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The ^{6}Li(^{22}Ne, ^{26}Mg)d α-transfer experiment for the study of low energy resonances in ^{22}Ne (α, γ) ^{26}Mg

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While the reaction ^{22}Ne(α,n)^{25}Mg in stellar He burning is considered the dominant neutron source for the s-process in massive stars, the competing ^{22}Ne(α,γ)^{26}Mg reaction may be of considerable strength and significantly suppress the neutron production [1]. The resonance parameters such as levels and strengths in ^{26}Mg produced by α + ^{22}Ne at some low energy resonances within the Gamow window (E_α = 400 ~ 1000 keV) should be experimentally determined with better accuracy to improve our understanding of those reaction rates [2]. In this work, we studied the feasibility of the ^{6}Li(^{22}Ne, ^{26}Mg)d α-transfer reaction to better investigate those resonance parameters. The ^{6}Li(^{22}Ne, ^{26}Mg)d α-transfer experiment was performed at the JAEA (Japan Atomic Energy Agency) -Tokai tandem accelerator. Two sets of four Si ΔE-E detectors were used for detection of Mg and deuteron, respectively. Details of detection systems for Mg and deuterons are described in [3]. The energies of deuterons were measured to determine the excitation energy of ^{26}Mg and coincidence detection of ^{26}Mg and deuteron were attempted to remove the deuteron background from unwanted reactions. We succeeded in detecting the expected Mg-d coincidence events and concluded that the ^{6}Li(^{22}Ne, ^{26}Mg)d α-transfer experiment can be a good tool to search for resonance levels of ^{22}Ne + α reactions in the Gamow window at stellar He burning in massive stars.

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