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Production and Separation of Radioactive Beams ^{20}Na and ^{20}Mg with MARS[1] GOPAL SUBEDI, REU student from Colby College, B.T. ROEDER, A.A. ALHARBI, M. MCCLESKEY, E. SIMMONS, A. SPIRIDON, L. TRACHE, R.E. TRIBBLE, Cyclotron Institute, Texas A&M University — We studied the production and separation of ^{20}Na and ^{20}Mg using the MARS spectrometer at the Cyclotron Institute, TAMU. Using a ^{20}Ne beam at 25 MeV/u on a H_2 gas target at 2 atm and 77 K, a large production of ^{20}Na was observed. Further, we were able to study its β, $\beta\gamma$, and β-delayed α-decay. For the β-delayed α-decay, we observed alphas with energies 2.1, 3.8, 4.4, 4.8 MeV. Following this run, we ran a test experiment to obtain the maximum production of the rarer isotope ^{20}Mg with the same ^{20}Ne beam on a ^{3}He gas target. The gas cell was filled with ^{3}He at 1.5 atm and 77 K. Overall, the fusion-evaporation of ^{20}Ne(^{3}He,3n) was found to be a better reaction for ^{20}Mg production than the fragmentation of ^{24}Mg at 45 MeV/u previously tested with MARS. These findings will be used for planning an upcoming study of the β-delayed proton decay of ^{20}Mg to better understand the resonance states in the ^{19}Ne(p,γ)^{20}Na reaction of crucial astrophysical interest in studies of the hot CNO cycle in stars.

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