2 shows a comparison with one work of the literature). In other hand, the Cativa and Polly milk presented normal radioactivity levels, with the radionuclides activity below the maximum level permitted by IAEA and CNEN (National Nuclear Energy Center), in this way the milk can be normally consumed, without any kind of restriction.