

Standardization Of Miniature Neutron Research Reactor And Occupational Safety Analysis

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Abstract : The comparator factors (Fc) for miniature research reactors are of great importance in the field of nuclear physics as it provide accurate bases for the evaluation of elements in all form of samples via ko-NAA techniques. The Fc was initially simulated theoretically thereafter, series of experiments were performed to validate the results. In this situation, the experimental values were obtained using the alloy of Au(0.1%) - Al monitor foil and a neutron flux setting of $5.00\text{E}+11 \text{ cm}^{-2}\cdot\text{s}^{-1}$. As was observed in the inner irradiation position, the average experimental value of $7.120\text{E}+05$ was reported against the theoretical value of $7.330\text{E}+05$. In comparison, a percentage deviation of 2.86 (from theoretical value) was observed. In the large case of the outer irradiation position, the experimental value of $1.170\text{E}+06$ was recorded against the theoretical value of $1.210\text{E}+06$ with a percentage deviation of 3.310 (from the theoretical value). The estimation of equivalent dose rate at 5m from neutron flux of $5.00\text{E}+11 \text{ cm}^{-2}\cdot\text{s}^{-1}$ within the neutron energies of 1KeV, 10KeV, 100KeV, 500KeV, 1MeV, 5MeV and 10MeV were calculated to be 0.01 Sv/h, 0.01 Sv/h, 0.03 Sv/h, 0.15 Sv/h, 0.21Sv/h and 0.25 Sv/h respectively with a total dose within a period of an hour was obtained to be 0.66 Sv.

Keywords : neutron flux, comparator factor, NAA techniques, neutron energy, equivalent dose

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