SPECTRA OF d, t, α AT THE INTERACTION OF NUCLEI ^{27}Al, ^{59}Co AND ^{112}Sn WITH ^{3}He IONS OF ENERGY 50.5 Mev

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This work is continuation of a cycle of researches of inclusive cross sections of reactions initiated by ions ^{3}He on nuclei – candidates of constructional elements of projected nuclear power plants. The development of the new generation of nuclear energy systems with a high level of safety (Accelerator Driven System (ADS)), consisting of a proton accelerator, the neutron production target and sub critical reactor is deployed in many countries. According to the physical scenario of ADS, high-energy protons passing target assembly generate the neutron flux once more complex nuclides such ^{2,3}H, ^{3,4}He etc initiating the reaction with the emission of secondary neutrons. Of particular interest is the measurement of the inclusive spectra of the reactions induced by ^{3}He ions. Experimental information about these reactions is extremely insufficient.

Double-differential cross sections of reactions (^{3}He,xd), (^{3}He,xt) and (^{3}He,xα) formed by the interaction of ions ^{3}He with energy of 50.5 MeV with a nuclei ^{27}Al, ^{59}Co and ^{112}Sn are received. The standard two-detector telescope has used for registration and identification of product of nuclear reactions. The self-supporting foil with thickness of 2-4 mg/cm^2 has used in these experiments. After integration on angels the integrated and partial cross sections of the specified reactions are determined.

The analysis of experimental cross-sections of reactions is carried out in accordance with exciton model for pre-equilibrium nuclear reactions that describes the emission of particles from an equilibrating composite nucleus. Additional components are calculated semi-empirically to account for direct nucleon transfer reactions and direct knockout processes involving cluster degrees of freedom. A satisfactory agreement between experimental and calculated values has been achieved.

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