

MC-50 사이클로트론을 이용한 Na-22 제법에 관한 연구

The Study of Na-22 Production with MC-50 Cyclotron

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요 약

원자력병원의 MC-50 사이클로트론을 이용해 $^{27}\text{Al}(p, \alpha pn)$ 핵반응으로 무담체의 ^{22}Na 를 생산하는 방법에 대해 연구하였다. ^{22}Na 는 반감기가 2.6년이고 주 γ -에너지가 1,274.5keV로서 표준선원으로 이용될 수 있다. 여기함수 측정결과 ^{22}Na 생산에 적합한 양성자 에너지는 26MeV 이상이었고, 43.8MeV에서 최고치의 핵반응단면적 40.8mbarn을 나타내었으며 50.5→26.3MeV에 대한 ^{22}Na 의 생산수율은 60.9 $\mu\text{Ci}/\mu\text{Ah}$ 이었다. 조사된 표적으로부터 ^{22}Na 의 분리는 이온교환수지법을 이용하였다.

Abstract

A method for the production of no-carrier added(NCA) ^{22}Na was developed via $^{27}\text{Al}(p, \alpha pn)$ nuclear reaction with 50.5MeV protons. The half life of ^{22}Na is 2.6 years and main γ -energy is 1274.5keV and it is used standard source and sodium catabolism study. The cross-section and thick target yield for the reaction was measured in detail in the energy range of 50.5→20.2MeV in order to determine the optimum conditions for the production of ^{22}Na . The maximum cross-section for the production of ^{22}Na was 40.8 mbarn at 43.85MeV. The calculated production yield of ^{22}Na by 50.5MeV protons on aluminium was 60.9 $\mu\text{Ci}/\mu\text{Ah}$. The separation of ^{22}Na was carried out by ion exchange, precipitation and diffusion. It was found that ion exchange column operation using AG50W-X4 resin was the most efficient method among them.