

## Neutron-induced Reactions Investigations in the Neutrons Energy Range of up to 16 MeV

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The published different theoretical calculations of the cross sections of neutron-induced reactions (n,p), (n, $\gamma$ ) and (n, $\alpha$ ) are disagreed with each other. In addition the available experimental data for neutron low energy region is scarce. The new calculations using nuclear reactions codes EMPIRE-3.1 and TALYS 1.4 were performed. The received results are compared with available experimental and theoretical data. The possibility of obtaining the neutron beam by the external proton beam of cyclotron C18/18 with energy 18 MeV and current 100  $\mu$ A through the reaction  ${}^7\text{Li}(p,n){}^7\text{Be}$  was investigated. The opportunity of using the obtained neutrons beam with energy up to 16 MeV for measurements of (n,p), (n, $\gamma$ ) and (n, $\alpha$ ) reactions cross sections are studied. As usable targets the natural Calcium ( ${}^{\text{nat}}\text{Ca}$ ) for (n,p) reaction and the natural Zirconium ( ${}^{\text{nat}}\text{Zr}$ ) for (n, $\gamma$ ) reaction are considered. There is no experimental cross section data for both Ca and Zr elements for neutron low energy range. On the other hand, Zirconium is an important and major component of the structural materials used in traditional and advanced nuclear reactors, owing to its very low absorption cross-sections for thermal neutrons and resistance to corrosion. During the experiment the activation method is utilized. For activation analysis is used the HPGe detector which calibration and electronic test already done.