

RADIOXENON PRODUCTION CROSS SECTIONS FROM CESIUM

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Due to interest in the production of certain radioxenon isotopes for their use in nuclear medicine, the cross sections for cesium have been measured for protons with energies from 65 to 155 MeV. The experiment was done by preparing gas-tight, sealed packets of CsNO_3 of approximately 0.2 gm/cm^2 thickness. The packets were stacked in two groups of five and seven packets with intervening energy degraders and irradiated with incident energies of protons at 95 MeV and at 152 MeV. Sufficient time elapsed for barium and cesium isotopes to decay into radioxenon before the packets were counted with a Ge(Li) detector. The quality of the gas-tight seal was checked by a measurement of the half-life of ^{127}Xe . The results are presented in the figure together with the prediction of the ALICE+HYBRID statistical code for ^{123}Xe directly produced by $(p, \alpha 7n)$ and $(p, 2p 9n)$ reactions. The agreement is excellent for proton energies where the $(p, 2p 9n)$ reaction is dominant. The predicted alpha particle process has too low a threshold by 10 MeV and a cross section maximum nearly 70 percent larger than the observed result.

The results indicate that for ^{127}Xe , cesium is an excellent target in that it has a high yield, and liquid metallic cesium has the advantages of showing no radiation damage and being very convenient for removal of the beam heating by vapor transport. For ^{123}Xe , the production cross section for a cesium target

is much smaller than that from an iodine target. In addition, the ratio of $^{125}\text{Xe}/^{123}\text{Xe}$ is higher and therefore less favorable for the cesium target.

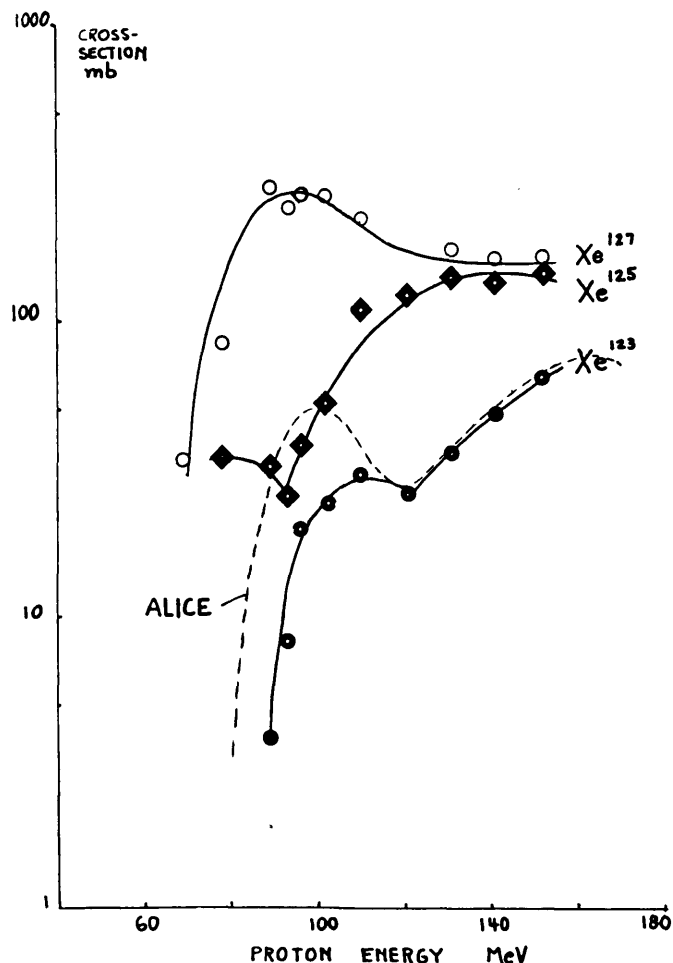


Figure 1. Total cross sections for production of Xe isotopes in proton bombardment of a cesium target. The curves are a guide to the eye. A statistical model calculation for ^{123}Xe production is indicated by the dashed line.