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A new PTS for short-time neutron activation analysis

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A fully-automatic pneumatic transfer system (PTS) for short-time neutron activation analysis (STNAA) is constructed to utilize two irradiation positions of a TRIGA Mark-II research reactor. The system consists of a vertical in-core irradiation terminal and a terminal for a radial radiation beam tube. Both terminals were constructed for a sample capsule of 3.5 ml. The transfer time of the irradiated capsule (4g) for a distance of 30 meters is found to be less than 3 seconds using pressurized air (3 bars). The Irradiation position of the sample capsule inside the beam tube is set at an angle of 45o and can be equipped with a moveable Cd filter for thermal/epithermal irradiations. The system is equipped with two sample changers for automatic analysis of un-irradiated and pre-irradiated samples for their short- or long-lived nuclides. A software package for the system is developed using two different codes. The first is based on PLC-code to control the irradiation procedures while the second is based on a Delphi to manage the measuring procedures with one of two digital spectrometers (Genie and Dspec). The software package manages the complete analysis procedure for reliable hardware/software control of the pneumatic- and the counting systems. The counting chamber is fabricated from Plexiglas and equipped with a linear motor to set the sample automatically at one of 4 geometry-positions, according to the activity of the analyzed sample.

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