

NEW STUDY OF THE ASTROPHYSICAL REACTION $^{12}\text{C}(\alpha,\gamma)^{16}\text{O}$

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$^{12}\text{C}(\alpha,\gamma)^{16}\text{O}$ capture reaction is considered to be the most important thermonuclear reaction in non-explosive astrophysical sites and its reaction rate is an important nuclear parameter in many stellar evolution models. This reaction was investigated through the direct α -transfer reaction ($^7\text{Li}, t$) at 28 and 34 MeV incident energies. After the determination of the reduced α -widths of the subthreshold 2^+ and 1^- states of ^{16}O from the DWBA analysis and the E2 and E1 S-factor from 0.01 MeV to 4.2 MeV in the center-of-mass energy and also the numerical determination of the reaction rate of this reaction at $r=6.5$ fm and at a different stellar temperature (0.06 Gk-2 GK), we will determine a new reaction rate of this reaction at $r=7.7$ fm.