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Neutron capture reaction of 〖Au〗^197characterized by Γ_y=0.124eV and Γ_n=0.007E^(b ½) eV and the role of exotic neutron rich nuclei

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Abstract: The use of nuclear energy offers numerous peaceful applications in the generation of electricity, medical diagnostics and treatment, agricultural advancement and food preservation. The main aim was to apply the concept of the cross-section to resonance in a quantitative manner. It gave the value of a single resonance level formed by an incident particle with zero angular momentum and charge zero so that the spin and the coulomb effects were not taken into consideration. The level of compound nucleus is bound, the excitation by incident particle was treated as oscillation produced by electromagnetic wave. We varied the nuclear cross-section with the incident energy, the same way the energy in a forced oscillation varies with incident frequency. In classical treatment, resonant circuits absorb energy because of resistive levels. For the case of nuclear, damping arises because of decay possibilities, hence nuclear states have a finite width Γ. A decaying state wave function of mean energy E_0 corresponds to an exponential decrease of intensity of excitation. It is via the r-process that exotic neutron rich nuclei play an important role in the formation of heavy elements. The result showed that a decaying state is not a function of definite energy E_ . A sharp resonance corresponds to a narrow width, hence the peak cross-section is 3.446×〖10〗^43 barns and was analogous to the dispersion formula. The compound formed nucleus in this resonance absorption has a spin 2. Improved nuclear structure and reaction calculation gives a better understanding of radiative capture rates of light-nuclei and medium-nuclei which affects the abundance of heavier nuclei.

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